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VOLUME II, NUMBER 4

The Broadcast Engineers' Journal

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Of, By, and For The Broadcast Engineer

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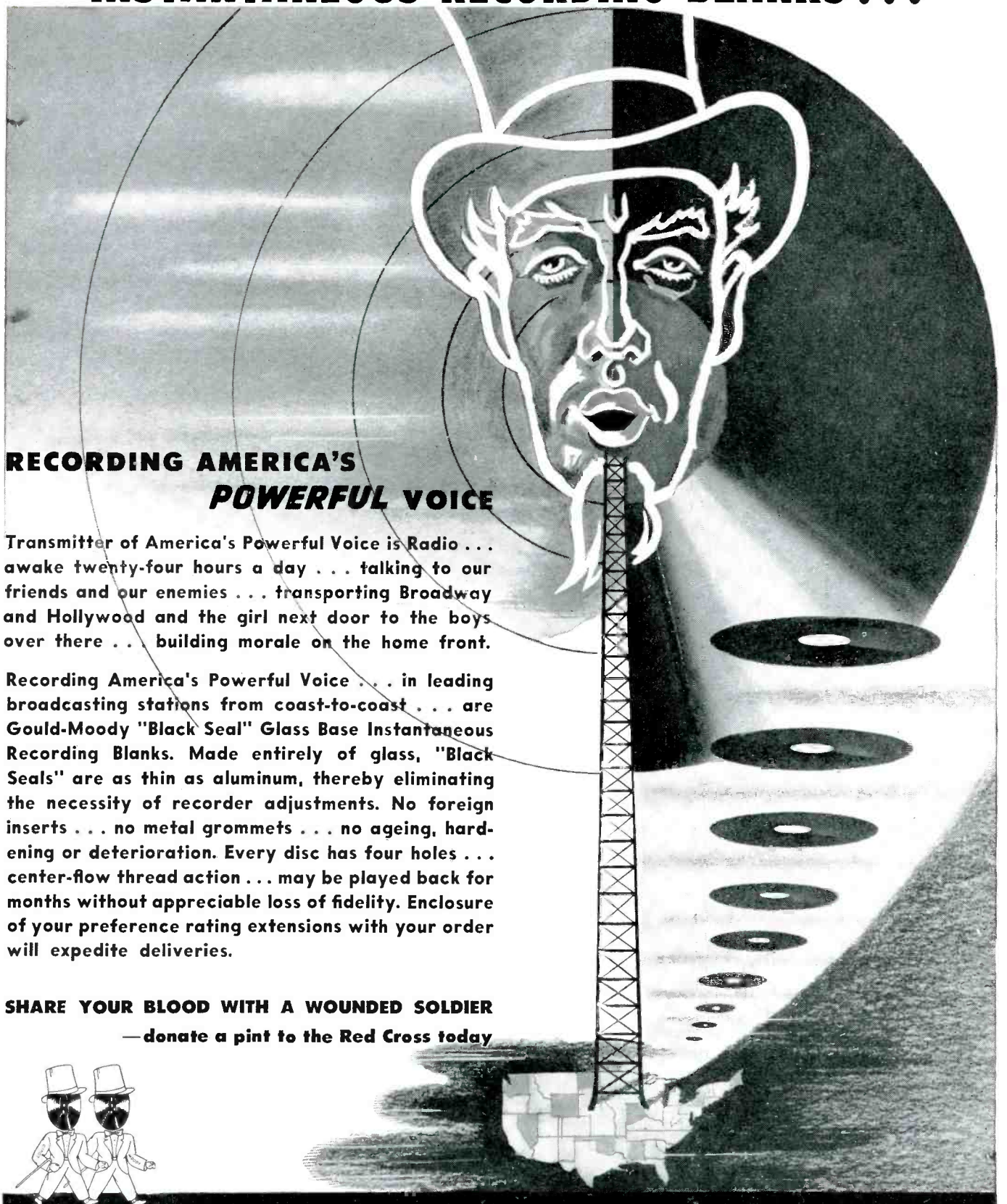

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THE BROADCAST ENGINEERS' JOURNAL

Volume 11, No. 4 409 April, 1944

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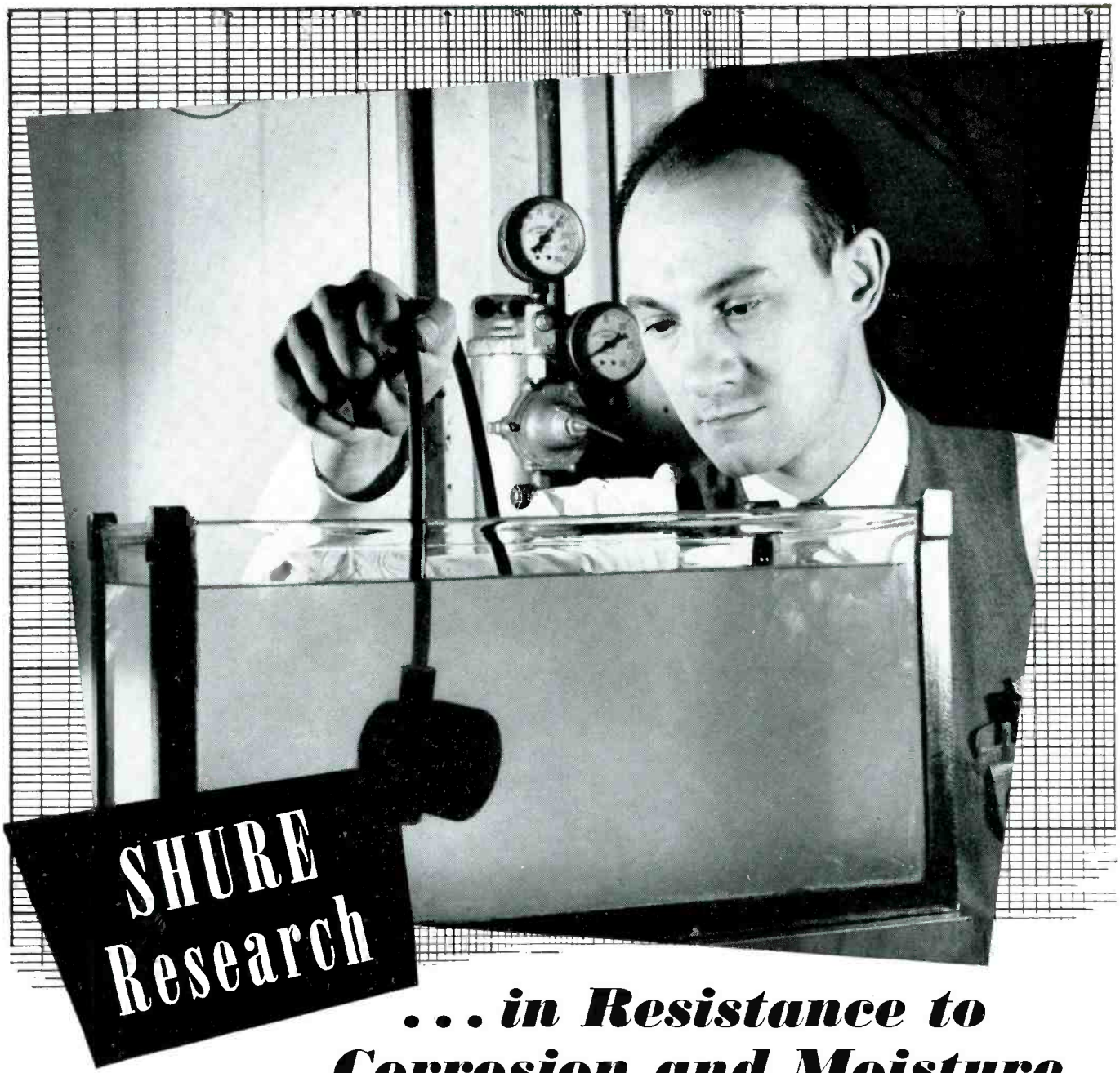

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SHURE MICROPHONES

Elemental Electronics — Part IV

Cathode-Ray Tubes : : By Jordan McQuay

THE cathode-ray tube is an electronic device in which a stream of electrons emitted from a cathode are caused to move at a very high velocity, are formed into a narrow beam by focusing, and are then allowed to strike a screen which fluoresces or glows.

Because electrons have so little mass, the electron beam can be deflected very quickly. This property enables the cathode-ray tube to measure currents and voltages in terms of microseconds when necessary. It also permits the use of the cathode-ray tube at extremely high frequencies, far exceeding any other type of indicating or measuring device (such as meters, et al).

The great singular importance of the cathode-ray tube is that it provides a *visual* means of examining and measuring current and voltage phenomena.

The cathode-ray tube can be employed in a variety of ways, but all of these applications stem from the characteristic means of *deflection* of the electron stream to produce a visual means of viewing either transient or steady-state electronic phenomena: the production of a *pattern* upon a viewing screen. These *patterns* may appear upon a fluorescent screen (as in the case of television receiving tubes, or the more familiar oscilloscope), or the patterns may be used with mosaics (as in television pick-up or transmitting tubes). All specific applications of the cathode-ray tubes are variations of these two types of image patterns, and a number of these uses will be considered in some detail later in this discussion. The fluorescent-screen cathode-ray tube has, perhaps, the widest use in electronics work, and has found extremely important application in radiolocation circuits for the display of information obtained by the high-frequency transmitter and receiver components. The use of the oscilloscope or oscillograph, as a testing instrument for the examination of wave shapes, has long been an important and accepted practice in audio, radio and video work. Special types of cathode-ray tubes are used as fast-action electronic switches, high-frequency oscillators, and generators of highly complex non-sinusoidal wave shapes.

The cathode-ray tube, in any form, is essentially a type of vacuum tube, consisting of four main parts: (1) the *electron gun* assembly, (2) the *deflecting mechanism*, (3) the viewing *screen*, which is usually fluorescent, and (4) the highly evacuated *glass bulb*, within which are contained all of the aforementioned elements. In simplified operation, the electron gun emits a concentrated beam of electrons, which is attracted to and eventually reaches the (positive) fluorescent screen. However, enroute to the screen target the electron beam is acted upon by the deflecting mechanism, and the beam can thus be controlled and caused to move above the screen. The resultant fluorescent spot on the screen can be moved according to the amount of deflecting voltage or current applied by the deflecting mechanism.

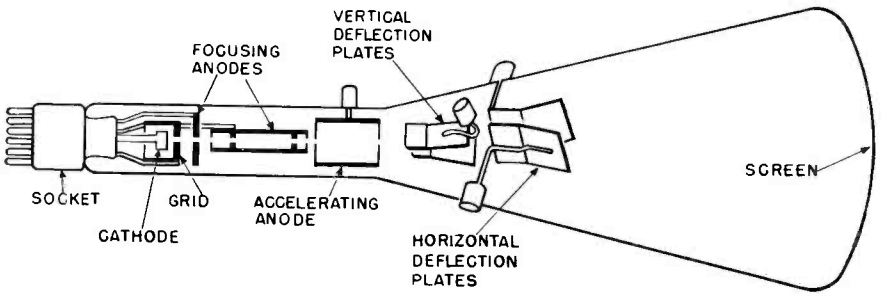


Figure 1. — A typical cathode ray tube with electrostatic deflection plates.

