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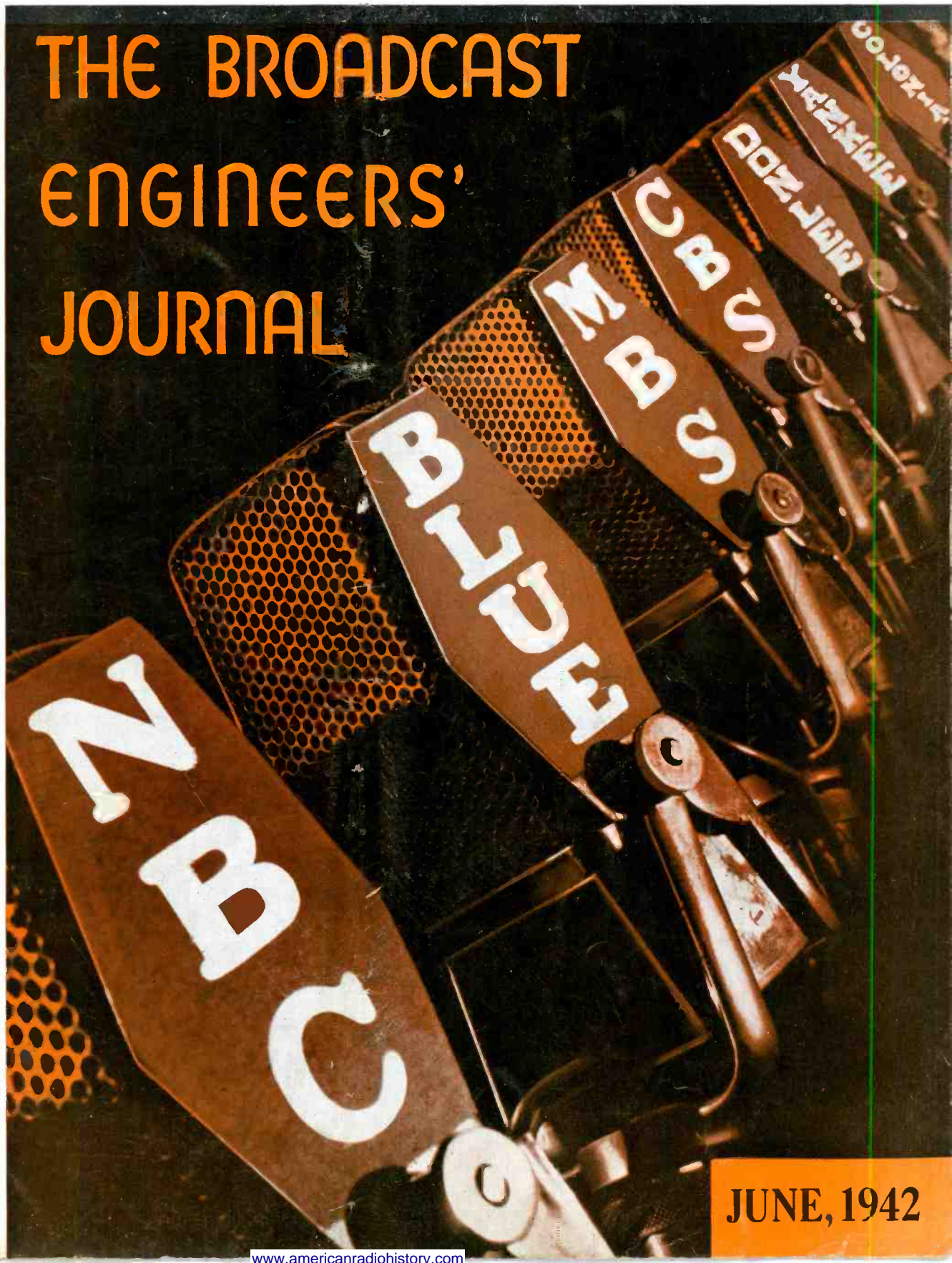
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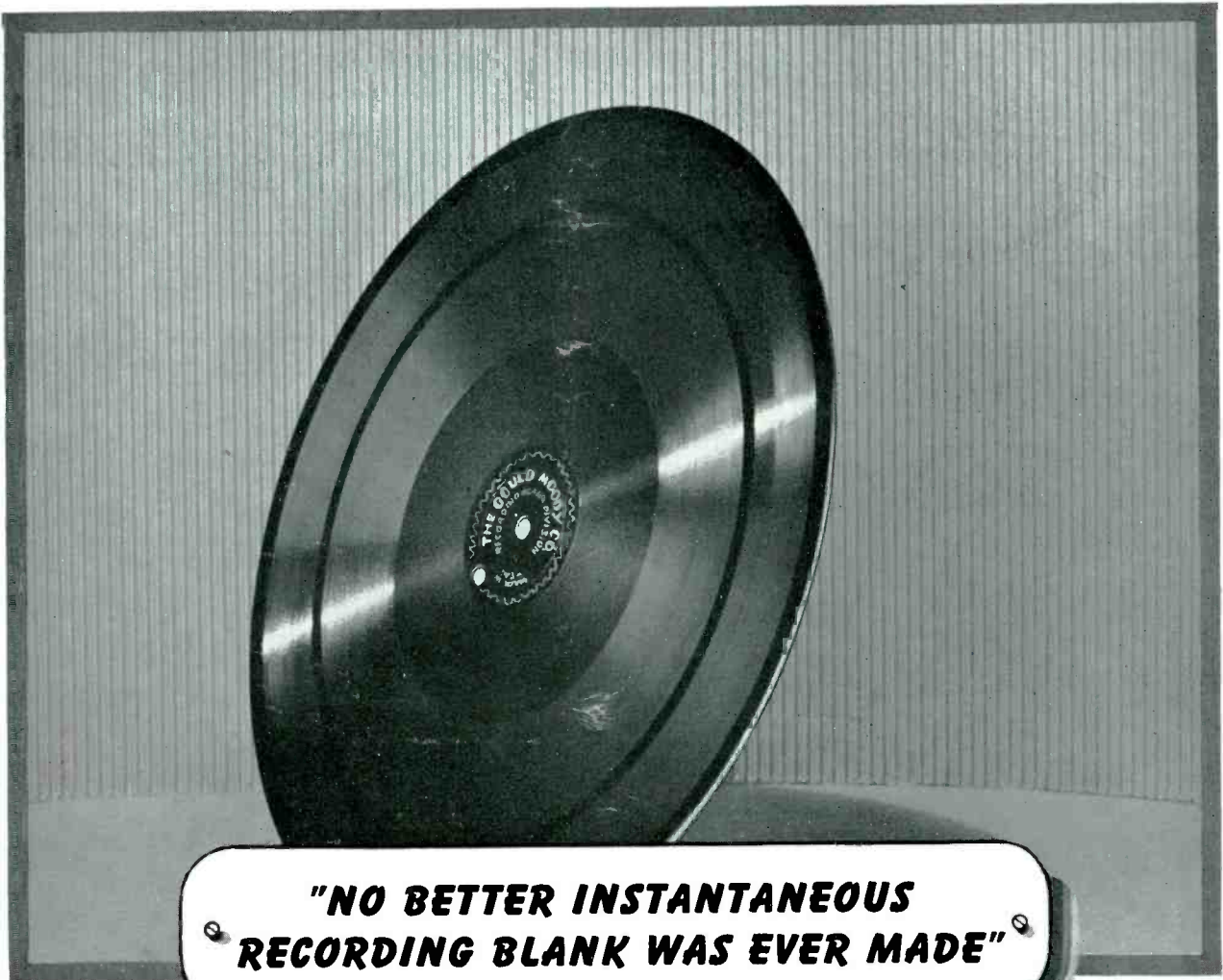
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THE BROADCAST ENGINEERS' JOURNAL



JUNE, 1942



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THE BROADCAST ENGINEERS' JOURNAL

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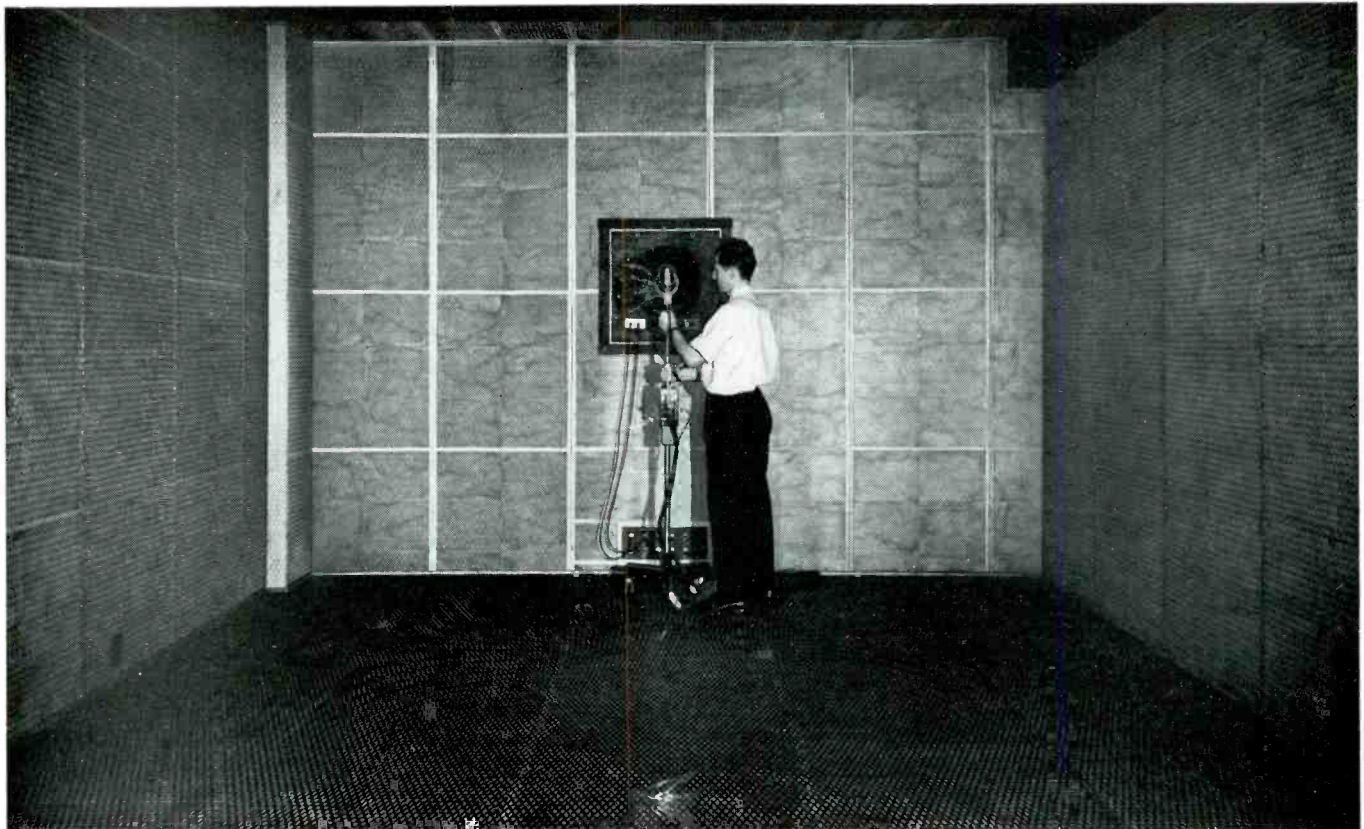
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Inventions, Patents, and Victory