There are two principal deflecting means: *electrostatic deflection*, and *electromagnetic deflection*. Either (or both in combination) can be employed to affect the beam of electrons. Since the electrostatic type of deflection is more commonly encountered in practice, this type will be discussed in detail first. A typical electrostatic cathode-ray tube is shown in Figure 1. In this representative tube, there are two sets of electrostatic deflecting plates: two placed in the horizontal axis, two placed in the vertical axis. Later it will be shown how various voltages can be applied to one or the other of these sets of plates, so that the resultant movement of the electron beam on or across the screen is due to these two voltages (horizontal and vertical) acting at the same time upon the electron beam as it passes between the deflecting plates. Where the stream of electrons impinges upon the fluorescent screen, a bright spot will be revealed. This spot, of course, will be caused to move about upon the face of the tube screen according to the movement of the electron beam which, in turn, is dependent upon the deflecting voltages applied to the horizontal and/or vertical plates for variation. The beam on passing between either pair of plates will experience a deflecting force proportional to the potential difference between the plates. The four plates are generally brought to separate terminals of most tubes, although in some types one plate of each pair is connected internally to the final (accelerating) anode. Since any deflection voltage is considered with reference to the final anode, such a permanent connection considerably simplifies the external wiring circuit. A certain amount of capacity always exists between the two plates of any pair of deflection plates. This capacity may be approximately calculated from the standard formula, the area of the plate and the distance between them being known. This capacity has a utilization in certain radiolocation applications.

The electron gun of the tube in Figure 1 consists of the cathode, grid, focusing anodes, and the accelerating anode. Other types of cathode-ray tubes may have different arrangements of these electrodes contained within the electron gun, but the prime purpose of the electron gun always remains the same: to emit a concentrated stream of electrons. Referring again to Figure 1, the cathode, when properly heated, emits a shower of electrons. A percentage of these electrons are attracted to the focusing and accelerating anodes, because these anodes are at a positive potential with respect to the cathode. However, in order to reach these anodes, the electrons must pass through the grid electrode. This grid is usually in the form of a cylinder of nickel completely surrounding the cathode. The application of a negative potential to this grid will produce a space charge and cause the electron stream to be compressed and concen-

trated — thus forming an electron *beam*. The tiny jet of highly concentrated electrons is shot through a small opening in the grid, attracted by the positive charge on the focusing and accelerating anodes. However, these anodes are in reality small cylinders which permit the electron stream to pass *through* them and eventually reach the fluorescent screen. The focusing anodes are employed much in the same manner as a lens is used to focus a light beam. The potentials applied to the focusing anodes are varied so that they cause the electron beam to become more or less compact; this causes a variance in the focus of the pin-point of light on the fluorescent screen where the electron beam impinges. Thus, by varying the potential on the focusing anode or anodes, the spot on the screen may be focused *visually*. It should be noted that the focusing anodes are found in a variety of shapes and sizes in various cathode ray tubes. Certain tubes, such as the one shown in Figure 1, have an additional accelerating anode cylinder which causes the electron beam to travel at an even higher speed toward the screen. This anode may often have some effect upon the focus of the tube. From this paragraph it can be seen that the essential elements of the electron gun in a cathode-ray tube are: (1) a *heater*, (2) a cathode emitter, (3) a grid, which controls the intensity of the beam, (4) a focusing anode, which controls the focus of the spot on the screen, and (5) an accelerating anode, which causes the electrons to move at a greater speed toward the target screen.

As just described, the process of electrons reaching the viewing screen from the cathode seems rather lengthy. But it should be noted that this process is accomplished in a very short time, due to the high speed of the electrons. In some cathode ray tubes the electron speed may be as high as 10,000 to 20,000 miles per second. Therefore, any *variation* in potential of either the horizontal or vertical deflection plates, *or both* at once, will cause a vector resultant movement on the screen almost instantaneously. This is an important property of the cathode-ray tube.

Energy contained within the *beam* of electrons does not lie in the visible spectrum, and therefore cannot be seen. To render this beam visible, it is permitted to strike a screen coated with a material which fluoresces when it is struck by the electrons. This screen has two important characteristic properties: *fluorescence*, the ability to emit light during the impinging of the electron beam, and *phosphorescence*, the ability to continue to emit light for some specific time after the electronic bombardment has ceased. *Willemite*, or zinc-orthosilicate, is widely used as a coating for most cathode-ray tubes; it gives a light green glow or fluorescence. The introduction of high-definition television resulted in the need for a white fluorescence, and this has been produced by using a coating mixture of blue-emitting and yellow-emitting phosphors which give a resultant white fluorescence. For certain photographic uses, a deep blue glow is more useful, because of its greater actinic power.

That portion of the electron energy which is not directly converted into light appears as heat at the screen. If this heat becomes excessive, the tube is said to have been "burned." Thus, operating a cathode-ray tube with excessive brilliance will also cause "burning."

A return path is provided for electrons to "leak off" the screen, and eventually reach the cathode via the glass tube. A type of conducting graphite is painted on the inside of the glass envelope for this purpose.

The methods by which an electron beam is deflected can now be considered in more detail. As stated earlier, electrostatic deflection plates are most generally encountered in cathode-ray tubes, but the electromagnetic system is also widely employed in television and radiolocation. In the electromagnetic type of deflection, a coil replaces the horizontal and vertical deflection plates previously used. A current applied to this deflecting coil will have a similar effect in controlling the movement of the electron beam—and the resultant movement of the spot on the fluorescent screen. Certain cathode-ray tubes may employ a combination of electromagnetic coils and electrostatic deflection plates. In the electrostatic type of tube, the deflecting plates are located after the final anode; but where magnetic deflecting coils are used, they are placed just before the final anode. Alternatively to the use of both pairs of electrostatic deflection plates, the deflection in one direction may be obtained electrostatically by the use of one pair of plates, while the deflection in one direction may be obtained magnetically. In this case the electric field and the magnetic field will be in the same direction since their resultant effects on the electron beam are themselves at right angles to each other. The use of two magnetic deflection systems is possible, but not common.

Tubes employing electromagnetic deflection are often focused by magnetic means. This is done by using a solenoid wound around the neck of the tube to produce a field parallel to the beam axis. The tube is then focused by altering the physical location of the solenoid and/or the current passing through the coil.

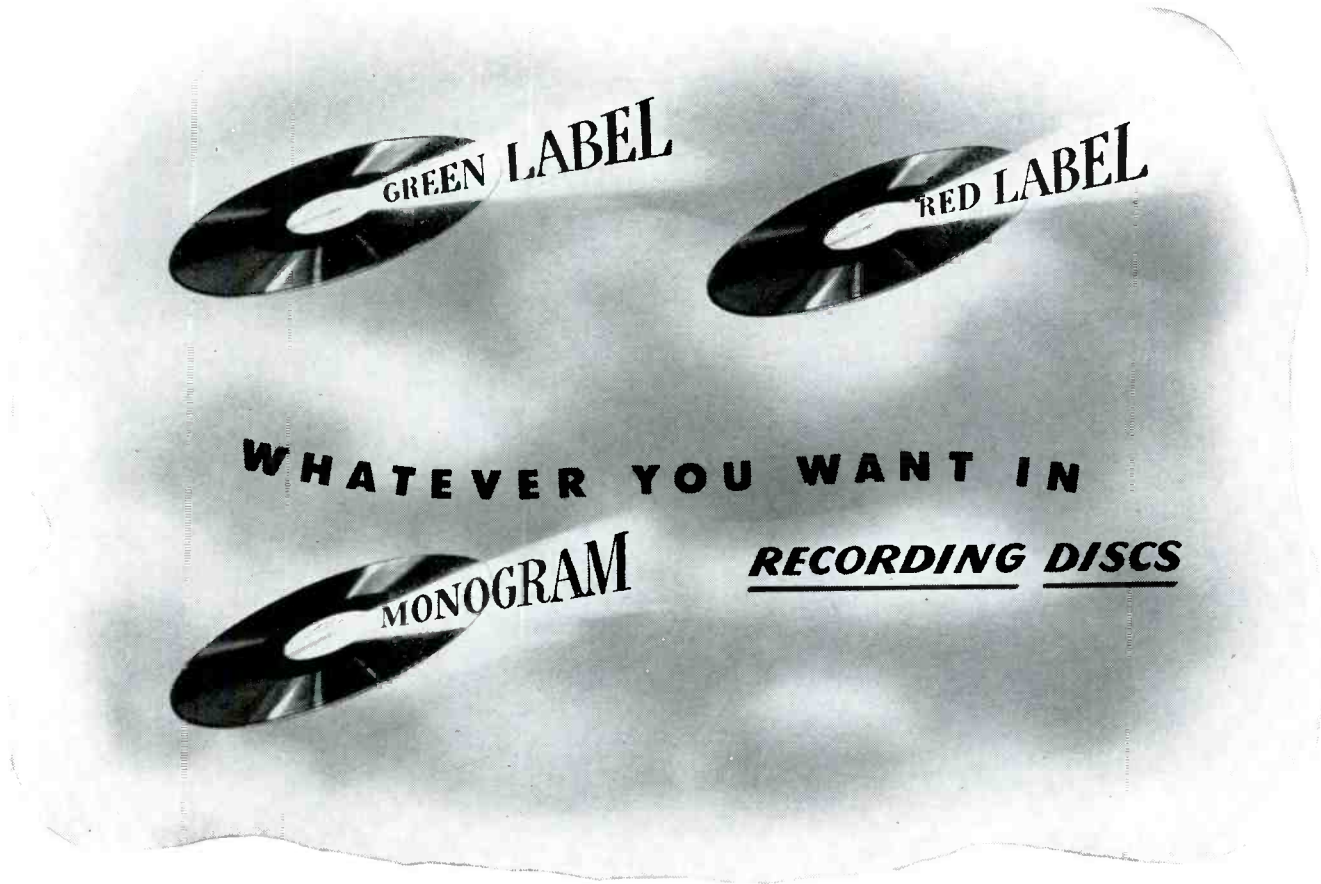
The limiting factor in the life of a cathode ray tube is usually the life of the screen. Therefore, care in the adjustment of the grid or *intensity* control (which varies the negative potential on the grid, thereby varying the concentration of electrons within the beam) will result in a prolonged useful life of the cathode ray tube.

Referring again to the typical cathode ray tube shown in figure 1, a voltage applied to the vertical deflection plates will cause the electron beam to move in a vertical plane, or up and down across the viewing screen. A voltage applied to the horizontal deflection plates will cause the electron beam to move in a horizontal plane, or back and forth across the viewing screen. When voltages are applied to *both* horizontal and vertical plates, the beam will be moved in proportion to *vector strength* of the two active potentials. Thus, by varying either or both of the deflection voltages (horizontal and/or vertical) the spot on the fluorescent screen can be made to move to any part of the circular viewing screen. It should be noted that the electron beam is, in this case, being continually acted upon by two forces which are at right angles to each other.

If a sine wave is applied to the horizontal plates of a cathode ray tube, such as that shown in figure 1, the electron beam will be swept back and forth across the tube screen, causing a bright *horizontal line* to show on the screen. If a sine wave is applied to the vertical plates alone, a bright *vertical line* will be observed on the viewing screen. Unles the sine wave is of extremely low frequency, the persistence of vision of the human eye plus the phosphorescence of the tube screen will make the moving pin-point appear to be a perfectly straight line.

If two sinusoidal waves of the same frequency and the same phase are applied to both pairs of electrostatic deflection plates *at the same time*, the movement of the electron beam will be proportional to the resultant of two forces (acting at right angles) at any instant; the image on the viewing screen will, therefore, move *diagonally* across the screen at an angle dependent upon the relative values of the applied (deflection) voltages. If the two applied sine waves have the same frequency but

(Continued on Page Eighteen)



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Roy 'Tex' Glanton's Station, WOW Omaha Originates Union Pacific Show for NBC Network

SATURDAY is a big day in Omaha, for on that day, this city, the home of the Union Pacific Railroad and station WOW present for a coast to coast audience the show YOUR AMERICA.

With Union Pacific employees headlining the show and NABET engineers "bottling" up this program via WOW facilities for the NBC network, the resultant efforts of these combined organizations has become an epic of the airways.

Interesting photos of this show shown here, furnished by WOW's Chief Engineer Roy "Tex" Glanton, reveal some interesting features.

Top Left: The serene expression on the face of Joseph Herold, Chief Control Operator, is explained by the fact that production and others were ordered out of the booth for the purposes of this picture. Al Maller, remote control engineer, is about 6 miles back of that first key on the left. Top Right: Sound effect Engineer Glenn Flynn at the throttle of the "City of Los Angeles" streamlined Union Pacific passenger train (a sound effects recording). Bottom Left: Balcony view of the stage and cast of the "Your America" program. Pre-broadcast warm up. Bottom Right: This is the so-called sound-proof booth not the rear end of a stock truck going to market. Reading from left to right, Joseph Herold, Glenn Flynn and Producer Lyle DeMoss.

Hudson Chapter News

By Herman G. Berger

MEET RICHARD BORNER

TWENTY years in the communications field has given "Dick" Borner a broad background in installation work ranging from telephone switchboard wiring to a complete modernization of WOR's Master Control Room. He gained his early wiring experience with Western Electric from 1923 to 1926, when he joined Western Union to work on the Hamel, Rockaway Cable Station. Borner next joined RCAC, installing equipment and receiving tables at Broad Street, followed by a similar task at Riverhead. In 1930, RCAC handled the installation of the new WEAF 50 kw transmitter, with Borner doing all speech input wiring under the supervision of NBC's Ray Guy. Early in 1931, Borner repeated at WJZ's new 50 kw installation, under the direction of NBC's Carl Dietch. Ted Smith, RCAV transmitter sales, saw Borner's fine work, and recommended him for installation work at WEEU, 1 kw, and WRAW, Reading, Pa. At this point Borner became unique and handled these jobs on a free-lance basis, later installing WGNY at Chester, N. Y., for the well-known Goelet family; after he finished with the WGNY transmitter, he wired the speech input equipment and studios at the Goelet Estate.

Borner next turned up at RCAC New Brunswick, doing installation and wiring in connection with two short-wave transmitters. This was 1933—the depression; work being scarce, he successfully took on the construction of the concrete foundations and 135 foot towers. After this, he

The one-two-three of Borner's work on the WOR recording main switching panel

took a leave of absence to work with Capt. (now Lt. Col.) Ranger and his Rangertone Pipeless Organ. He installed two bays of 1200 interlocking relay circuits for producing the innumerable tonal combinations. This equipment was duplicated in portable form, and was used at the dedication of the New York State Roosevelt Memorial, January 19, 1936. While connected with this project, he was employed by WOR for the wiring of new studios in 1933 under the direction of Edward J. Content, and from that time on, handled the Rangertone job on an after-hours and spare-time basis. The WOR assignment became permanent with the continual progress and expansion at WOR, and in 1935 he wired the new Master Control speech input and switching equipment. Later in the year, he wired the speech input equipment at Carteret. Borner was actively engaged in the installation of WOR broadcast equipment at the New Amsterdam Theatre. Typical of the growth of the whole industry, in 1936, the Recording Division consisted of one portable recording channel; the Recording Division now occupies the 18th floor, has 16 channels, with its own modern air-conditioned studios and audition rooms. The photo shows Borner and the 16 channel selector switching panel for the new Recording Control Room, representing 201 man-hours, using insulated, shielded pairs. In 1941, he did most of the wiring of WOR's new studios Nos. 8, 9, 10 and 11 on the 24th floor, including turntables. Since September, 1943, he has been in charge of changes in the Master Control wiring, moving all circuits without interruption to program service.

Borner was born May 2, 1906, in New York City, attended Cooper Union in 1923 and studied electrical engineering. He plays the violin, works on Victory Garden, was Captain of the WOR Soft-Ball team, an ardent contract bridge player, and blindfold checker player (try him out sometime—a challenge!).

Chicago Chapter Chatter

By A. W. Hjorth

THIS story could be headed "CHICAGO CATASTROPHE CAUSES CONSTERNATION". Handsome **Alan Scarlett,** NBC studio and recording, by diligent search having located a quart of bourbon cough syrup, with stealth did purchase these medicinal spirits. Carefully secreting the glass container in the voluminous pocket of his topcoat he jauntily rode the "L" to Evanston, giving his fellow passengers a smug smile. Inwardly glowing in anticipation of the real radiant glow to be had from the contents of the gurgling package, Handsome Alan loved his fellowmen (and the gals too)!

Breathlessly arriving at the threshold of his domicile, his wife **Doris** knew, without a spoken word, that her hero, Handsome Alan, had a gift even more important than that semi-monthly message "YOU ARE NBC—NBC IS YOU".

With a frenzy, born only of eager anticipation, Doris peeled from her handsome hero his laden topcoat. In the silence of the auspicious moment there was an ominous gurgling crash!! Forcing their grief stricken eyes downward, they saw a mishappen mass on the floor, exuding a light brown fluid that removed the varnish as it rapidly spread in a pool, reflecting the anguish in the eyes of Doris and Alan Scarlett.

. . . and the moral to this fragment of real life is, "If you live in Evanston, don't wear a topcoat".

Lieut. Charlie C. Blanchard, ex-NBC studio, flashed thru Chicago recently. Spending the winter at the Navy's sunny Corpus Christi. As a top flight pilot he returns to Corpus to teach tricks to other fledgings.

Belated welcome to Dale Shimp at WLS and also new **Blue** studio flash, **J. W. Eastman.**

Ralph Knowles, NBC nite-studio, after many weeks of off-day riding the "Roarin' Elgin," arms loaded with maps, found many mansions to the liking of Marie and himself but was oft heard to mutter, as he returned . . . "if we only had the down payment". Now, Marie and Ralph have moved to Elmhurst with their small daughters Eleanor and Kathelene where they found a modest twenty-seven room three-story colonial mansion.

Al Otto and Byron Spiers continue to lug cases of eggs to town to be sold to those of NBC and the **Blue.** Farmer Spiers claims his hand feeds each hen with fifty-seven varieties of vitamins while Al Otto modestly lays

(Continued on Page Twenty-One)

History of Communications Number Three of a Series

PRIMITIVE COMMUNICATIONS

An early communications instrument was the Tom-Tom—to prove its efficiency, it is still used by the natives of Africa. Tom-Tom signals are "Beat out" along jungle lined rivers, but even then distance is a handicap, and "repeater" stations are many.

Like all means of communications, other than voice communication, translation of coded signals must take place in which additional skill is required, and another chance of error is presented. As in the case of the Tom-Tom beater: knowledge of the Tom-Tom code was restricted to a special family within the tribe, and was handed down from generation to generation.

Today, Universal Microphones in the hands of the fighting men of the Allied Armed Forces are performing a simple but vital need in electronic voice communications where their quality and efficiency are bringing us one step closer to victory.

< Model T-30-S, illustrated at left, is but one of several military type microphones now available to priority users through local radio jobbers.

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Television and Post-War Jobs

By T. F. Joyce

Manager, Radio, Phonograph and Television Department, RCA Victor Division, Radio Corporation of America

Before the Sales Executives Club of New York Tuesday, March 14, 1944, 12:30 P. M.

THE American Institute of Public Opinion—better known as the Gallup Poll—recently invited more than 3,000 voters of the country, so selected as to represent accurately all segments of American life, to tell what questions they would like to ask President Roosevelt. Leaving aside purely military subjects, the questions included:

"How will we avoid a depression after the war? Will there be jobs for all of us? Will the soldiers be able to find work? Will our wages be cut when peace comes? What is being done to make sure that people won't have to go on relief again?"

And many other questions of like nature.

Gallup discovered the questions uppermost in people's minds. But Gallup could not give the answers.

The positive affirmative answers to these human questions must come from the people themselves, through their leaders in government, agriculture, labor and business management. The leaders of these predominant groups, as well as the other social and economic groups in the United States, working in cooperation and harmony, must provide the answers.

As I said, the answers must come from the people themselves, for the American system is based on individual initiative and enterprise. Here is a system which has outproduced the enemy on the home front and which, once again, is demonstrating what American individual initiative means on the battlefront. This is the system to which Premier Stalin drank a toast when he said:

"Without American production the United Nations could never have won the war."

Obviously, then, our postwar problem will not be one of production. It will be one of distribution. Only as people buy goods are people put to work growing farm products or turning out manufactured products.

Since our American system is based on individual initiative, the responsibility for furnishing the fuel that will keep this production engine fully loaded necessarily falls upon business management. Specifically, it is the sales management group that must carry the load. They—the sales managers—must develop a total demand for goods and services that will keep all the people who wish to work fully and profitably employed.

They must find ways of getting merchandise from our farms and from our factories to the ultimate consumers at lower costs.

They must reduce the time needed to show consumers the advantages of the new postwar products and services and to bring about rapid buying of those goods and services on a large scale.

The sales managers must find more effective ways to show consumers how to use the products of our farms and factories to improve health, lighten the burden of our domestic and farm work, raise the standards of education and culture and bring material happiness and well-being to every home.

How can they—the sales managers—do this?

Rather than try to answer that question myself, I have sought answers from a number of leaders in American life. One such leader is Paul Hoffman, President of Studebaker and Chairman of the Board of Trustees of the Committee for Economic Development. He came up via the sales manager's route. He is one of America's greatest sales managers. Here is what he has to say:

"The coming of peace will create a challenge to the sales executives of the United States. They must take on a large share of the responsibility of keeping our factories and our farms in abundant production through their sales activities.

"It is estimated that by the end of 1944, the American people will have accumulated individual savings of 100 billion dollars. That 100 billion dollars is static so long as it remains in the form of nonproductive savings. It becomes a dynamic productive, giving jobs to millions, only as it is transformed into effective consumer buying.

"In the postwar period, the sales executives must assume the responsibility of putting this accumulated purchasing power—as well as the postwar earning power of the people—into motion and thus into jobs.

"New and better weapons are playing a large part in defeating the enemy. Our postwar sales executives must also make use of new instrumentalities if they are to create the volume of consumer purchases necessary to support our greatly expanded production facilities. The most far-reaching and comprehensive new instrumentality for the presentation of new ideas is now on the threshold—television.

"When television is established as a nation-wide service, it will enable sales executives to *demonstrate* their product simultaneously in millions of homes. Television makes it possible to project the most effective sales presentation directly into the intimacy of the family circle. Television is dynamic salesmanship.

"In 1940, 46,000,000 people were gainfully employed. If the intelligent advertising and sales use of a nation-wide television system increases the demand for goods and services by only 1%, the effective result will be to create, in terms of 1940 employment standards, 460,000 new jobs. I would not be the one to say that a so far-reaching development as television could not be responsible, within a decade after its full commercialization, for increasing the demand for goods and services by as much as 10%. That would mean potentially 4,600,000 new jobs that have been created as a result of the increased purchasing of goods and services brought about by television."

Paul Hoffman is not in the television business. He doesn't stand, so far as I know, to make a penny out of television—except as he can use a television broadcasting system to help sell the products of his company. But Paul Hoffman has a larger interest than just the Studebaker Company. He has demonstrated during these years that he is vitally concerned with the success of the American enterprise system. In his capacity as Chairman of the Committee for Economic Development, he has great faith

in the contribution which television can make toward more effective distribution of goods and services, which in turn mean more prosperity and more jobs.