By James D. Cunningham

Vice-Chairman, Committee on Patents and Research, National Association of Manufacturers

(This is the second in our series on the patent situation, and since the entire radio industry is dependent upon an honest patent system, it is our pleasure to present Mr. Cunningham's address, originally delivered over the Columbia Broadcasting System, May 14, 1942.)

AMERICA looks to its inventors for new weapons to help win the war—secret bombsights, new explosives, and devices to detect submarines and enemy planes. And we depend upon inventions used by industry to speed the production of war materials. This country has been built on patented inventions, and now inventions will help preserve our country, and our way of life.

This is a war of machines—of production methods—of industries; and America's strength lies in its inventions. Inventions give us not only the best weapons in the world, but also the best production methods. It is the American system of mass production, based on patented inventions, that will defeat Hitler and the Japs.

Throughout the country, thousands of scientists and inventors diligently search for and perfect new products and new processes for war and for production of the necessities of war. Their discoveries are among the most closely guarded military secrets. Armed guards pace, vigilantly, before every laboratory in which war research is being done. The research workers themselves are so secretive about their endeavors that they do not even discuss them with their colleagues or at home, for fear that vital information might become public and get into the hands of fifth columnists.

America has had its great generals and admirals, like Washington, Sam Houston, Grant, Lee, Pershing, Admiral Dewey, and MacArthur, but equally important have been its inventors and industrial geniuses—heroes like Edison, Bell, and Eli Whitney. The country has become great through science and invention, and the production of goods for a high standard of living. Now we turn that same ingenuity to war, to save our civilization. After the war we will need this spirit

of invention to give us jobs, incomes, and new goods and services to help stave off a postwar depression.

Patents and the War Effort

We are all keenly interested in new ideas—in progress, based on new inventions and scientific discoveries. Now we are interested in new weapons. But most of us think very little about patents and their relation to inventions and progress. Just what connection do patents have with our present war efforts?

To begin with, this country could not produce war materials at today's phenomenal rate, if the brain-children of American inventors had not been protected by the American Patent System. Our patent system has done three important things:

- (1) It has encouraged inventors to invent new products and processes.
- (2) It has encouraged manufacturers to manufacture new and better products.
- (3) It has encouraged investors to invest money in the development of new industries, based on invention.

We owe much of our industrial supremacy today to the Patent System.

We have seen a great deal in the newspapers recently about charges that patents are holding up war production. Legislation is now pending in the United States Senate, to give the government power to take over rights under patents which are vital to the war effort. That is all right.

American industry has long insisted that every invention which can contribute to victory must be fully utilized, and the National Association of Manufacturers favors any legislation which is necessary to win the war. The legislation proposed by Congress, however, is not limited to the war emergency. It should be.

So far as patents are concerned, every invention in the country is now available for full use in the war effort, and I do not know of a single instance of any war production being held up because of a patent.

During the last war the patent statutes were changed so that the United States government acquired, and has retained, the power to have *anyone* make *anything* for the government, without considering whether any patents may apply. This is true whether the country is at war or at peace.

In the view of authorities on patent law it would have been possible under existing laws for the government to have synthetic rubber, or any other product now in the headlines, produced for it in any quantities it desired, at any time.

The shortage of synthetic rubber is not caused by patents.

Why America Is Short of Synthetic Rubber

Neither the government nor industry foresaw Pearl Harbor and the sudden loss of our sources of natural rubber in the Pacific. When plenty of natural rubber was easily available, everyone in industry and government considered it economically wasteful to build huge plants costing millions of dollars to produce synthetic rubber which would have sold at a higher price than the natural product. This case is typical of many shortages which have arisen suddenly as a result of the war.

Instead of blaming patents for our shortage of synthetic rubber, we can thank the present Patent System that the necessary research has been done, so that we know how to produce synthetic rubber now. Anyone familiar with the tremendous amount of research on synthetic rubber in America, in recent years, will tell you that the costly work would not have been done

except for patent protection. No company could have invested the millions of dollars necessary to hire scientists and to buy expensive equipment to develop this product, if its discoveries could be pirated—stolen—by anyone after they had been developed. Those who risked their money in research had to have some hope of reward—a chance to earn a return on their investment, or to get their investment back.

Patent Is Gift from Inventor to Public

We must not overlook the fact that a patent is a special kind of property. It is a title to an invention. It is a reward for the creation of something that never existed before. Inventions may lie unborn in the minds of inventors. They might never be brought into existence, nor made available to the public. The framers of our constitution wisely decided to offer a reward—an incentive—to development of these unborn concepts for the good of mankind.

Our patent laws provide such reward—a seventeen-year monopoly, during which the inventor may specify the terms and conditions under which the product of his brain may be utilized. In return, he makes public, through the Patent Office in Washington, the details of his invention, as a contribution to human knowledge.

Let us not confuse inventions with tangible, physical property, like land, coal, iron ore, and forests, which existed before man appeared on the earth. Anyone who conceives an invention, and makes it public through a patent, makes available to mankind something which never existed before.

Great as America's achievements in research are, many important inventions and discoveries come from other countries. Science knows no geographical boundaries, and during peacetime scientific knowledge flows, as it should, from country to country by way of technical publications, international conventions of scientists, and interchange of patents. German inventors and scientists, for instance, developed optical instruments, chemical formulas of many kinds, and other ideas which this country obtained through patent agreements. Without such agreements we

should have been deprived of the German developments.

All such exchange, of course, ceased when we went to war with Germany. The President has taken over all enemy patents in this country—which is right and which everyone applauds.

There are some who feel that the patent system is out of date, and that it ought to be completely overhauled. Bills for that purpose are now pending in Congress. I believe that the basic principles of the Patent System are sound, just like the basic principles of *democracy*, which are much older.

Means of Improving Patent System

The patent system is a creation of man. It is not perfect. Like all other institutions it can be improved, but there are wide differences of opinion as to what is improvement. The President recently appointed a Patent Planning Commission to study the Patent System and recommend revisions to conform to changing conditions. That commission consists of extremely competent, well-qualified patent authorities. It should have an opportunity to complete its study and report its findings before any legislation is passed. That Commission is in a much better position to recommend legislation than is Congress.

With this country involved in world chaos, and the extreme necessity that our economic system function smoothly both now and after order is restored, no effort should be spared to perfect the system which above all is so vital for the encouragement of the "progress of science and useful arts."

Manufacturers, inventors, and research scientists who deal with patents and inventions believe that patent protection should be strengthened rather than weakened. Enactment of the legislation now pending would, to a large extent, emasculate the patent system and destroy property right in invention. In my opinion, and that of many others, it would remove much of the incentive for invention and industrial research. Consequently, issues are at stake which are vital to the destiny of our nation. Every American, and particularly every patent holder, has a responsibility to

safeguard this country's incentive to invention and research.

Examples of Benefits from Patents

Up in New England is a young man who found a method of producing glass that would polarize light—take the glare out of it. He made his invention as a student in a university laboratory. He has built a business of great social benefit to our country, because the patent system protected that invention so that he could get production under way.

In the Middle West is a man who spent months, during the depression, experimenting with a glue by which rubber half-soles could be stuck on shoes. He got a patent, and by virtue of it built a business which has given millions of poor people a good, economical method of repairing their shoes and keeping their feet dry.

On the West Coast is Lee de Forest, who sold his patent to a big telephone company for its use, while he himself is licensed under the patent to make diathermy machines for treatment of pain. The arrangement is to the benefit of both, and of the country generally. Such a license agreement would be illegal under the laws now proposed.

In the South is the great Negro scientist George Washington Carver, who holds scores of patents on industrial uses for peanuts and other Southern farm crops.

We should encourage men and developments like these. The legislation now pending would have exactly the opposite effect. It would be most damaging to small inventors and manufacturers. Patent protection is not so vital to a big company as to a small one. It is most important to the man who sets out to build a business on a new idea, and we need more such men.