Paul Hoffman is not alone in this belief. In discussing the subject of television, Ed O'Neil, President of the American Farm Bureau, said:

"For centuries the farmer has had to live an isolated life. Modern forces have been breaking this tradition down. First came the R.F.D. Then the telephone. Then the automobile. Then radio. All that's necessary to make the farmer as much a member of the commercial community as your next-door neighbor is television.

"Television will undoubtedly stimulate the desire of people everywhere for better foods, fancier farm products. Higher average farm income should prevail. If the farmer is thus permitted to share in a general increase in prosperity, he will continue to buy more manufactured goods, and contribute substantially to the increased employment and welfare of all concerned."

What is it that Paul Hoffman sees in television?

What is it that Ed O'Neil sees in television?

What is it that Winston Churchill saw in television when he said:

"I hope to see a vigorous revival of healthy village life . . . what with modern methods of locomotion and the modern amusements of the cinema and the wireless to which soon will be added television, life in the country and on the land ought to compete in attractiveness with life in the great cities."

These leaders and others in political, economic, social and religious life see in television the great scientific accomplishment which will break down the last barriers of man's isolation.

Now, to the magic of radio sound, has been added the magic of sight. A much greater revolution is ahead of us than when sound was added to the motion picture. The Chinese proverb states "One seeing is better than a hundred hearings." From this, I would deduce that the relative importance of television over radio—FM or standard broadcasting—is in the ratio of 100 to 1.

Let's see how this new system of communication—television—is going to work to help sales managers sell more goods, thereby keeping our farms, factories and services busy and making more jobs.

First, listen to this radio commercial selling Beer:

ANNR: Believe me, men . . . for a real thirst-quencher, there's just NOTHING like a cool foaming glass of Ruppert beer! The minute you pour it out, you see how clear and sparkling and golden it is . . . makes you thirsty just LOOKING at it! Now taste it . . . enjoy its smooth light mellowness! Yessir—Ruppert beer is mellow-light . . . it tastes just right! But don't take my word for it . . . NEXT time, say: "Make mine RUPPERT!"

TOM JOYCE: (LIVE REMARKS TO EFFECT THAT: "Well, in television we don't HAVE to take some announcer's word for it . . . We can SEE the enjoyment Ruppert's brings!") (LIGHTS ON STAGE "A" . . . MAN HOLDING GLASS AND BOTTLE OF RUPPERT BEER . . . HE POURS IT INTO GLASS . . . LETS IT FOAM . . . LICKS "CHOPS" IN ANTICIPATION . . . THEN DRINKS AND REGISTERS INTENSE SATISFACTION)

TOM JOYCE: (LIVE REMARKS TO THIS EFFECT: "Or let's say you're selling overalls—with radio, it's a case of 'listen' ";)

(Continued on Page Twelve)

Television and Post-War Jobs

(Continued from Page Eleven)

No. 2

ANNR: Men, if you're doing a war job . . . you need work clothes that can "take it" . . . so when you buy overalls, insist on "No Rip"! Are they TOUGH? Well, you've seen their trademark . . . six men in a tug o' war! Yes . . . it's a FACT! "No Rip" work clothes are SO tough . . . SO durable . . . the seams are SO sturdy . . . they just WON'T rip . . . no matter WHAT kind of punishment you give 'em! They're guaranteed—a brand-new pair if they rip or tear! So NEXT time, get "No Rip"—you'll see that "No Rip" means longer wear!

TOM JOYCE: (LIVE REMARKS TO THIS EFFECT: "All right now—let's SEE how strong they are!") (LIGHTS ON STAGE "A" . . . GIRL HOLDING OVERALLS . . . THREE MEN ON EACH SIDE . . . FIRST IN LINE EACH PICKS UP A LEG . . . TUG O' WAR)

TOM JOYCE: (LIVE REMARKS WHEN OVERALLS RIP: "See? In television you have to be **careful** what you promise—I'm going right back to the manufacturer and demand a **new** pair!"

* * *

TOM JOYCE: (LIVE REMARKS TO THIS EFFECT: "This next manufacturer hasn't gone in for radio advertising . . . because he doesn't think mere words can adequately describe his product . . . I'm inclined to agree:")

No. 3

ANNR: Listen, lady—if you could only SEE how easy it is to operate an ELECTROLUX, you'd never be satisfied with any other cleaner! No heavy machinery to push around . . . just a light wand that obeys your every command! And what a cleaner! Dirt disappears as if by magic. But there's only one way to find out how superior Electrolux is—that's to actually SEE it in operation! So tomorrow—phone the Electrolux Corporation for a free home demonstration.

TOM JOYCE: (LIVE REMARKS ALONG THESE LINES: "Right! The only way to appreciate an Electrolux is to see it in action . . . Television will bring the Electrolux demonstration into millions of homes. No one will shut the door on a demonstration via television, which shows the housewife how to avoid drudgery. (LIGHTS ON STAGE "B" . . . GIRL CLEANS RUG AND HUMS "TAKE IT EASY")

* * *

TOM JOYCE: (LIVE REMARKS TO LEAD INTO NO. 4: "Here's ANOTHER products that defies radio to do it justice:")

No. 4

ANNR: Now let me tell you about Tuf-Flex, that miracle of glass-making developed by the Libbey-Owens-Ford Glass Company. Tuf-Flex is the amazing heat-resistant and shock-resistant plate glass that's from three to seven times stronger than ordinary plate glass. It's SO tough that you can pound it with a sledge-hammer . . . so FLEXIBLE that in actual tests, Tuf-Flex has supported the weight of a two-ton elephant! If we only had TELEVISION, you could see, with your OWN EYES, why it's named Tuf-Flex—T-U-F, because it's tough, F-L-E-X because it's flexible—Tuf-Flex!

TOM JOYCE: (LIVE REMARKS . . . TO THE EFFECT . . . "Well, we don't have a two-ton ELEPHANT, but we DO have television! (LIGHTS ON STAGE "B" . . . SHEET OF TUF-FLEX BETWEEN TWO CHAIRS WHICH ARE HELD DOWN BY TWO MEN, WHILE TWO OTHER MEN STAND ON TUF-FLEX . . . THEY GET DOWN AND BURLEY STEVEDORE HITS GLASS WITH SLEDGE HAMMER THEN HOLDS IT UP TO SHOW IT HASN'T SPLINTERED)

Only about five per cent of the department store advertising revenues goes into radio broadcasting. That's because department store executives have found through actual experience that they must show their goods in order to sell them. Television will do just that!

Take a store like Best's, for example, which has a nation-wide reputation in baby wear. In the average year, there are born, in the area served by NBC's New York television station, 190,000 babies. If Best and Company—or some other progressive department store—has a weekly television program which will show the expectant mothers, the mothers and the mothers-in-law—not to mention the fathers—how to take care of the baby, there will be an enormous and eager audience.

On such a program would appear the outstanding authorities in the field of baby care, to show the mothers in the New York Metropolitan area—as well as elsewhere, if Best and Company chooses to use network broadcasting—the proper care of the baby.

Everything used on such a program would actually be a commercial—although not directly intended as such. The bassinet, the baby powder, the baby oil, the diapers, the toys, the food, the dresses, the shoes, the furniture, the room decorations, the outdoor playthings—every stage property, so to speak would be of interest to the hundreds of thousands looking in. The desire of these mothers to give to their babies the advantages of all the things shown on the television program would translate itself into purchases which, in turn, would translate themselves into more jobs.

Television may enable department stores to compete effectively with mail order distribution. Daily "television specials" with a telephone order service will make shopping easier and may reduce distribution costs. One sales demonstration can reach hundreds of thousands—or millions—of possible buyers. Whereas newspaper "specials," before the war, were largely designed to get the customer in the store, the "television special"—occurring at a different spot in each day's program—will be an inducement to watch the sponsor's entire program of advertised goods; and therefore will pay for itself in added sales, with far less inconvenience to the customer.

There is a lively, interesting, once-a-week television program in every department of the department store. Because the primary problem of life is living—and to make life worthwhile is the problem of the women, who spend 85% of the income. America's purchasing agents—the women—would be keenly interested in such programs. The fact that the most widely read pages in any newspaper, by women, are those of department store advertising pages, is ample proof of the interest value and sales power that will be packed into department store television advertising. All this spells one thing—more consumer buying and more jobs.

Or take the travel industry. This group, only a moderate user of radio, ranked as the most prominent television advertiser over a two-year NBC experimental period. And for obvious reasons. Bathers splashing in the surf at Miami, in the winter, and beautiful maidens sporting in the snow

at Sun Valley, stimulate more train, auto and air traffic than all the still or word pictures in the world.

So whether you're selling Buicks or bassinets or lower berths, steamship tickets or airplane tours, you're going to sell more of them by television; and what's more, you're going to have to hire *more people* to take care of the extra business. And I need not remind you gentlemen that the same goes for a host of other products, from shoes to sealing wax.

What proof have we of television's selling power as compared with other advertising media? Just this:

One of the National Broadcasting Company's 1941 television advertisers in a scientifically controlled test determined that the effectiveness of television selling was of the order of ten to eleven times greater than all the other media used by the advertiser combined.

Because television has the power to create consumer buying of goods and services beyond anything that we have heretofore known, we can count upon its helping to bring about a high level of postwar prosperity in agricultural, industrial and the distributive industries, as well as personal and professional services.

This means jobs.

Jobs are made when people decide to buy goods or services.

During the depression years, the individual savings of the American people reached a low point in 1933 with $22,292,000,000 in savings banks and postal savings. More than two billion dollars were being hoarded. Every year after 1933 the amount of money in savings banks, postal savings and the newly developed U. S. Savings Bonds increased substantially. By 1937 reached $26,265,000,000. Yet we continued to have, during this period, extensive unemployment.

People valued their money, all through that period, more than they did merchandise. It is only when people value merchandise more than money that they are willing to exchange money for merchandise. Television, properly used, has the power to make people want merchandise more than money, thus creating the necessary turnover of goods and services which alone can sustain continuing and useful jobs.

What is needed to start television immediately after the war?

First, a full agreement on television standards which will have the approval of the Federal Communications Commission so that manufacturers and broadcasting stations can intelligently plan their post-war program. If these standards are not agreed upon and approved by the Federal Communications Commission before the end of the war, obviously, television will be delayed.

Secondly, television started in a portion of the radio spectrum, which has been proved admirably suited for television broadcasting. Just now, some people are proposing that television broadcasting be shifted to higher radio frequency channels. Before the war, we started to learn just how well we could do television broadcasting at the higher frequencies, but the war interrupted these tests. We must still do this work and then make practical field tests. This will take time, even if the results are satisfactory after the first trial. It will mean a relatively long delay. In the opinion of a number of engineering experts, it will be five or more years.

It is important for the future prosperity of our people that large scale television expansion start *immediately after the war*. A nation-wide television system should come into being before the first postwar blush of prosperity begins to

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Television and Post-War Jobs

(Continued from Page Thirteen)

fade away, which based on previous experience happens when the most urgent consumer needs have been taken care of and the wholesale and retail stocks have been built back to normal.

With a television system in existence at that time, American agriculture and industry will be in a position to so present their products and services so effectively *that a high level of purchasing will be maintained, thus contributing to the maintenance of a high level of employment.* Any substantial delay in starting television after the war will prove to be a disservice to American farmers, American labor, American industry and to all of our people. The price that will be paid for this delay will be measured in terms of a reduced volume of turnover of goods—which in turn means a reduced number of jobs.

Assuming that television is given the green light and no obstacles are placed in the path of its commercial development, then this is what we may expect:

1. The development of a satisfactory home radio and television set to retail for approximately $200. Our analysis of the market has shown that 61.3 per cent of the people are prepared to buy a television set at this price.

2. The rapid expansion of television receiver sales in the first television market—that is, New York, Philadelphia, Albany-Schenectady, Chicago, and Los Angeles. Television transmitters already are in operation in these cities. This first television market has 25,907,600 people, 7,410,000 wired homes and 28.46 per cent of the United States buying power.

Within 18 months after television receivers are available at a $200 retail price, 741,000 homes will be equipped. Assuming the average viewing audience per receiver, on the basis of 741,000 equipped homes, is six people, (the present average is 10) the total advertising audience available would be 4,446,000 people.

3. Three of these markets — New York, Philadelphia and Albany-Schenectady — are already broadcasting television programs originating at a central source. Thus, the nucleus of a television network has already begun.

Within three or four years after the commercial resumption of television, a network will connect the main cities on the Eastern Coast between Washington, D. C., and Boston, Massachusetts, and by the end of the fourth year, a 1,500 mile network circuit will connect the Middle West with the Atlantic Seaboard. This trunk line television network just outlined, with the secondary networks that would be offshoots from it, will serve the 19-state area bounded by Illinois and Wisconsin on the West and Virginia and Kentucky on the South. There are approximately 70,000,000 people in this area. It represents approximately 62 per cent of the purchasing power of the country. All of this development can be expected to take place approximately five years after the full commercialization of television.

4. Within five years, television transmitting stations will provide coverage for the 157 key cities of the United States.

5. It would also be reasonable to expect that by the end of the fifth year, after the full commercialization of television, the engineers of the industry should be able to develop a low cost automatic rebroadcasting television transmitter to provide coverage of the smaller markets.

The American Telephone and Telegraph Company has announced that it is tentatively planning to construct "between six and seven thousand route miles of coaxial cable in the next five or six years." Should these facilities be available for television, so much the better. So whether we have radio relays or coaxial cable, or both, as is likely, it will be economically feasible to bring television service ultimately to practically every home in the United States.

It would not be unreasonable to assume that within ten years after the full commercialization of television, television service would be available to 23,700,000 wired homes or 80 per cent of the wired homes of the United States. This would represent an audience of about 112,000,000 people and approximately 82 per cent of the total U. S. buying power.

Television industry sales at this point should be, approximately, 2,500,000 units per year for a total retail billing of between six hundred million and seven hundred million dollars. This billing, together with replacement tubes for existing receivers, service, transmitter sales, television advertising revenue, etc., will make television the billion dollar industry that many have prophesied it will be.

On your way out, you will see on Dumont, General Electric, Philco and RCA television receivers, television commercials the way they will look in the home. Remember, all these receivers are pre-war production. Unquestionably, each of these manufacturers knows how to do the job better today and at lower cost. Make allowances for the fact that these television receivers are in a ballroom. Remember television will be in the living room. It is intimate. It is personal. And remember, too, that the present size of the picture is no indication of what will ultimately be available. We have successfully shown television pictures on a theatre screen 16 feet by 20 feet.

Before closing, I would like to cover one more fact of television—a very important one— *entertainment!* What form will it take?—what about talent?—where will it come from?—will television get the top flight stars? Let's ask an expert for the answers—an expert whose organization has a television department in full operation and is now supplying talent to television stations and advertising agencies. Let's ask William Morris, Jr., president of the William Morris Agency, one of the oldest and largest theatrical agencies in America with a star-studded roster of artists and performers in every field of entertainment. Among them, Orson Welles, Judith Anderson, Merle Oberson, Tallulah Bankhead, Burns and Allen, Dinah Shore, Milton Berle, Red Skelton, Joe E. Lewis, Olson and Johnson, Sigmund Romberg and scores of others. This is what Mr. Morris says about the availability of talent for television.

"I believe that there will be a parallel in the devolopment of television to the early periods of motion pictures and radio when performers cooperated fully by offering their services at reasonable fees. When motion picture shorts were the proving ground for today's full-length super talking motion pictures, actors, producers, and directors cooperated by working for minimum salaries. The same will hold true for television. Talent will be the key to television entertainment and whether that entertainment takes the form of live shows or film—*or both,* you will find a willingness on the part of the artists to make their contribution to the furtherment of this new industry. Obviously, their reward will come later as it did in motion pictures. Yes, expect the finest in entertainment thru this new medium—both from the world of talent that has already achieved fame and from an untapped world of new faces, new names, new voices that looks to television for expression of their artistry."

TOM JOYCE: Let's exemplify what Mr. Morris means.

Listen to a little of this piano concert the way you would hear it over your radio.

RECORD—KORBEL PIANO SOLO. That might be Brailowsky. It might be Horowitz. It might be Rubinstein. Unquestionably, it's a great artist with a great talent. If you did not hear the announcement before or after the program, you would not know who was the soloist. But this is what television would show:

CURTAIN—BOY SEATED AT CONCERT GRAND PLAYING (use telephone book on chair). Now, you gentlemen have the imagination to recognize what the impact of such a demonstration would be on a typical American home. Every mother thinks her son has in him the spark of genius. Certainly, any mother seeing and hearing Richard Korbel perform would be inspired to have her son play the piano or some other musical instrument. Consider the demand that such a program—even though it were not selling pianos directly—would create for pianos and sheet music. Think what it would do in arousing the competitive spirit in American youth. Millions of boys and girls would say: "Well, if that kid can do it, I can, too—except twice as good!"

That's what Paul Hoffman meant when he said: "I would not be the one to say that a so far-reaching development as television could not be responsible, within the next decade, for increasing the demand for goods and services by as much as 10%. That would mean, potentially, 4,600,000 new jobs that have been created as a result of the increased purchasing of goods and services brought about by television."

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HOLLYWOOD NEWS

By Bob Jensen

WEATHER . . . RAIN . . . also SNOW, HAIL, THUNDER and LIGHTNING!
(To h—— with the C. of C. And you, too, Brooke.)

1A IS no longer a rumor around Hollywood but is fast becoming a large, hairy hand that is picking us up one by one. First to be grabbed was **Louis Onofrio.** He's in and reported to Fort McArthur, March 15. Louie dropped back a few days later, but his uniform didn't look as if it had become accustomed to the framework of former civilian Onofrio. **Cravens, Bryant, Platt, Cooley,** and **DeGrazzio** all were in 1A but have received deferments. Two left are **Brown** and **Jensen,** and rumor has it that the latter is a little concerned about the matter.

Lt. Bob Brooke dropped in from Mare Island Navy Yard for a visit. Nice to see you, Bob . . . **Capt. Figgins,** former Maintenance Supervisor, seen visiting with Jim Brown . . . **Bill Moyer** left NBC March 15 for the Pacific Northwest. Sez he likes apples and salmon fishing better than oranges and Hollywood cheesecake . . . **Pickett** reports Engineering Department did more than their share in War Bond Drive . . . **Hobart** still smoking El Ropo cigars . . . **Hal Lea,** formerly KPAS, joined Recording Group, March 16. Hobby is collecting phonograph records—H'm-m . . . **Hal Platt** leaves Recording to go to Field, which makes **Bob McGaughey** a Studio engineer . . . **Bert Korngold,** Recording Clerk, arrived from Mail Room . . . **Jim Thornbury** out with flu for two weeks . . . **Lt. Tom Casey,** former Chicago announcer, dropped in for visit. He's stationed at Salinas . . . **Max Burnam** still complaining about high cost of living. Cost him $2.00 to jaywalk the other day . . . Maintenance abandoning all-night watch except for Saturday and Sunday. **Bill Comegys** happy because it's only two nights instead of five now . . . **Joe Kay** doing a fine job in getting Field gear simplified and in better condition . . . **Lew Winkler** taking course in "Industrial Applications of Electronics" at UCLA War Training School. If you ask me, he should be teaching it . . . **Saxton** and **DeWolf** looking over yellow pages marked "Application for Employment". Wonder why? . . . **Eddie Miller, Charlie Norman, Al Korb** and **DeGrazzio** waiting for Steel Head Salmon to start running on Santa Ynez river. Transportation? . . . **Louis Benvenuto** known as "soap opera kid". He covers Across the Treshold, Gallant Heart and Confessions . . . **Pickett** still heating his apartment with old record boxes, and he's not the only one . . . **Lt. O. H. Underkofler,** U.S.N, formerly with KFAB, Lincoln, Nebraska, called us up the other day, on his way from Pearl Harbor to a Naval Base in the States. Saw the whole thing on Dec. 7, and probably knows more about the Pearl Harbor attack than any other radio engineer in the business . . . House formerly occupied by Engineer **Bill Knight** literally blew to pieces from a gas explosion. Good thing you sold it when you did and moved back to Chicago. How's the optical business, Bill? . . . **Charlie Norman** off to South America with the Bob Hope show. Lucky guy . . .

DRAMA! (Sound—phone rings) "Maintenance, Wick speaking," Voice, "Will you please come right down to D and exercise my normals?" (Remainder censored) End Drama.

Wait a minute. Here's another phone call: "Mr. Jensen, you have a letter from "the President of the United States, 'Greeting' "—Ye Gods, that's me! 88.

BLUE DOINGS *from Hollywood*

By Norman Dewes

FEATURE STORY this month (or ANY month, for our money) is "our MISS BLUE" (see pic this issue). In real life **Helen Wendt,** Hlyd Blue Engineering's gal Monday thru Friday brightens the corner where Mr. Denechaud is, Room 319. Miss Wendt, who holds down the job of house mother AND pin-up gal for the fellows and maid-of-all-work for Denny, came to Engineering from Program Traffic about a year and a half ago, where she was secretary to Cliff Anderson and before that to Marvin Young. Helen makes out the schedules and manages to keep 'em straight, keeps track of the boys on the road AND sees that the swindle sheets at least LOOK logical. You'll always find several of the gang a'sittin around the office SANDBAGGING the boss, but LOOKING at Helen. She thinks

—photo by Ragsdale
". . . Our Miss Blue"

ALL engineers are CRAZY, but we love 'er, for she does many little things which help to make the days pass pleasantly. She is our OSCAR gal . . .

RUMOR DEP'T . . . hear tell of a FABULOUS 5% (Peak:—3½% RMS!) boost for some engineers on another network . . .

To get this weather routine over with, we have had large amounts of every variety . . . all UNUSUAL, Thunderstorms with lighting, SNOW on L. A. streets and Valley roofs, and RAIN all over the place. As happens every year, storm drains overtaxed and transportation tied up due to lack of enough ROWBOATS to go around. Beautiful DAMSELS standing on corners HELPLESS to span raging curbstone torrents and many mechanized SIR WALTERS driving up and spreading their cars so damsels can climb thru rear seats . . . it's a GOOD GAG, especially if you wire the far door shut and drive off RAPIDLY as soon as she's inside. To top it all off, the boys who manufacture the kilowatts decide that they ain't happy and STRIKE, leaving large portions of the town in darkness for several days, until the ARMY takes over. Citizens in mad search for candles, kerosene lanterns, perfume lamps, or ANYTHING that will give off light . . . guys with all-electric houses freezing and starving in the darkness, BESIDES not knowing what TIME it is. That's CALIFORNIA for you . . . never a dull moment.