Invention and Research Must Be Encouraged

Patent protection will be more important after this war than ever before. We've got to have new jobs, new industries, new goods and services. The way to get them is to encourage, not discourage, inventions and research, and the development of new enterprises based on new ideas.

In my own company, for instance,

which is a medium-sized business, we are expending in research more than at any previous time in our history. We are doing this because we believe that in the postwar period our normal business, which deals with capital goods, will be severely curtailed and that we must look to other products so that we shall continue to have jobs for our employees and sources of income for our company.

Naturally, the incentive for such expenditures comes from patent protection. Why should we spend money, time, and effort to develop new products if our competitors would be permitted to manufacture them?

Summary

To sum up:

Victory for America will depend, to a large extent, upon American inventions.

Patents have provided a stimulus for inventions, and we should not have the ideas or the industrial system we have if it were not for patent protection.

American industry insists that every invention which can contribute to victory must be fully utilized, regardless of patents on it.

The government has long had power to have anything produced for it, by anyone, at any time, regardless of patents; and, so far as patents are concerned, synthetic rubber, carboly, or any other products could have been produced in peace or war in any desired quantity for the government.

The patent legislation now pending in the United States Senate would reduce the incentive to invention and research, and to development of new industries from new ideas. It would make it easier, instead of more difficult, for an inventor's idea to be pirated—stolen.

Today we can see the frontiers of the postwar period only through the smoke of war, but we may be sure that Yankee ingenuity, which has played such an important role in this country's development, will be equally important in the future. We must encourage it. From our inventors and our scientists, stimulated and protected by the Patent System, will come the progress and prosperity of tomorrow.

The Broadcast Engineers' **5**
Journal for June, 1942



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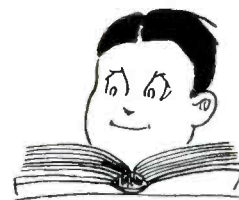
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TECHNICAL PRESS REVIEW



By Ed. Stolzenberger

A digest of leading technical articles in the current contemporary press.

[In these busy times few engineers can spare the time required to read all the current technical literature. It will be the purpose of this regular feature to provide an index of current technical articles on radio broadcasting and related subjects.—Ed.]

Electronics for May, 1942

The Fluxgraph

By Paul G. Weiller

An automatic machine for plotting the magnetic fields of coils, and for the study of deviations from standard caused by winding or core irregularities.

FM Carrier Current Telephony

By Braulio Dueno

Description of a simple 70 kc transmitter with narrow band reactance tube modulation and a companion receiver for communication over power company high lines.

High Frequency Sweep Generator

By E. J. H. Bussard and T. J. Michel

Description of an instrument of aid in alignment, in production, of FM receivers using over-coupled, double tuned circuits.

Electronic Phase-Angle Meter

By Edward L. Gimzton

A simple circuit for the measurement of phase angle between two sine waves.

Communications for May, 1942

A 100 Cycle Frequency Standard

By P. M. Honnell and L. W. Dickerson

A temperature controlled 100 cycle tuning fork is amplified to provide a 100 cycle standard and to operate a 100 cycle clock for checking purposes. Auxiliary circuits provide 100 cycle harmonic output and a locked 1,000 cycle multi-vibrator output.

Bell Laboratories Record for May, 1942

Applications of Junction Line Filters

By F. A. Hinshaw

By the use of the junction line filter, carrier loading is avoided; this paper also discusses other frequency problems.

The Junction Line Filter

By J. O. Israel

Mechanical and electrical specs of the filter are discussed, together with impedance-frequency, and loss-frequency characteristics.

Proceedings of the I.R.E. for May, 1942

Experimental Polyphase Broadcasting

By Paul Loyet

An experimental installation of polyphase broadcasting is described using 1 KW carrier power on a frequency of 1000 KC. Fidelity measurements made of the modulated field intensity radiated from this installation indicate that comparable performance to other present-day amplitude-modulated broadcast transmitting equipment can be obtained readily. It is demonstrated that transmitting equipment of this type need only have a peak power capability of the output tubes approximately 1½ times carrier power.

Horizontal-Polar-Pattern Tracer for Directional Broadcast Antennas

By F. Alton Everest and Wilson S. Pritchett

Making space-pattern calculations for the three-element array is very much more difficult than for the more common two-element array. Many problems of broadcast coverage or interference have their solution only in the non-symmetrical patterns of three-element directional antennas. This paper includes the derivations of the equations for the relative field strength in a horizontal plane of such an array. A mechanical tracer is described which automatically plots the horizontal pattern for two or three-element arrays once the adjustments of tower configuration and current magnitudes and phasings are made. Patterns traced by this machine are shown to have an accuracy usually within the width of the line of the recording pen. Its simplicity and rapidity of operation adapt it particularly to preliminary exploration to find a pattern which meets certain coverage or interference problems.

A Mechanical Calculator for Directional Antenna Patterns

By William G. Hutton and R. Morris Pierce

In the design of a directional array, the engineer is confronted with the solution of a problem that is laborious because of the many parameters to be considered. The variables that enter the problem are spacing, phasing, radiated field, and orientation for each antenna involved. In particular, for an array of three elements, there are nine parameters when one of the elements is considered to be at the origin. This paper describes a mechanical calculator that eliminates a major part of the tedious work involved in the calculation

(Continued on Page Fourteen)

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V. J. Duke

N.A.B.E.T. Presents R. Beardsley Graham

R. Beardsley Graham is a native of California, was graduated from Berkeley High in 1931, and received his B.S. in Chemistry from the University of California in May, 1935.

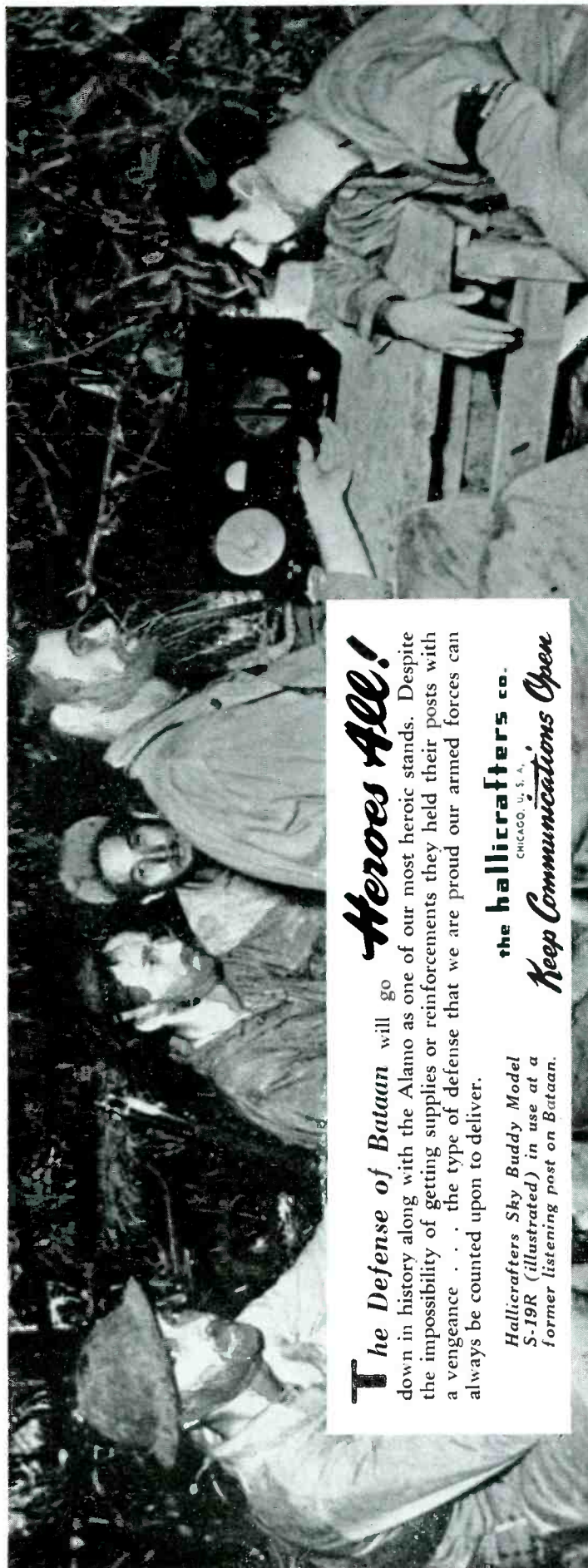
His early amateur radio activity indicated a natural aptitude for things electronic, and after college he became an instructor at the Edison Electrical Schools. In 1936 he joined the Techna Corporation as Chemical Engineer, where he designed and installed a chemical lab in conjunction with their electronic laboratory, which included work with broadcast, theatre, PA, disc and film recording.



R. Beardsley Graham

Graham next joined the Pacific Tel & Tel Company where he worked with panel automatic switching and attended U C on part time for graduate work. He left the P. T. & T. Co. to return to U C full time for the year 1938, and became a Television Engineer for RCA at the San Francisco Exhibition; a short time later he became engineer-in-charge, which permitted more part time work at U C. Early in 1940, he joined the NBC Engineering Staff at Hollywood, California, as Television Engineer, and in July of 1941 he was transferred to Radio City, New York—the hub of all Television activity, and more recently assigned to the Development Engineering Group.

Through a genuine desire to make a more positive contribution to the prosecution of the war, Graham left NBC as of June 1, 1942, to engage in essential research at the Massachusetts Institute of Technology. NABET, of course, regrets this loss, and hopes it is for the duration only. ^{533, mit.}



The Defense of Bataan will go *Heroes All!*
down in history along with the Alamo as one of our most heroic stands. Despite the impossibility of getting supplies or reinforcements they held their posts with a vengeance . . . the type of defense that we are proud our armed forces can always be counted upon to deliver.