Denver News

By K. N. RAYMOND

THE Denver Chapter had the good fortune recently, of having one of its war-time engineers back on a furlough. He is Warrent Officer A. C. McClellan. Al has been in the Navy now for three years, being the first man to leave KOA to enter the service. A member of the Naval Reserve, he was called in before Pearl Harbor. During a luncheon held in Al's honor, he related his experiences of the last three years, which sure kept all the boys on the edge of their chairs. We all enjoyed the visit with him, and are wishing him all the success possible.

The winter sport enthusiasts, such as "Chief Peregrine," "Shus Rohrer," and "Cristy Neal," have been able to do a little rationed skiing due to memo pick-up, such as Camp Hale. Perry handled the recent Lowell Thomas show, and in the week at Camp Hale, managed to get the boards in fine shape.

George Anderson TE has been concerning himself with a local Army air field problem. Soap opera and commands don't mix well. George also reports that he has seen some swell post war ham equipment; in fact, his mouth has been watering ever since.

Denver's advent of some Spring-like weather has produced many day dreams among the ardent flyrod experts, such as "Three Pounder Kahle," "Lost His Worms Thompson," and "Plug Nessibet". They are all going around with that May 15th look, it won't be long before the Monday t-a-l-l tales will begin.

"Oil Can Nessibet" TE is again having troubles, such as trying to oil oiless bearings, and putting too much oil on the fan at the transmitter. Result—everyone gets a free oil beauty bath.

Aubry Blake SE recently married, is now taking on that contented married look—gaining weight! Our secretary, Blake, wishes to thank all the members for their fine cooperation in putting over the new method of collecting Nabet dues, making it possible for Denver to be among the first to send in the National dues.

Gene Carpenter SE, the gentleman farmer, is looking forward to a good year on the old five acres. The place is sure taking on that farm look now, with a cow and calf and two pigs. Transmitter engineers are concerning themselves with the latest seed catalogue, anticipating that Victory gardening.

Dobby Dobbins TE is sporting a new set of "China Clippers" and the reports from the transmitter are that all the chairs and desks are taking on that ragged look where he has been practicing. Maybe what they need is some termite exterminator.

Milt Hall is devoting his spare time to a compressor for the ham rig, so that he can really put it out.

Vern Andrews SE is occupying his time building a vacuum tube voltmeter and an audio oscillator. George Pogue is now spending his time looking for spare mikes to use on choral pickups.

Flash! . . . Dutton TE comes to a meeting saying that housekeepers are harder to keep than money on March 15th.

D. D. Kable, after rebuilding that fine 1936 model, reports that he will have no difficulty making those early morning open ups. He now has a new head, new door, new battery, less some volts in the transmission, and two new tires.

The Denver editor wants to ask forgiveness for missing a few editions. A new addition to the Raymond's family in the form of bouncing 7 lb. 11 oz. baby boy, has accounted for a slight interruption in the routine of the Raymond household.

FLASH . . . FLASH . . . Sup. Rohrer and company surpass the Raymond edition with a boy weighing 7 lb. 11¾ oz., mother and child doing fine. It would appear that those wishing boys in their family should swing over to the early morning trick!

Cathode-Ray Tubes

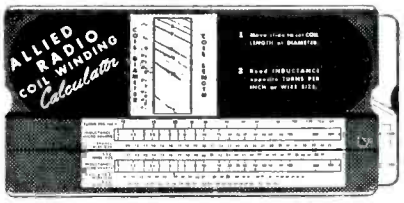
(Continued from Page Four)

differ in phase, the electron beam is again subject to two forces, but this resultant varies continuously. The movement of the electron beam will then be in the form of an ellipse, whose dimensions will depend upon the values of the deflection voltages and the phase angle between them at any instant. As this phase angle between the two potentials becomes greater, the resultant ellipse becomes broader and broader. When the phase difference is precisely 90°, the resultant wave shape is a perfect circle. It will be noted that when two sine waves of equal amplitude and frequency but 90° *out of phase* are added together, the result is a circle. From this discussion it will be seen that various known values of deflection voltages applied to each of the sets of deflection plates, will produce various images on the screen. These figures are commonly referred to as Lissajous Figures.

When a cathode ray tube is used to observe or measure wave shapes, it is general practice to apply the (unknown) voltage to be measured to the vertical deflection plates. In order to *compare* this unknown wave shape, and create a similar wave shape image upon the viewing screen, a timing wave form must be applied to the horizontal deflection plates. This timing wave form is known as a *time base,* and will be considered in greater detail in the next chapter of Elemental Electronics. Suffice to say now, that a *time base* is a locally-generated *known* wave shape with which an unknown wave form may be compared. The known wave shape, or time base, is generally applied to the horizontal deflection plates.

Although the electron beam is capable of being deflected in either of two directions, it is not possible to record two phenomena simultaneously. To remove this disadvantage, *multiple tubes* with separate beams have been made, each beam controlled by a system of deflection plates — and two results are recorded on a single screen. With low accelerating potentials, very little interaction between the two beams is experienced.

The cathode ray oscilloscope or oscillograph is a testing instrument containing a cathode ray tube, a suitable operating power supply, and a time base generator. It is used for the observation and measurement of wave shapes. There are a number of commercial types of oscilloscopes on the market, and detailed technical data on individual units can be obtained from the manufacturer or by reference to any radio engineering text.



NEW COIL-WINDING AND RF RESONANCE CALCULATOR

We are pleased to announce to our readers the release of a new slide-rule type rapid calculator, permitting quick and accurate determination of inductance, capacitance, and frequency components of series or parallel tuned RF circuits as well as inductance, turns-per-inch, wire type, wire size, coil diameter and coil length for single layer-wound solonoid type RF coils. All values, in either case, are found with a single setting of the slide and are accurate to within approximately one per cent for coils ranging from one-half inch to five and one-half inches in diameter and one-quarter to ten inches in length. All possible combinations within these limits are shown. *Wire types and size* include 11 to 35-gauge plain enamel, 11 to 36-gauge S.S.C., D.S.C., and S.C.C., and 12 to 36-guage D.C.C. The rule is also engineered to indicate: *turns-per-inch* from 10 to 160; *inductance* from 0.1 to 15 microhenrys; *capacitance* from 3 to 1,000 micromicrofarads; *frequencies* from 400 kilocycles to 150 megacycles with equivalent wave-lengths in meters. The speed and accuracy with which these factors can be related provide the engineer, maintenance man, service man, amateur, student, instructor, and experimenter with an invaluable tool. Priced at 25 cents each. Send order and money to Allied Radio Corporation, 833 West Jackson Boulevard, Chicago 7, Illinois.

Engineers Feast on Geese

By Bert Pruitt

LAST minute get-together parties have the tendency to stretch out until the wee hours of the morning show there is no more stretch left. That's the way the party, that engineer Glenn Morr went to, stretched itself.

The friendly winter moon smiled down at Glenn and he smiled back. He's a sociable sort of fellow and if a mule smiled at him you can rest assured he would return the favor.

Glenn crossed the street at E9th and Superior. A glance at his wrist watch told him it was 3 A.M. He was due at the studios at 4:30. He decided to take a snooze in the NBC Bldg. He was soon stretched out on the lounge in the 1100 Club.

Barney Pruitt came in at 4:30 and there sat Glenn in the Master Control Room. You didn't have to be a professor of Facial Expressions to come to the conclusion that Glenn hadn't slept well. He was rubbing his eyes and he looked as though he had tried to sleep on a potato grater. Barney took one look and said:

"Why don't you go to bed at night? Look at me! I went to bed at 5:30 yesterday afternoon. I feel fine!" Glenn looked, and sure enough, Barney looked as wide awake as a gold fish at feeding time.

"I tried to sleep down here but the wild geese kept honking . . . they must be going south!"

"Wild Geese?" Barney sidled over and tried to get a sniff of Glenn's breath. "Are you sure it wasn't a traffic jam out front?"

"No . . . they were wild geese . . . hundreds of them and they were honking as though they were starving to death!"

Barney said nothing in answer to this. He was doing some thinking, however. Freddy Wilson, WTAM's ace production man, had said something about ordering some sound effect records and Fred had been especially anxious to get the effect of wild geese winging their way through the sky. "I wonder", thought Barney, gazing at an air vent, "could Fred have been up there playing those records in the middle of the night?" Glenn headed for studio 'A' and Barney got sleepy and forgot all about the geese.

Harry Caskey and Frank Whittam were up on the roof working on a high frequency antenna system. The wind was blowing in from Lake Erie and the swiftly moving, low hanging clouds dipped low as though in salute to two of the hardest working engineers in the middle west. It looked like old Mother Nature was getting ready to have a tantrum and shoot the works.

"Look!" Harry could not believe his eyes.

Frank looked, and neither could he. There stood Glenn Morr dressed like a polar bear hunter. Cradled in his arms was a 12 guage shotgun.

"Seen any geese?"

Frank and Harry gave Morr a peculiar look. Was he trying to be funny? If so, where did the shotgun come into the humor? Frank and Harry wondered if the gun was loaded. Frank answered Glenn's question as to whether they had seen any geese. "No!"

"Well", says Glenn, "this is my day off and I thought I'd come up here and do some goose hunting while you fellows fix that antenna, but don't let me bother you . . . I'll be careful when I shoot!"

Glenn went over and stood by a vent. He shaded his eyes with his right hand. Frank and Harry told him they'd be back in about an hour. They went out, or rather, down to lunch. Glenn was gone when they came back.

"Wonder where he is?" Harry was looking at Frank.

"Probably got cold and went home!"

"What color are geese?" Harry picked up a handful of white feathers.

"Must be white."

"Guess so", said Harry.

They finished the job, then went down to the technical floor. Glenn was standing near his locker, taking off his hunting coat and hip boots. "How about you and Frank coming out to my place for a goose dinner tonight?" They wondered if they were hearing things.

I'll now attempt to tell the rest of the story as told me by Frank. You could have bowled the two of them over when Glenn invited them out to his house for dinner. Neither of them had ever eaten goose. They called their wives and told them to take it easy at lunchtime. Their wives were delighted when they heard that they were going to have a feast with the Morrs.

Frank and Harry asked Glenn to show them the geese he had killed on the NBC roof. Glenn said his wife had taken them home. She had to hurry home and prepare the geese for dinner. Glenn told them that Mrs. Morr had never cooked geese and she wanted to make sure she had plenty of time to roast them.

"Bert", says Frank, "you could have used my eyes for basket-balls when we sat down to dinner. You should have seen those geese! I have spent a lot of time on the lakes

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Engineers Feast on Geese

(Continued from Page Nineteen)

near Duluth, Minnesota, and the geese up there are at least twice as large as a wild duck, so imagine my surprise when they passed the platter and I saw geese no bigger than a banty rooster! I asked Mrs. Morr how she had managed to shrink the geese to such practical size. Well, she sort of looked at me with a hurt expression and I felt like a bashful boy reciting a poem at a PTA meeting.

"We each took two geese at the first helping and they really were delicious. I knew that Mrs. Morr was a good cook before I took a second bite . . . but I couldn't, for the life of me, figure why the geese were so small. I asked Glenn about it when Mrs. Morr went out in the kitchen to get some hot coffee. Glenn told me these were a special breed of geese that thrive in the icy wilderness up near the Arctic Circle. He said this brand of geese have their young in the fall instead of in the spring. The young geese, explained Glenn, are not able to fly when it comes time for the geese to make their annual flight south. Frank then told me about the opossum and the way a mother opossum transports her young when it comes time to move to a more modern opossum apartment. The mother opossum curls her tail up over her back and the young opossums hop aboard, curl their tails around the mother opossum's tail and are ready to venture forth into opossumland unafraid.