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Keep Communications Open

KFI—KECA Los Angeles News

By H. M. McDonald

FLOYD JONES, Studio Engineer at KFI-KECA for the past ten years, and Harold Christensen, Transmitter Engineer at KFI for eleven years, have been granted leaves of absence and joined the exodus of radio men from Los Angeles to Massachusetts Institute of Technology at Cambridge, where they will assist in research and developmental work. The group from Hollywood includes two other former KFI-KECA men, both well known in radio and sound here, Hal Cooper of General Service Studios (ERPI), and Harry Lindgren of Paramount Pictures.

Albert Laurent, at KFI Transmitter only a few weeks, but nearby with Globe Wireless at Cypress for a long time, has been called into the Army. He's a nice fellow to work with and we wish him a lot of luck. It is expected that he'll be on special detached duty soon and we'll see him now and then. (Incidentally, we just heard that the Army has today taken over all Globe stations.)

To date KFI-KECA has experienced no difficulty in obtaining experienced radio men to replace those who have left. It's surprising how many men with tickets (with service on them, too) are around, teaching in schools, servicing juke boxes, selling receivers, railroading, operating P.A. systems, recording, sound men in pix studios, etc.

The latest additions to our staff are Ernest Sams and Charley Lampkin. Sams has been in commercial radio since 1931 and worked at three other stations in Los Angeles. Lampkin was in the Signal Corps for three years, with telephone companies for nine years, and more recently has been free-lancing, handling sound effects, and doing some mixing, for various people.

Rumor has it that Consolidated Aircraft at San Diego is recruiting a staff for their new radio laboratory. A building to house it is now under construction and will be completed within thirty days. Unconfirmed reports as to salary, for radio men of average ability, vary widely; some say \$300 to \$350.

We extend a cordial welcome to the new members of NABET at KFSD, San Diego. We trust there will be notes in the Journal from them each month. (Me, too!—Ed.)

How about a few words from the brethren at WOW, Omaha? In our boomer days our record sojourn was in Omaha, a year and a half. (No, not in the clink.) Had a lot of good times there while putting ten on a line for the W.U.

Bryan Cole, in the Army Reserve for a long time, and called from KFI-KECA Studios more than a year ago, is



now a captain. He is with the Signal Corps at Ft. Sill, Okla., an instructor in the Field Artillery, we believe.

The world will note but Lloyd Jones will long remember the going-away party thrown in his honor at John Hidy's home out in the Valley. In keeping with Lloyd's new research job the evening was devoted to various experiments. One discovery made was that a very powerful torpedo could be made by combining equal parts of seven different kinds of anything 90 proof. Another was that the giant size (12 oz.) could be made in the same length of time as the smaller size, and that it was so powerful that it immobilized any object with which it came in contact! In honor of Jones it was named "Down Under."

During the "radio silence" periods, nightly here at present, many city dwellers with jalopy receivers are experiencing the thrill (?) of "DX" for the first time. At other times signals of distant stations are "swarmed under" in the barrage laid down by the 18 stations within a 20-mile radius of the center of Los Angeles. Reports indicate that KOA, Denver, and KOB, Albuquerque, are heard best. KOA is an NBC outlet and KOB releases the Blue.

Telecasts from W6XAO, the only television station operating in Los Angeles at present, have been curtailed to one and a half hours, alternate Saturday nights, only. Very little live material is presented. Program is made up mostly of films depicting defense work of various types.

Men here who have read much material on FM say that Raymond Guy's article "The Why and How of Frequency Modulation" in the September issue of the Journal, is by far the best they've seen anywhere.

"Everything happens for the best," quotes Ray Moore, Maintenance Supervisor at KFI-KECA Studios, when he hears the "radio silence" signal, which gives him an opportunity to service equipment that has been in use almost constantly for the past six months due to 24-hour operation of KFI.

Dave Kennedy and Rex Bettis, though working together here for the past two years, have just discovered that while in the Navy during World War I, they were

(Continued on Page Nineteen)

Amplifier Economy

By Whitney M. Baston, New York Transmission Engineer, NBC
and

E. Stolzenberger, NBC Engineering Department

THE NBC plant at Radio City, New York, was originally equipped with a number of different types of DC operated RCA amplifiers. One of these types, the 4162, is used for several different services. The amplifier has a 20,000 ohm bridging input, and a split winding output transformer which, when connected in series, has a rated output of 500 ohms. The maximum single frequency output level is plus 28 vu. The absolute noise level is minus 75 vu. The frequency response of the amplifier as originally received had less than 1.5 db deviation from the 1000 cycle reading from 20 to 17,000 cycles.

One of the uses of the 4162 amplifier was to supply a program feed from each broadcast studio to more than 120 dial selector switches in an Automatic Electric 100 line PAX system used for remote monitoring of up to 100 programs. In this particular capacity the two split windings of the output transformer were connected in parallel to provide a 125 ohm output impedance. This 125 ohm output circuit was then terminated at the amplifier with a 125 ohm resistor, since all the monitoring positions fed from the 120 dial switches were bridging. The low output impedance was

used to reduce to a minimum the capacity loading on the amplifier output caused by the several monitoring lines. The voltage gain of the amplifiers in this service was 0 db.

Several of the 4162 type amplifiers were also used to feed the NBC Radio Recording Room audition programs from the regular broadcast studios. In this capacity it was necessary for the Master Control Room to make one patch from the broadcast studio to the bridging input of the 4162. The amplifier output was normalled to the Recording Room. This was a satisfactory arrangement for a few audition recordings, but with the rapid growth of radio recording it was found that the Master Control Room was almost continually setting up or taking down one of these audition feeds. As the number of recordings increased the danger of a Master Control error in patching or a misunderstanding of instructions passed over the phone likewise increased. A point was finally reached where it was no longer practical to use such a system, and a change was made to increase the efficiency of this operation.

There were a number of changes that could be made.

(Continued on Page Fourteen)

If you have not been using or have not yet tried Allied's New Glass Base Discs, a trial will convince you of their merits and superior quality — at no premium in the cost to you. We invite you to try this disc — that is how we obtain new customers. We feel certain that you will

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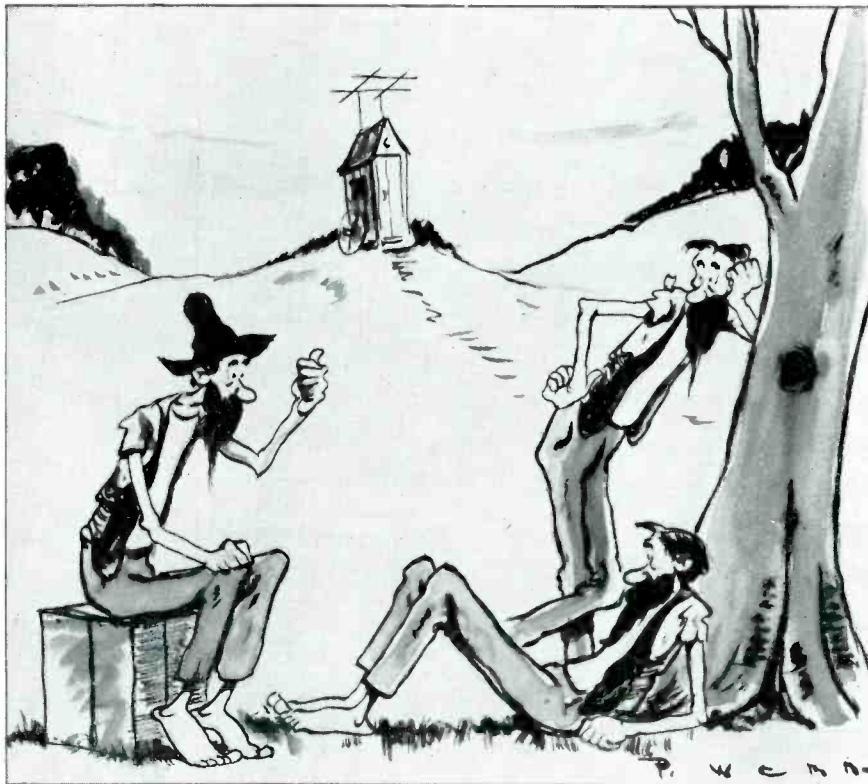


Television Programming Gives Way to War Effort



The NBC Television Staff rejoiced at the good news that the FCC had reduced the minimum mandatory program hours from fifteen to four hours per week. In effect, this meant a cessation of live-talent studio programs and mobile unit pickups of wrestling, etc., which in normal times would have been much cause for gloom. However, we are in a war, and the sooner it is won, the sooner we can get back to normal living habits. Shown in the above picture are, left to right, standing: Howard Gronberg, Stan Peck, Bill, Gary Simpson, Marshall P. Wilder, H. J. Mallen, Walter Clark, Ed Nathan, Stoddard Dentz, Ed Hoffmeister, Dorm Albert, Bert Nazimento, Berrian, Walt O'Hara, and Harold See — Senior Television Supervisor. *Kneeling*: Tom Riley, J. Russell DeBaun, Art Hungerford, Hank Folkerts, Ed Cullen, Geo. Neuman, Frank Burns, and Charlie Townsend. *Sitting*: Ray Monfort — Television Maintenance Supervisor, Harry, Rah Davis, Ed Stolzenberger sporting vacation whiskers, Joe Conn, and Al Protzman. Also present but not shown in the picture were Al Jackson, R. Beardsley Graham, and Warren Wade.

“Shecks . . . Gran’pappy don’t even kem out fer meals anymore since he got that new radio an’ television set out thar”



(Drawn especially for THE BROADCAST ENGINEERS' JOURNAL by Paul Webb and reproduced with his permission)

N.A.B.E.T. Engineers in the War Effort

Four former NBC Engineers, and members of N.A.B.E.T., now with the U. S. Army Signal Corps —held a “reunion” recently at Fort Monmouth, New Jersey. Shown in the photo are: Major F. C. Shidel, Capt. P. H. Clark, and Lt. T. E. Gootee (all of Chicago), and Sgt. Phil Falcone (of New York). These N.A.B.E.T. Engineers, along with dozens of others, are serving their country well, and we are proud.



(Photo by U. S. Army Signal Corps.)

Don Castle Honored By Fellow Engineers

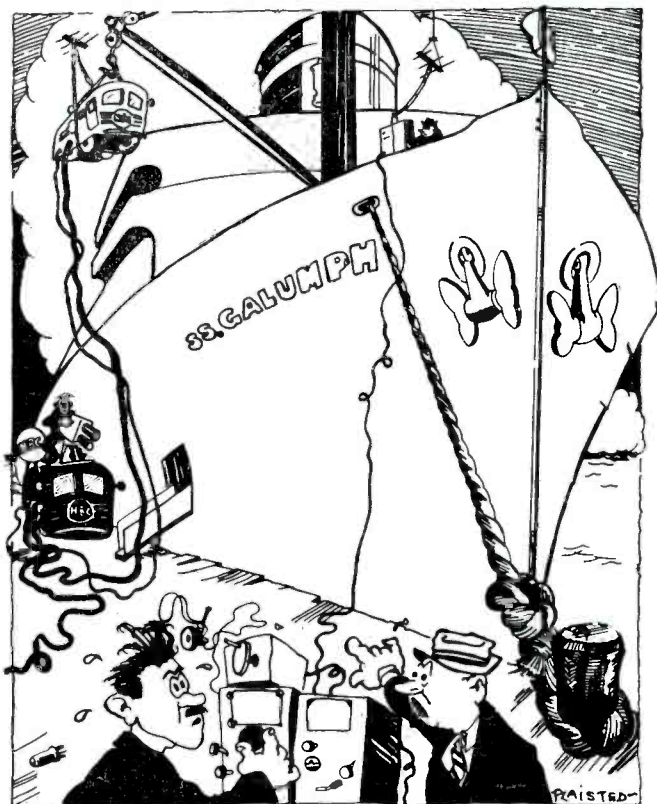
Twenty-five broadcast and television engineers recently gathered at the Hotel Abbey, New York, and tendered an impromptu dinner to Don H. Castle as a fitting climax to his bachelor days. His bride was the charming Mary Lou Irvin, and at this writing the newlyweds are honeymooning in Georgia.

Attending the dinner were Messrs. Hastings, Berglund, Saunders, Wilder, Don Castle, Compton, Duke, Monfort,



The clean-cut gentleman partaking of liquid refreshment is Don H. Castle

Somers, Shelby, Walsh, Bob Clark, Nixon, Christian, Wankel, Rah Davis, Stolzenberger, DeBaun, Nolan, Goodale, Looney, Seibert, Jim Wood, and our photog, Joe Conn.



“Chiefie says wash it up, the show’s been cancelled — we’ve got bigger things to do for the duration”

Washington, D. C., News

By Bill Chew

CLYDE M. CLARK, SE., who has been with the company about ten years, has been recalled to the Navy, from which branch of the service he retired on sixteen years service about 1932. He retired as chief electrician, radio and is now in the same capacity. It was a real pleasure to have him present at our last meeting at which time the boys presented him with a swell cocktail set.

In line with the same topic, I learned only this morning that Walter Godwin, S.E., has received a commission as lieutenant senior grade in the Navy and the week of June 8 is his last week with the company. He has waited a long time to get this news and seems to be happy about the whole thing. With these two men and any who may follow them into the service go our best wishes.

Well, vacation time is well under way and I am sure each is looking forward to his even though "circulation," due to gas rationing, will be restricted. Clarence A. Allen, maintenance, started his vacation by going to his farm in Virginia, about twenty-five or thirty miles out. The tough part of it is the fact he had been away about two days when

his appendix acted up. He was hurried back to Washington to the hospital and was operated on at 3 A. M. What a swell way to spend a vacation. Al says he couldn't have gone anywhere anyhow, due to lack of gas. At this writing I am glad to be able to say that he is doing fine and should be back on duty before very long.

Ralph Hamill, Relief Supv., also vacationing, details unknown. Having received no news items from our transmitters, they are not represented in this issue. Guess I'll have to get behind them and do some persuading!

New members are Gordon Henry and Harold Thomassen, and soon Albert Allen who came to us from another station.

On May 4, our regular monthly chapter meeting was held at the home of Barton E. Stahl. Election of officers was held, and S. E. Newman, who for years has done an excellent job as secretary-treasurer, was elected chairman. Mr. Newman will make a good chairman, competent and capable. The new chairman appointed Clarence A. Allen, S.E., as his secretary-treasurer, and we feel he, too, will do a good job. Incidentally, Newman is from WRC's transmitter, which makes the first time the chair has been occupied by a transmitter man since the position was held by Cliff Rothery, now in San Francisco.

More next month, until then, 73 from Washington.

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New Shure Booklet on Super-Cardioid Dynamic Broadcast Microphone

An attractive 8-page book on the Super-Cardioid Microphone for Broadcast and Recording Engineers has just been issued by Shure Brothers, Chicago.

This new book tells what Super-Cardioid means, how it works, and what it does for sound pick-up. It also gives complete specifications, technical data, diagrams and curves on the new Series "556" Super-Cardioid Dynamic Microphones for Studio and Remote Broadcasting, Recording, and high-quality Public Address.

A copy may be obtained by writing on your letterhead to Shure Brothers, 225 West Huron Street, Chicago, Illinois.

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What Can I Do? By Con Conrad

WHAT can I do?" That appears to be a question that every good American is asking himself today. Each and everyone of us wants to do something to help in the war effort. The broadcast engineer and radio engineer of today will play an ever-increasing role in the war effort; his services are extremely valuable. It is with that in mind that we present the following factual analysis upon which every broadcast engineer can evaluate what his place will be in the war effort.

The first point we must all keep foremost in our minds is this,—we are not in such a vital industry that we are going to be exempt. At the recent N.A.B. convention, the Director of Selective Service gave no hint and no indication that there could ever be a blanket exemption for the engineers in the broadcast field. We must face that fact, and, too, we must realize that the longer the war goes the more our services will be required in the war effort.

The next point is an indication of what might be done by us all to help. During the past few years the hours of work have been reduced so that our work week now allows considerable free time. You can turn that free time into useful service. How? You can organize among the broadcast engineers of your own station and other stations to conduct free radio classes for the public. You can induce persons who would not normally be available for military duty to take your course. You can produce a large number of radio people equipped for the lesser radio jobs, in the war effort. If these people are not produced you may be forced, in a short period of time, to take some of these lesser jobs at greatly reduced income, thus depriving the government of your services to jobs that require higher training. In the larger cities these classes have been organized and are operated with government money; however, they could be supplemented with individual effort, and you could really feel you were doing your part.

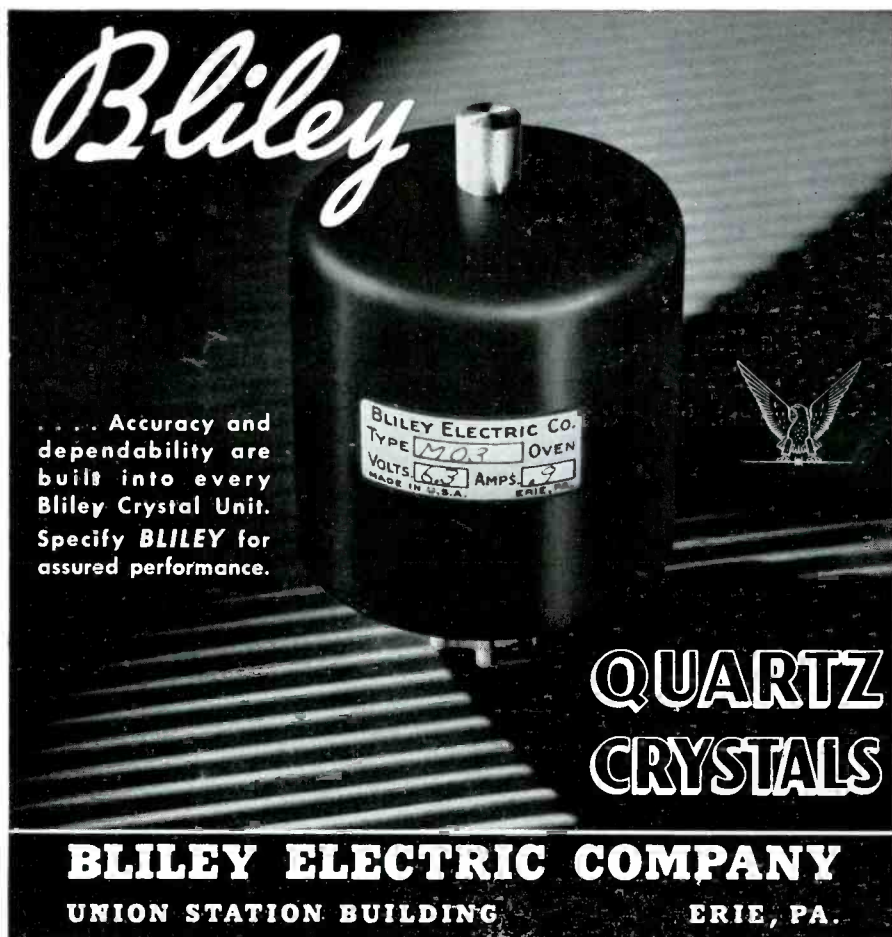
Teaching arrangements could be scheduled between the many radio men in your town, which would reduce the additional strain on each one. You could conduct code classes, with only elementary radio principles, as many persons with that type of training are needed.