I asked Frank if he was hinting that a mother goose curls her tail up over her back and takes off with a cargo of young geese on her back. Frank said he wasn't sure about that for Mrs. Morr came back into the dining room and Glenn changed the subject to filter condensers.

Frank said he was convinced they were eating geese so he forgot about the size and concentrated on the taste. Six of them ate twenty-three geese. "Frank", I says, "that's a lot of goose!"

Frank said twenty of the regular honkers would feed an army, but these were special geese no larger than quail. Quail are classified as song birds here in Ohio and I knew Glenn would as soon shoot off his index finger as shoot a song bird. "Frank", I stated, "Glenn is a nature lover and spends a lot of his time out on bird walks, so if he said you ate goose then you must have eaten goose!"

He said he felt identically the same until he was crossing the public square two or three days after the feast. "Bert, do you know what I saw over there on the square?"

"Is that guy still over there trying to sell the Terminal Tower Building a second time?"

"I don't know about that, but here's what I saw over there day before yesterday. I was crossing the square to catch the Lorain car and there stood a pigeon on one leg. That pigeon was the saddest looking thing I've seen since John Disbrow lost that five dollar bet on the St. Louis Cards last fall. He had one leg up against his body and looked as though he thought the entire world was against him."

"John or the pigeon?"

"The pigeon . . . and he didn't look as if he was trying to show off so I walked over near him and when I did he stuck the leg out toward me!"

"Frank", I says, "you've been over at the Guild Bar!"

"Not a drop!" says Frank, and I knew he was telling the truth by the way he said it. "Well, Frank, did you shake hands with the pigeon?"

"This is nothing to be funny about. . . . I looked at that leg and what do you think I saw?"

"A foot!"

"Yes, and just above the foot, in the leg under the skin, was a shot from a 12 guage gun!"

"What?" I couldn't believe it. That someone had been hunting pigeons on Cleveland's Public Square just didn't seem possible in these days of world-wide expressions of humanity and good will to men.

"Not on the Public Square . . . I'll bet the hunting was done on the roof of the NBC Bldg!"

"What! Do you mean to say those geese you ate were pigeons?"

"That's what I'm wondering", said Frank.

(Left) In this picture you see a genuine cat of royalty. The cat's father was imported from a King's Palace in Afhganastan and the cat's mother lived in an alley out at Brecksville, Ohio. It is reported that the goose, the one Morr is holding, came from a Royal egg laid on the bank of a royal river somewhere south of the North Pole. Morr's sheep-skin-lined coat also has a history. The sheep in that coat came from a ranch out in Montana. The sheep kept going over to Wyoming; this provoked the farmer and the sheep went to the Chicago slaughter house. If the sheep had been content to stay in Montana the farmer wouldn't have sent it to Chicago. And if that hadn't happened Glenn couldn't have gone hunting because he wouldn't have had a sheep-lined coat. Thus anyone can see that the runaway sheep is responsible for the goose's death.

(Right) Glenn Morr, Harry Caskey, Felix Catt and Frank Whittam. Frank is our Secretary-Treasurer, Harry is our Lady-Killer engineer and Glenn is our goose hunter.

Chicago Chatter

(Continued from Page Eight)

no claim to special feeding but does admit he greets his hens with a cheery word each day.

Observing off-duty games being played in the lounge "Just-for-fun," am much bewildered by a game called **Hearts and Flowers** and another something about **Cabbage.** The Decadent sun-lamp that emits the cadaver green glow is on the way to rejuvination, according to **L. M. Mulazt** of the **Blue,** if **Minor Wilson** is able to collect enough money.

Jimmy Daugherty, recently resigned from WLS to become a member of the **Blue** engineering staff at New York's Radio City. An active member and councilmen for the WLS group he did much to foster amiable relations between employee and employer.

H. C. Eckland of the **Blue** assisting ex-**Blueite Ray Bierman** at Permaflux Corporation, reports versatile Bierman still manages to take time out to do a bit of "stunt" flying.

Ralph Brooks, NBC Maintainence and ex-Polar Explorer, is now at a local hospital.

Read new book, **Latchstring Out,** written by Swedish authoress, Miss Skulda Banner. All about the folks in Ironwood, Michigan, and fish candy. NBC Supervisor **Bill Cole** lived in the same block and recalls Miss Banner and all the people she writes about . . . and the fish candy.

W. H. "Bill" Cummings can be found scooting around the studios these mornings for he is an important engineering portion of the **Blue** show **Sweet River.** Otherwise he is one of Brother **Rife's** Field Boys.

Maurey Donnelly of WLS had half of his stomach removed during the middle of February and just about six weeks later connived with him over a bottle of milk and he claims he feels like a twenty-year old and looks swell. Sez he eats twice as much as before.

NEW TELEVISION STATIONS

From FCC Report No. 1491:

Jamaica (NY) Radio & Television Co. 250 watts, 66-72 mc.

From FCC Report No. 1527:

DuMont, Washington, D. C. W3XWT. 4 kw peak video, 2 kw audio.

Louis Wasmer, Inc., Spokane, Wash. 50-56 mc.

From FCC Report No. 1532:

RCA, Camden, N. J. W3XAD, 321-327 mc, 500 watts peak.

RCA, Camden, N. J. W3XEP, Chan. 5, 84-90 mc., 50 kw peak.

Broadcasting Corp. of America, Riverside, Calif. Chan. 3, 66-72 mc.

From FCC Report No. 1534:

Westinghouse, Inc., Boston. Chan. 5, 84-90 mc.

Westinghouse, Inc., Phila. Chan. 7, 102-108mc.

Westinghouse, Inc., Pittsburgh. Chan. 1, 56-60 mc.

RCA PUBLISHES BOOKLET ON TUBE SUBSTITUTIONS

A comprehensive Tube Substitution Directory, the most complete list of its kind ever offered, designed to help radio dealers and service men use available tubes in place of hard-to-get types in servicing civilian radio receivers, has just been published by the Radio Corporation of America, through its Commercial Engineering Section, 596 S. Fifth Street in Harrison, N. J. Available for ten cents.

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Harold Brandt Takes the Mike

By Bert Pruitt

ISABELLE TAPE was born in Brecksville, Ohio, during the summer of 1918. Her father, Oscar Q. Tape, was a munitions Czar during the last war. He amassed an imposing fortune that would easily have taken care of the Tape *descendents* for generations to come had it not been for the depression that came in the late 20's. Oscar Q. Tape was not the type to cry over spilled milk, however. When his fortune was all gone he applied for and was given a shovel.

"Oscar Q.," said the WPA foreman, "go out there and assist those brave fellows in their gallant effort to move that hill seventeen feet due east of the point at which it now stands".

Oscar Q. joined the group and commenced doing exactly what the other 500 men were doing. He did this for an hour or so, then came to the conclusion that he had leaned on his shovel long enough for one day. He socked his shovel into the hill, lifted some dirt and carried it 17 feet due east where he deposited it in a small valley that was destined to become the second Bunker Hill of America!

Isabelle Tape was blossoming into womanhood as Bunker Hill slowly emerged from the valley. She used to hurry home from school each day in order to witness these men *work*. They all seemed to be so carefree and happy. None of them showed the frantic hustle and bustle of the average group of Americans set on setting the world on fire with their confidence and ambition. Their apparent satisfaction may have been due to the fact that they had vision enough to foresee the day when porterhouse steak would sell for 75 cents a pound instead of 21 cents. On the other hand, that may not have been the cause of their happiness at all. But regardless of the cause Isabelle watched them work and soon developed a few ideas of her own.

"Father," she exclaimed one night, "I'm going to be a radio engineer some day!"

"A what? questioned Oscar Q.

"A radio engineer . . . they work in radio stations."

"Why daughter dear, why in the world would you desire to wear overalls and shovel coal into a firebox for a living?"

"They do not shovel coal father; I was talking to John Disbrow the other day and he says it is a dignified and honorable profession."

Isabelle graduated from high school and Bunker Hill grew into a midget mountain. Snowball fights were numerous atop Bunker Hill during the long winter months when the ground was frozen too hard for a government shovel to penetrate it. Fighters donned in fighting mittens lined up their battle paraphernalia and aimed snowballs at each other's chins. Stonewall Jack got a black eye when A. C. Fitzsocket wrapped some snow around a billiard ball and let fly.

Then a fellow by the name of Adolph got ambitious. That put an end to the growth of Bunker Hill. Stonewall Jack and A. C. Fitzsocket were two of the first men to volunteer to fight the Nazis and Japs. Their experience gained by snowball fighting on Bunker Hill helped them considerably when it came to the art of tossing hand grenades into a fox hole full of stubborn Japs. They both highly recommend snowball fighting as a regular part of the Army's training program.

Oscar Q. Tape began making munitions and Isabelle Tape went to college to take a 90-day course in radio engineering. She attended Fred Everett's class and graduated with high honors. Employment scouts from the Cleveland radio stations were all intent on signing Isabelle to an engineering contract. Scouts from station WUHU got her Jane Henry on the dotted line; this was accomplished in the following manner.

Two clever WUHU talent scouts drove out to Burton, Ohio, and studied the dress of the Amish farmers. They then purchased two complete Amish outfits and let their beards grow on the lower halves of their faces. They went to college on Graduation day! And they were dressed like two Amish farmers. Imagine the surprised looks that spread across the faces of the scouts from the other Cleveland stations. While the surprised scouts were standing there goggled-eyed our two Amish-dressed scouts dashed past them and signed Isabelle to a 20 year contract before the other scouts realized what was taking place. Fred Everett became so disgusted he requested a transfer to the New York Engineering Department.

Engineer Tape had not been working long at station WUHU when the Chief Engineer, Miss Josephine Ozite, called her into her office.

"Miss Tape," began Chief Ozite, "we want to do something different for a change . . . have any ideas?"

"Well, Chiefess . . . how about a broadcast from Bunker Hill?"

"Let's see . . . Bunker Hill . . . oh, yes, that's down near Boston . . . we could not afford anything like that. Our station manager, Miss E. T. Platter, wouldn't stand for an expensive broadcast like that."

"Not the Bunker Hill near Boston . . . I mean the one out near Brecksville . . . and what kind of face powder do you use, Miss Ozite?"

"Oh, yes, that's an excellent idea . . . I use Cody's . . . I'll talk about it to Miss Spark Gap our program director . . . and that's a nice shade of lip stick, Miss Tape."

"Thanks Miss Ozite . . . I bought it at the dime store . . . Do you think there's a possibility of me being able to purchase a better grade through a slight increase in pay?"

"Wages," says Miss Ozite, "are frozen for the duration!"

"And so is her face!" thinks engineer Isabelle Tape, slamming the chief's door.

Miss Spark Gap thought the idea well worth while, especially after Miss Mable Voucher of the Accounting Dep't advanced them $2.27 for the broadcast.