The next point is this. You hear from every source that you should help the war effort by buying bonds. Although buying bonds does help the war effort, it actually helps you more. It really is a selfish way to help, as you are just investing a part of your income for future uses. It is the approved way to help financially. Your income as a broadcast man has increased during the past few years. You can and should invest at least 10 per cent of your income in bonds. That may sound like a lot; you will do it sooner or later,

so why not now? Start today, have 10 per cent taken from your pay and invested in bonds. I'll wager that in two months you won't miss the amount and you will go on living as before. Think the entire matter over; if you follow along the paths outlined you are buying the best type of job insurance that can be had today.

Lord Mountings Beat Vibration

The application of Bonded Rubber Vertical Snubbing Mountings for vibration control and shock absorption in electronic equipment is described in a new 20-page Bulletin 103 published by Lord Manufacturing Company, Erie, Pa. In addition to describing the complete line of Lord Vertical Snubbing Mountings, this Bulletin contains basic engineering information. Copies of this Bulletin 103 may be secured by writing Lord Manufacturing Company, Erie, Pennsylvania.



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Amplifier Economy

(Continued from Page Nine)

A separate amplifier could be purchased for every broadcast studio; the output of the separate amplifier normalised to feed the recording room. This arrangement would be very satisfactory from an operating standpoint. It would, however, mean a very high first cost, additional mounting space, and increased maintenance.

It is very definitely against the policy of the NBC to provide a direct feed from any studio without adequate isolation protection. A direct feed to Radio Recording would introduce the possibility of causing cross-talk, wrong program, or low level if a wrong patch were made. Regular broadcast studio programs must be given the best possible protection at all times.

Several special selector switches could have been purchased having as many separate points as there were broadcast studios. The output of these switches could then be connected to feed the 4162 type amplifier that in turn fed the recording room. Upon investigation this arrangement was found to require a large amount of expensive new cable in addition to the purchase of the very special selector switches. A relay system to accomplish the same purpose as the selector switches was found to have the same disadvantages.

The final solution to the problem was found by utilizing the split windings of the output transformer of the 4162 amplifier used to feed the House Monitoring selector system.

The 125 ohm output of the office monitoring amplifier could not be used to feed the recording room directly due to changes in level caused by capacity loading and the ever present danger of a defective switch or monitoring speaker placing a short circuit on the output of the amplifier. Therefore, each half of the amplifier output transformer was connected to a "U" type pad. One pad was connected to feed the dial selector system. The other pad was connected to feed the Radio Recording Room directly.

The input impedance to each pad was fixed at 250 ohms so that the two pads would match the output impedance of the transformer winding. The output impedance of the pad was made as low as was permitted by the maximum amount of permissible voltage loss of the pad. The permissible loss in the pad was determined from the maximum output level that the amplifier was capable of delivering without distortion. The final pad connected to each half of the transformer had 9.5 db of voltage loss. The measured output impedance of each pad when connected to the transformer winding was 68 ohms. The two pads were mounted internally in the amplifier. The extra output was brought out on two amplifier tally light terminals which had not been used. The conversion required no amplifier jack layout changes and the only extra cable required was one direct run from each amplifier to the recording room jack field. The initial cost of this method was less than half that of any of the others and there is no additional maintenance required.

At the time the pads were installed a vernier gain control was installed in the amplifier second stage grid circuit. This permits a very precise gain adjustment. A high and low frequency compensating circuit was also included in the amplifier. The frequency response with this arrangement can now be maintained flat within ± 0.3 db of the 1000 cycle reading from 20 to 17,000 cycles. Tests show that there is 12.2 db of isolation between one pad output and the input to the other. A short circuit on one pad reduces the output level on the other by only 0.7 db. These modified amplifiers have been in continuous service for some time and have given absolutely reliable service.

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TECHNICAL PRESS REVIEW

(Continued from Page Six)

of the horizontal pattern of a two- or three-element array. The calculator is of equal use in the determination of the vertical pattern when the antenna heights are equal. An analysis is made to show that the results given by the calculator are solutions to the standard equation. The accuracy of the results are also considered.

The Inclined Rhombic Antenna

By Charles W. Harrison, Jr.

In this paper, the use of an inclined rhombic antenna as a means for reducing the effect of fading is discussed. Equations are given for determining the angle at which a rhombic antenna should be inclined to obtain a desired response pattern at various elevation angles in the vertical plane containing the major axis.

WE REALLY take great pleasure in presenting Captain C. S. Bidlack to the readers of The Broadcast Engineers' Journal. Capt. Bidlack was with us here at WTAM until called to active duty in the Army on March 31, 1941.

When attempting to write something complementary about a friend, one must approach the subject like an antelope crossing a gulch on tiptoes. Otherwise the slightest hint as to

the age of the one you are writing about may cause a sensitive man to wince with a pain located in the part of the anatomy that isn't discussed in public. To prevent anything like this happening we will merely say that he recently passed his 25th birthday. How many times he has passed it has little to do with engineering and Army maneuvers.

Cecil, we will take the liberty of saying Cecil instead of Capt., was born at



Capt. C. S. Bidlack

Oakwood, Ohio. He moved from there to Columbus in time to attend North High School which proved to be a stepping stone to the Ohio State University ladder of Higher Education. He received his degree of Bachelor of Electrical Engineering at Ohio State and was elected to the honorary electrical engineering fraternity, Eta Kappa Nu and also to the honorary engineering fraternity Tau Beta Pi at Ohio State. He won an "O" and \$25.00 worth of wool by getting there first via hoof in '24 and '25.

After garnering his share of the Greek alphabet he worked as student engineer for Western Electric in Chicago and as student engineer for the Ohio Bell Telephone Co. in Columbus. Along about this time the radio bug nipped him and set up oscillations that weren't damped out until Uncle Sam quenched them.

At WEAO, now WOSU, Cecil was hired as assistant operator and announcer and did everything but clean the glasses of a near-sighted announcer. While at WOSU he announced all of the Ohio State basketball games during the seasons of '29-'30 and '30-'31.

In 1938 he left his job as Technical Supervisor at WOSU to become a member of the Operating Staff at WTAM.

Due to holding a 1st Lt.'s commission in the organized reserves of Uncle Sam's Signal Corps, Cecil received an invitation to report to Ft. Knox, Ky. He reported on March 31, 1941. They accepted, so WTAM lost a good engineer to the 47th Signal Co. of the 1st Armored Division.

In the meantime Cecil has had the experience of being Officer in charge of the Division Radio School which trains radio operators for the Army. A platoon Commander in the Replacement Training Battalion . . . Battalion Chemical Warfare Officer . . . Battalion Mess Officer and Battalion Range Officer . . . My, my . . . and I am merely a platter twirler.

In January, '42, he received orders to report to Ft. Hayes, Columbus, Ohio. At present he is officer in charge, Fifth Corps Area Signal Corps Repair Shop . . . We understand they repair anything from a General's lawn mower to an African blow-gun.

That's about all the information we have about Capt. Bidlack. We certainly couldn't end without saying that Cecil has a lovely wife and two sons who show indications of being as brilliant as their likeable father. Jerry, the younger of the two, is eleven years old and Jimmy just recently celebrated his thirteenth birthday.

Ear Ticklers From the Transmitter

Horace Clark (TE) nearing the regretful part of his vacation . . . Regrettable inasmuch as he will soon have forty-nine weeks to worry about his next vacation.

John Cheeks (TE), the slide rule wizard, chucking math

(Continued on Page Seventeen)

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Hollywood News

By Bob Brooke

Spring Fogs at Last . . . More Ace Men to Uncle Sam
. . . Summer Shows Start . . . Radio City Being Redecorated
. . . Vacations . . . Still More New Men . . .

SUN . . . Our newer Easterners solemnly predict rain every morning and the "natives" assure them daily over coffee that it's just spring fog . . . and daily our "newys" are amazed at the blazing sun by noon and the blondes appearing in sun suits, as if by magic, at the first arrival of a 100 per cent sunbeam . . . (Blondes in said attire also appear before microphones on daytime shows) . . . Anyway, we have discovered that it takes about three years of daily lessons in California weather to turn out a true California native who can tell high fog from an Illinois storm . . . However, more beach weather every day and by the time this is in print we'll be basking in sun from sun-up to midnight . . . And going to the beach, schedules and tires permitting . . . KOA Williams taking golf seriously and sporting the reddest sunburn of the Engineering crew . . . The waves at Santa Monica missing Ferguson, who reports from the North that all's fine with his Government Engineering job . . .

Army . . . Headlines this month go to Frank Figgins, our excellent maintenance supervisor and senior Hollywood

staff member, who left late in May for a post as captain in the Signal Corps . . . Known as Butch, Franky, Speed, etc., to the old gang, he was the second Engineering Department employee in Hollywood and ran many of the old shows from RKO . . . Frank, an old hand at equipment installation, personally did much of the wiring and supervising of all three Hollywood NBC units, RKO, Melrose, and Radio City . . . Probably his greatest personal achievement (and headache) was the emergency construc-



Division Engineer Saxton looks on while Johnny Morris accepts reins of Hollywood Maintenance Department from Captain Frank Figgins

tion of three outside theaters to handle overflow shows (Fred Allen, Packard, MGM, Maxwell House, Fleischman) in the fall of 1937 . . . In that hectic year shows were arriving weekly with no notice and we had no place to put them . . . Frank, under the most difficult conditions, worked night and day building beautifully equipped stages and control booths at minimum expense . . . In any event, we have lost a friend and a valuable man for the duration . . . However, remember the stuff about the dark clouds and silver linings? . . . An excellent choice has been made in Johnny Morris to replace Frank as Maintenance Supervisor for the duration . . . Johnny is an old timer from Chicago who has been working as Frank's assistant in Maintenance the past three years . . . Johnny was unquestionably the man for the job and we all wish him luck with tubes and priorities till it's all over . . . So long, Franky, we're damned proud of you, keep the old Signal Corps rolling . . .

Research . . . Another ace engineer to feel the call to duty is Bob Callen of Recording . . . Bob leaves the 15th of June for a research job with the government in the East . . . Bob is probably one of the oldest and best known wax recording engineers in the country and has been with us since the opening of Radio City, having come from Decca . . . Bob's background includes the

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GE Lab and several trips with weight-driven recorders around the world for Brunswick . . . While with Decca Bob handled all of Bing's recording as well as the entire Hollywood output for many years . . . So long, Bob, Recording will miss you, but we'll keep 'em rolling . . . Lots of luck . . .

Misc . . . My apologies to Stoltzy for this late copy, but between Army shows and rebuilding a house I've been up to the well-known ears . . . Matter of fact I've been keeping my nose to the ground looking for copy and it's all been pretty dull stuff or overshadowed by the tremendous defense effort that probably occupies all of us in every office of the Company or Radio . . . Denny wants more news from the Blue . . . Okay, we'll hunt for Blue news next month . . . In the meantime they're doing a swell job out here and getting organized rapidly . . . More Blue mike signs are showing up every day and Blue's publicity is going to town . . . Denny has his own private office, now having traded with Operations Supervisor Don DeWolf, who works from a new desk in Sax's office . . . Bert Capstaff writes from NY while on the Kay Kyser tour and sez he'd give anything to be back in Hollywood . . . Reports a trip through Florida will extend his stay . . . Also that he's been doing some of the Bandwagon programs for the Treasury Department . . . Been gone three times as long as planned and, speaking of that and the Kyser show . . . Mac's wife Ginny is singing on the show and poor Mac, just married, hasn't seen her in months . . . He still hopes to stay out of the Army long enough to have a much-postponed honeymoon when the Kyser show gets back . . . Hey . . . Kay . . . Come on back . . . Well, vacations are well under way with most of the gang staying at home . . . Les Culley, Recording supervisor, reports two new Sculley Master Recorders to be working soon, along with associated amplifiers and switching equipment . . . Eddy Miller and wife on recent trip to isolated Dollar Lake had quite an encounter with a mountain lion . . . Beachcomber Reid they call him now . . . Ralph Reid, ex-New Yorker, frequently seen frequenting famed "Don the Beachcomber's" and other choice nighteries around town . . . Sez I, what were you doing there, Brooke . . . Art Brearley looking for a motorcycle to negotiate his forty-mile round trip a day . . . Irene Rich, after years with NBC, goes to CBS because of a time confliction with the Fred Allen show . . . Al Korb taking vacation relief in Master Control . . . Big shows folding rapidly with summer replacements almost 100 per cent . . . Mort Smith in and out looking fit and fine . . . New men include Eilers from RCA Manufacturing, Dewes from coast broadcasting . . . Knight from Chicago NBC . . . Nelson from the picture lots . . . welcome, fellows . . . Hope you'll like us . . . Letters from Fullaway and Sugg in the Navy . . . Both fine and doing all right for themselves . . . More about them if and when it won't reveal military information . . . 73.

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Cleveland News

(Continued from Page Fifteen)

books, slide rule and test tubes into one drawer of his desk with his right hand while his left brings forth fishing tackle, sun-glasses and mosquito nets. The vacation bug once again has performed a miracle. It amazes us to see a man doing everything by the rigid rules of math for forty-nine weeks of the year, then what happens? The vacation bug nibbles and the believer of Euclid disregards all proven laws to shoot the works on the fickle laws of chance for the remainder of the year.

Al Stewart (TE), Independence, Ohio, Scout Master, preparing his troops for a forty-mile hike and an overnight stay in the woods.

That reminds us of the midnight oil we used to burn while following the Rover Boys on identical trips. Hope Al has as much fun on his trip as we had in those far distant days of the past when kerosene lamps and dobbin-propelled transportation were considered luxuries.

P. S.: Just received a call advising that Program has changed studios again . . . We'll madly dash to another floor . . . If we fail to make it you may have a new Cleveland Ed next month!

In the FINDER

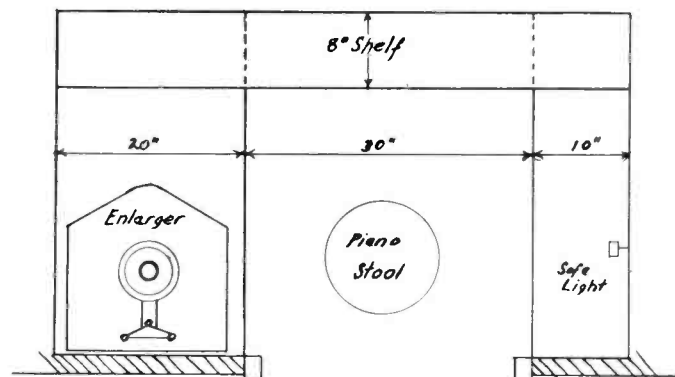
By Jerry Renneck

THIS month it will positively be Darkrooms and such. Each time I have started to tell you something about darkrooms, something else has come up which seemed more important at the time. Nothing shall stop us this time.

To get to the subject at hand. All, and I say that with very little fear of contradiction, all of us have at some time or another wanted to own a dark room in which we go to do the work that seems so important to us. Well, believe me, it is a simple matter to have one. If you live in an apartment, or if you live in a private house, you can have a darkroom of your very own. When I returned to New York after having been away a number of years, we found ourselves in an apartment where I could not get cellar space for a lab. However, we did have a couple of fairly good-sized closets, and, after staining the kitchen floor a few times, Madame Wife decided that it would be just too ducky if I could build a darkroom in one of the closets which she would assign to me and mine. After we decided what could go to the storeroom in the basement and what could be distributed among the other two closets, I went to work. The closet, which I shall refer to henceforth as

"the room," was about 3 feet deep and about 5½ feet long with the door in about the middle of one of the long sides. The door being a standard thirty-inch gave us 30 inches with which to work and plan.

Now, let's open the door and see what's inside the room. On the left, as we look in, there is a shelf at table height and about 20 inches wide. On this, in the near corner, sits the enlarger which is a Multifax taking negatives up to 2½ x 3½ inches. To the right of the enlarger are all the gadgets that we use in enlarging. To the right of the door is another shelf about 10 inches wide on which we see two trays. (The shelf would hold two 11 x 14 trays.) They are side by side and, on closer examination, we see a slot has been cut into the shelf between the two trays. Through this slot were passed the prints, as they



came out of the short stop bath, into a hypo bath which was suspended under the shelf. This was used when making small prints. Of course, larger prints had to be passed in beyond the edge of the shelf.

Between the two shelves is an old piano stool on which the operator may sit and merely swing around from enlarger to trays without any fuss. On the wall opposite the door we find some more shelves placed at a height so as to eliminate any possibility of cracking the skull in the dark. On the ceiling there is a two-way socket for an amber light and a white light controlled by a pull chain, and over the trays is the conventional safelight with interchangeable slides.

This little room worked out beautifully and a lot of prints were made in it. When it was finished, a great sigh of relief was "hoved" by both of us. It was necessary to use the kitchen from then on only for washing and drying. The drying was accomplished by hanging the negatives on the clothes dryer which was suspended from the ceiling. Yes, Junior, there's one in your kitchen if you take the trouble to look up sometime.

The accompanying sketch will give you a clearer picture of the layout, and I hope that you will find it to work out for you as well as it did for me. If you have a darkroom problem, why don't you write us and we may be able to help you. We'll even lay one out for you if you give us all the data. Floor space available, obstructions (structural;

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we can't do anything about other kinds), equipment on hand or contemplated, and anything else that you think will be helpful in planning your darkroom for you.

K.B.R. writes in to find out what we can tell him about composition. He adds that he would like it as brief as possible. Had he not added that part about being brief, we would have been glad to answer his question, but if he thinks he is going to get a course in lights and shadows and masses in brief, he's way off the track. As it is the question will be answered to some extent, but believe me, composition is as complex as television. You can't learn composition homeopathically. You must take it in large doses. But anyway, the Dictionary of Photography by Wall, which, incidentally, I recommend heartily to all photographers, says, in part, as follows: "**Composition.** The term denoting the grouping of the materials of a picture so as to form a pleasing and harmonious whole . . ."

What can we gather from that? If we place a stick about twelve inches long alongside another of about eight inches length, we have formed a pleasing composition. But on the other hand, if we place the long stick at the top of the short one so that two-thirds of the long one extends beyond the vertical, we have an unbalanced composition. It is not pleasing, for it seems as if the long one will topple over at any minute. It is disturbing and annoying. The same applies roughly to pictures. If we compose our picture so that the dominant mass or subject of the picture seems to overbalance the minor mass, we have achieved an unbalance that can be very disturbing.

This is so inadequate that it is funny, but it is almost hopeless to try and give you "composition" in the space allotted to our department. But in another issue, we will try and go into it a little deeper, and have a few sketches to illustrate our points. 'Til then, cap your lens.

KFI — Los Angeles

(Continued from Page Eight)

both quartered at the same towns in Scotland, Inverness and Invergordan. "And didja know that kinda auburn-haired one that lived up that first short street?" etc., etc.

If it is "blackout" information you want, see Floyd Everett and Charley Lampkin, Studio Engineers by day and Air Raid Wardens by night.