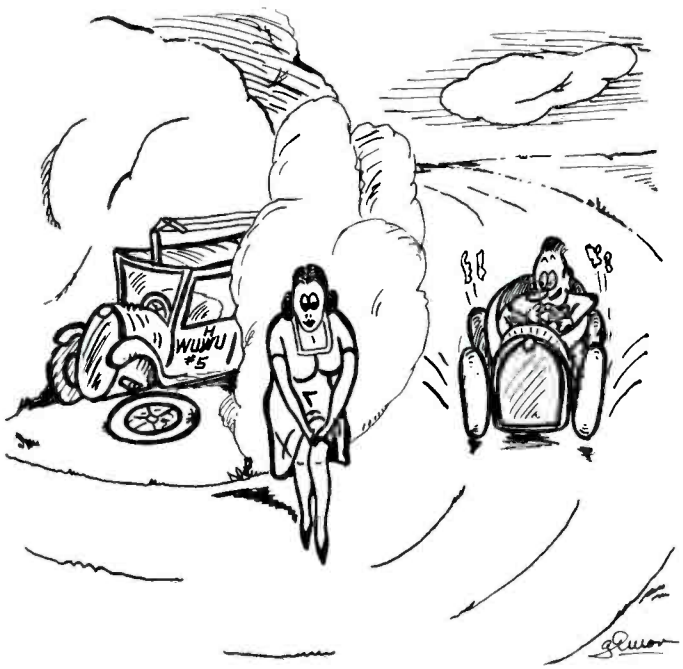
Engineer Isabelle Tape was assigned to make the pickup. "Let's see," thinks she, "I'll need an MP-10 . . . a portable telephone . . . powder puff . . . spare batteries . . . lipstick . . . three microphones . . . one hair ribbon . . . screwdriver . . . extra package of hair pins . . . three extension cords and some dime store rouge."

She blew a tire on the curve south of Independence, Ohio. "Goodness, gracious," thinks she, "how in the world do you take a wheel off this thing?" Isabelle Tape was not

one to give up without a struggle. She'd combated some serious situations successfully before.

Isabelle found a wrench under the seat and powdered her nose. She then applied the wrench and loosened all of the nuts except one. The last one hung on like a leach so she gave a mighty twist and loosened it. The nut and bolt both came off and the wheel rolled down the highway. The Unit's front axle took a good sized chunk of cement from the highway when it hit.

Isabelle failed in her attempt to make the spare wheel fit the axle. Something was obviously wrong. "Oh, fiddlesticks!" said she, "here comes a car and I'll ask them for a ride to Bunker Hill". The car stopped and a farmer stuck his head through the lowered window.



"Please drive me to Bunker Hill!" pleaded Isabelle.

This farmer had heard a lot of jokes about the city slicker's daughter, but this one topped them all. "Does not," thinks he, "she realize we are fighting a war? And hasn't she heard that gasoline is being rationed?" "Just how," wondered he, "can city people be so dumb?" He did not say that to WUHU's ace engineer . . . he did say, however:

"Bunker Hill? I have an 'A' card and that wouldn't take me a third of the way to Buffalo, much less to Boston!" Whereupon he rolled up his window and shot down the highway with little regard for the 35 M.P.H. speed limit.

Harold Brandt had been to Cleveland to see Barney Pruitt and Alvin McMahon about some tomato plants for the WTAM Victory Garden. "By Ned!" thinks he, rounding a bend south of Independence. "Can that be WUHU's Mobile Unit squatting there by that mulberry tree?" Sure enough it was. Harold stopped his car to lend assistance to an engineer with a flat.

"Oh, Mr. Brandt," exclaimed Miss Tape, "I'm in trouble!"

Harold stopped dead in his tracks. Fixing a tire is one thing . . . becoming involved in a kilocycle scandal is another story.

"My tire's flat!"

"Oh!" exclaimed Harold with a sigh of relief . . . "That's nothing . . . we'll have it fixed in a jiffy."

"We haven't time . . . our broadcast is scheduled for three and it's 2:30 now! They'll fire me if I miss this pickup and I just love engineering . . . Oh, Mr. Brandt, what'll I do?"

"We'll throw the equipment in my car . . . oh, yes, where's your broadcast coming from?"

"Bunker Hill . . . the one near Brecksville."

"I know where it is . . . we'll be there in ten minutes."

They made it in nine flat. Harold and Miss Tape sat their equipment on Bunker Hill. "Miss Tape," said Harold, "where's your announcer?"

"Oh, dear . . . I hadn't thought of her, Mr. Brandt . . . she must have had a flat too . . . did you pass a woman with a flat on your way out from Cleveland?"

"Not that I know off."

"Then she's lost . . . goodness, Mr. Brandt . . . what'll we do?"

"How about me doing the announcing?"

"Oh, Mr. Brandt . . . you're the sweetest thing in radio!"

They received the cue to go ahead with the program. Harold took the air and worked the microphone like an old timer. He gave a vivid description of Bunker Hill and the surrounding country. "My," thinks engineer Isabelle Tape, "I would never have suspected that Mr. Brandt is such a brilliant extemporaneous speaker!" Having lived in the near vicinity of Brecksville for the past fifteen years proved to be of tremendous help to Harold. He ran into no serious difficulty describing the habits of the sly fox that inhabits the caves in the rocky hillsides south of Brecksville where Bunker Hill stands. Harold then devoted ten or fifteen minutes to a detailed, yet colorful, description of the Metropolitan Park System that lies directly East of beautiful Brecksville. Due to his having been a student of biology, each grasshopper and cricket there on Bunker Hill furnished him with an unlimited amount of subject matter. Harold finished the hour's broadcast with a breathless description of the Battle of Lake Erie.

"Oh, thank you, Mr. Brandt," exclaimed Miss Tape; you did a wonderful job of announcing . . . much better than our announcer, Miss Condenserphone, could have done . . . and you have amazing descriptive powers that should take you far in the field of announcing. And Mr. Brandt," continued Isabelle Tape with a coy look, "your voice is full of frequencies that do things to . . ."

We realize that we should never interrupt one when a lady engineer is talking, but we feel that the readers of the *BEJ* are not interested in hearing a strictly *technical* discussion between two radio engineers there on Bunker Hill. Therefore, we leave them alone to discuss frequency modulation and the post war possibilities offered by television.

We cannot, however, end this story without advising you that Harold Brandt became a mid-west hero over night. The management of radio station WUHU offered him a job as Chief Announcer but he modestly refused the offer. The Brecksville Chamber of Adverse insisted on electing him to the Office of President but Harold's retiring nature caused him to decline this liberal offer made by Brecksville's appreciative citizens. The station where he works came through with a five per cent (—peak; about 3½% RMS!) raise and Harold's modesty naturally prevented him from declining it.

IT SEEMS I NEVER HEARD THIS SOUND BEFORE

I was sitting in my office, ruminating about the good old days before preference ratings and synthetic girdles, and I said to Frank, "Let's hear that playback of the recording you made while I was out borrowing a couple of points for the little woman."

So Frank deposited his chiclet in his special chewing-gum conservation container and said, "Boss, it's solid!" And I said, "The description as expressed in the vernacular will neither sway nor influence me — play."

So Frank said, "Close your eyes and open your ears." Which I did. And then it happened. It is given to me neither to praise high nor scorn low. But it did seem that the sounds issuing from the speaker were such as to inspire a modicum of amazement.

"Whodunit?" I asked. "I did it with my little turntable and Advance Glass Base Recording Blanks," said Frank. "Dim the commercial," said I, "and tell it to me in words of one syllable."

"Well, Boss," said Frank, "those Advance Blanks came in this morning, and I thought I'd give them a spin myself. How do you like it?" And I said, "Such fidelity can only be the work of some demon who's trying to make a mess of my emotions. How many recordings did you cut?" And Frank said, "Five", "And did they all sound like that?" I asked. "Definitely!" said Frank.

"How come?" I asked. "That I cannot answer," said Frank. "All I did was the cutting, but that is the info about these blanks. Advance Blanks are coated with a special formula, and they give, as you have witnessed, boss, exact reproduction . . . and they can be played back indefinitely. Also they have an unlimited frequency range. Also . . ."

"Stop, Frank," I said, "let me have a turn at the table with an Advance Blank." "Okay, boss," said Frank, "I have to go out anyway. I've got a date with the Red Cross to give some blood, and you might do the same."

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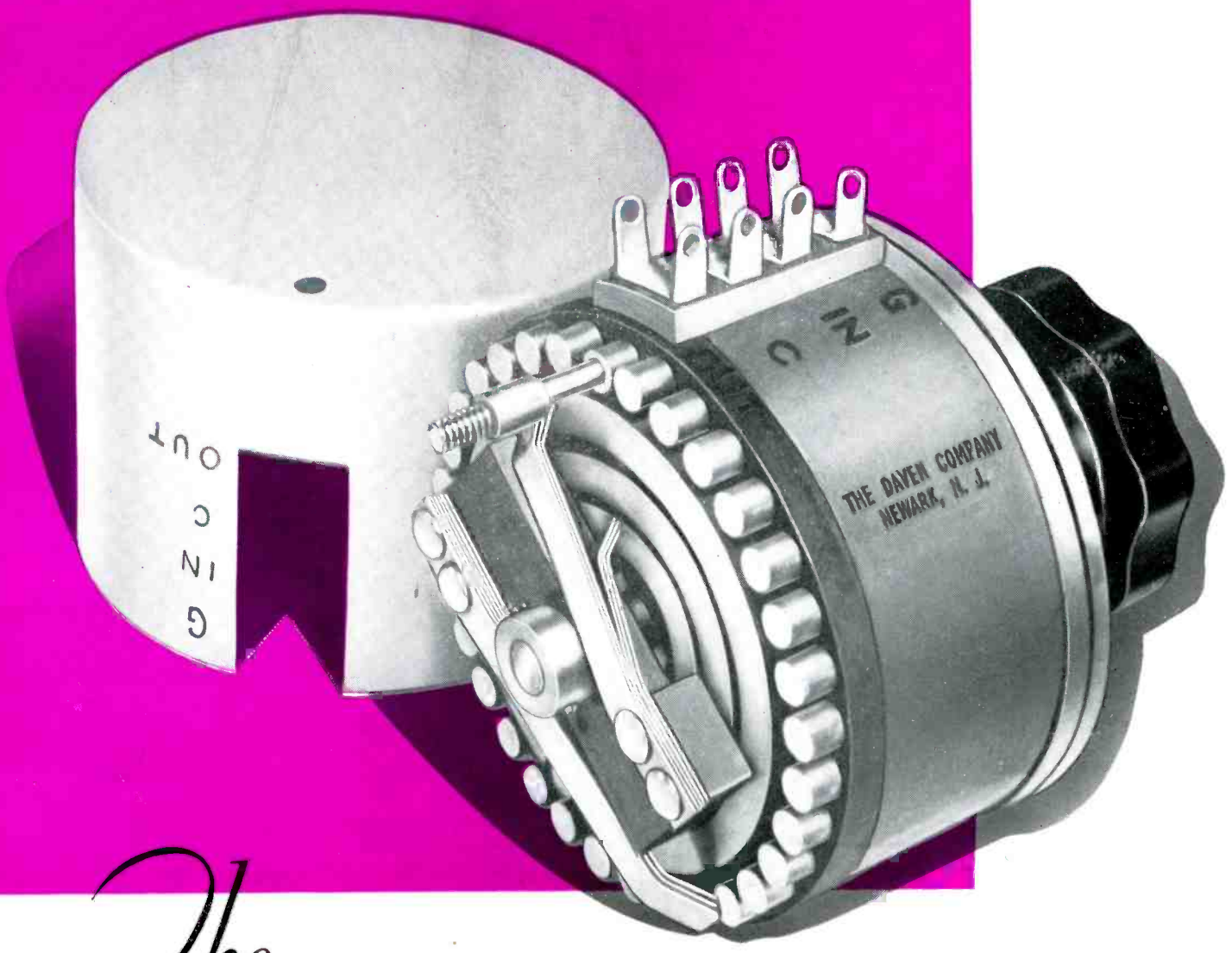

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