Norol Evans, Transmitter Engineer at KFI, is a rancher betwixt times. He owns an orange grove, near the City of Orange, in Orange County. Also raises scads of vegetables for the market. He is W6ADT; has one of the best ham rigs in these parts; 70-foot sticks, too; a member of the Century and other radio clubs.

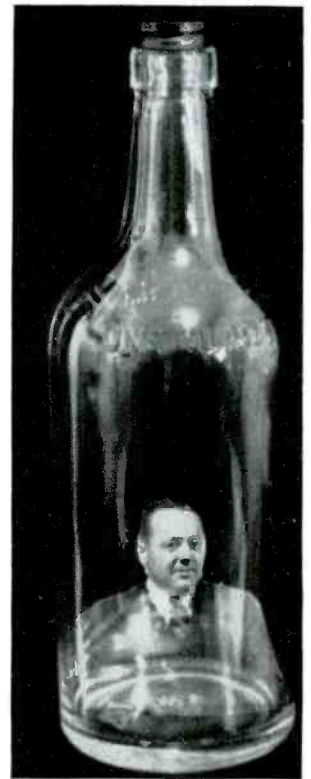
George Tokar, also T.E. at KFI, has also acquired a grove, near Anaheim, in the most beautiful part of California. If you have never seen the country around Fullerton, Orange, Anaheim and Santa Ana, put it on your "must" list.

The Djinn

We just had to do it . . . As you well can see he is sitting pretty low where we put him . . . As a matter of precaution we used a screw-cap bottle so he couldn't escape by popping the cork out like a Djinn of one thousand and one nights. The prisoner belongs to that tribe too, for by now you have probably recognized Buddha, also known as s. e. Whittaker. The latter had a pernicious habit of flying the coop and leaving for lands where one basks in sunshine and swims in the ocean in winter; all this with astonishing regularity. He'd stay away from the fold for a couple of fortnights and then return to reap his extra days-off and a well earned vacation . . .

Well, we put a stop to that. So we think. What is your consensus of opinion, dear reader?

—S. de Somov.



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Behind the Mike By Con Conrad

CLAUDE M. GRAY has just recently been upped to the position of Chief Engineer of WTOG, Savannah, Ga.

Ross Griffith, WDRC, Hartford, Conn., is new to the transmitter staff. Griff was recently honorably discharged from the army because of his health.

Erwin Ahrndt to WAIT, Chicago, Ill., his former duties were with WJOB, Hammond, Ind.

Lewis Smith of WCCO, Minneapolis, Minn., has taken leave to join the Army Signal Corps.

Johnny Bart, KVOO, Tulsa, Okla., has taken leave from his engineering post to join the army.

John O'Neill of the Greenwich Police Radio has joined the engineering staff of WSRR, Stamford, Conn. He replaces Victor Milana, who has joined the Marines.

Edward Tauber of WBYN, Brooklyn, has resigned and is now connected with The Pan American Airways foreign service.

Byron Lindsey of WSB, Atlanta, has reported for civilian duty with the U.S. Army Signal Corps.

A. B. Chamberlain, chief engineer for CBS, has reported for active duty with the Navy as a lieutenant-commander.

Dick Ashenfelder, chief engineer of WCBS, Springfield, Ill., has taken leave for military duty.

A. H. Otto, NBC, Chicago, has been upped from studio

Recording and Broadcasting become more synonymous with every day of the war, as greater numbers of engineers and staff join the armed forces. The photo shows Engineer Harry Cole at the console of WJAX, Jacksonville, Florida. While the photo is humorous, it is nevertheless symbolic of the complexity of doing a good turntable job



engineer to the post of Control Room engineer. This on top of the announcement that Al is again proud papa of a son born recently is really good news.

Harvey Kees, chief engineer of KILO, Grand Forks, N. D., has resigned to join the Harvard U. research staff.

Ewald Tromp is new to the staff of WGN, Newburgh, N. Y.

G. E. Webster, NBC, Chicago, has been upped from the position of studio engineer to the Control Room staff.

E. E. Schultz is new to the WMAQ, transmitter staff; he is also new to commercial radio.

T. E. Gootee, NBC engineering, Chicago, is on leave and now with the U.S. Army Signal Corps. As you will recall, Tom was staff writer for our Journal. Last we heard, Tom was stationed at Ft. Monmouth as a second lieutenant.

C. L. Pierce, NBC engineering, Chicago, also on leave and is with the U.S. Army Signal Corps. Curt is stationed in Detroit for the time being in the Procurement Division. He is a second lieutenant.

L. E. Dutton, NBC engineering, Chicago, into Civil Service doing important work with the U.S. Army Signal Corps.

T. G. Bombaugh, WENR Blue Network station in Chicago, has taken leave for military life and is with the Navy as a lieutenant.

J. F. Mehren, new to the transmitter staff of WENR, Chicago. Mehren was formerly connected with the NYA training program in the Windy City.

W. T. Knight, Blue Network, Chicago, has transferred to Hollywood. Dr. Knight has already assumed his new duties and can be found doing the engineering of the new Dinah Shore programs from that point.

R. A. Kelley new to the engineering staff of the NBC in Chicago. He hails from WASK of Lafayette, Ind., and the University station at Purdue.

D. R. Fitch has joined the engineering staff of the NBC, Chicago. Fitch was formerly connected with WOAI, San Antonio.

A. W. Hjorth, formerly of Haliburton Oil Enterprises and a varied radio background, has recently joined the engineering staff of NBC, Chicago. Along with the influx of new men to the Chicago staff of NBC comes C. C. Blanchard, formerly of Purdue, and H. C. Johnson, formerly of the Airlines, and C. A. Cabasin, formerly of WDAY, Fargo, N. D.

T. H. Paclig, formerly of the NBC engineering staff at Chicago, has retired from active duties in radio. He expects to live down south.

Mr. Mulatz has just joined the staff of the Blue Network staff in Chicago as we go to press. No further info available on his past in radio.

MILLIONS?

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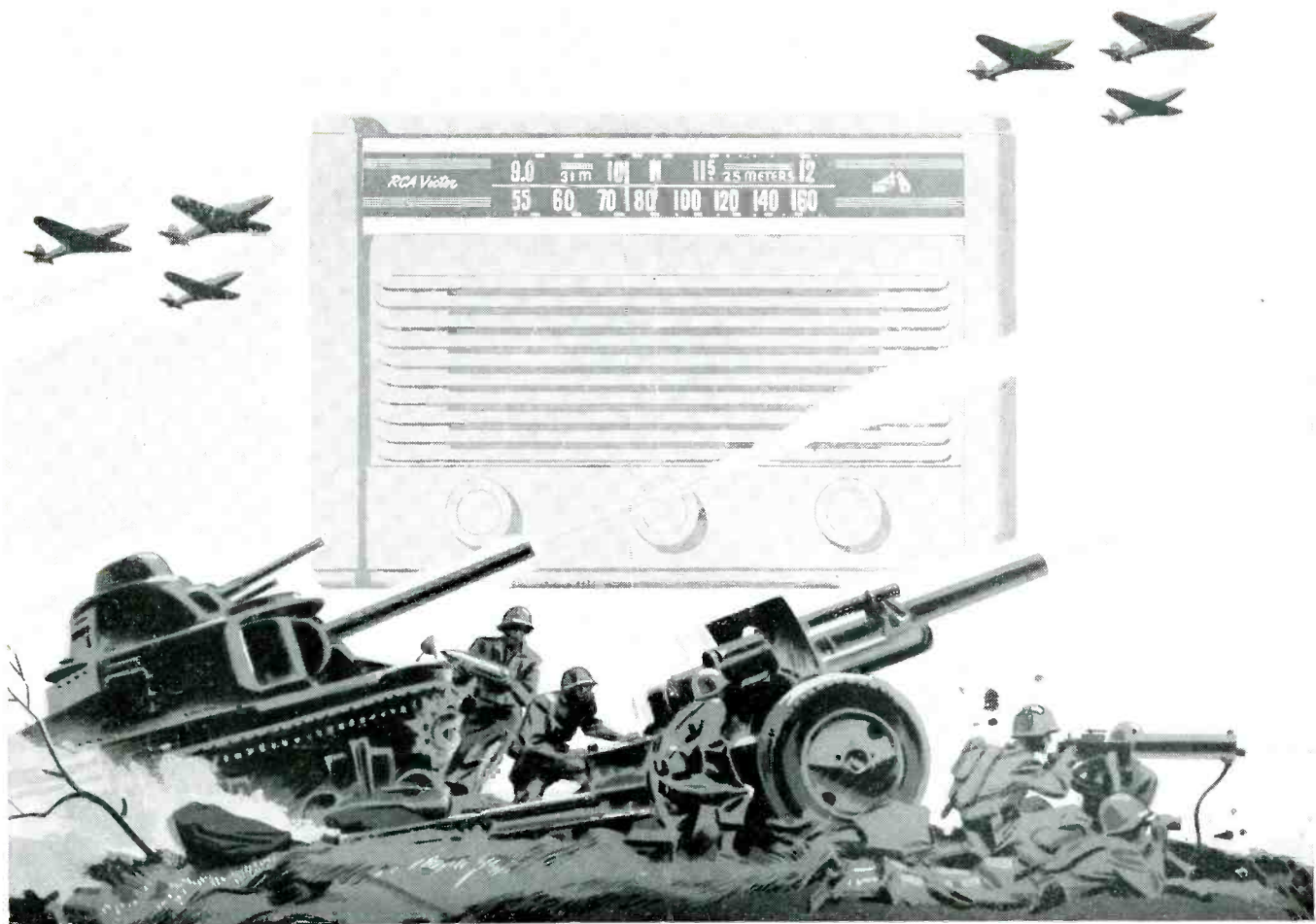
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