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THE BROADCAST ENGINEERS' JOURNAL

APRIL, 1950

Vol. 17, No. 4

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A Message to the Members of NABET

from

JOHN R. McDONNELL
President, NABET

The report of the balloting on affiliation is now public knowledge. The majority of the NABET membership do not favor affiliation at this time. Those who do are fairly evenly divided in their opinions as to which of the three unions they prefer.

For the past six months, we, NABET, have been practically in the position of inviting the three International Unions to convince the NABET membership that they should be in one of the Internationals. The results as indicated by the members' votes would indicate that they, the members, do not want affiliation, or the affiliation offers were inadequate, probably a combination of both. The Affiliation Committee remains as constituted and will serve as a means of further exploration of the subject.

Every NABET Officer and member in a position to coordinate muscle and settle down to the business at hand. We have contracts to negotiate and service and it is imperative that we forget such differences as may have divided us during the discussion of affiliation, and display a solid front to both management and other unions.

NABET will continue to be the best union to represent radio and television men, and it will require the unflagging efforts of us all. Let's do it!

JOHN R. McDONNELL, President.

NLRB ISSUES TWO RULES ON COLLECTIVE BARGAINING

The National Labor Relations Board has made the first rulings under the Taft-Hartley Act on two points of collective bargaining, holding that:

1. A union may not require an employer to post a "performance bond" as a condition to collective bargaining or the settlement of a strike lock-out.

2. The secondary boycott ban does not prohibit an employer and a union from including "hot cargo" or "struck work" provisions in a contract, or honoring these provisions. (Such contract provisions ordinarily provide that employees may, without penalty by their employer, refuse to handle goods from a struck employer. In the trucking industry, such provisions are known as "hot cargo" clauses; in other industries, they are generally known as "struck work" clauses.)

The rulings were made in a decision involving a Pittsfield, Mass., truck line known as Conway's Express. In the decision, the Board found Local 294 of the Teamsters' Union (AFL) had violated the act by threatening a driver who continued to work during a strike and by demanding that the operator of the truck line post a performance bond. The Board ordered the local, which is located at Albany, N. Y., to cease these illegal activities.

The Board dismissed other charges brought by the company that the union had (1) attempted to coerce him in his choice of collective bargaining representative; (2) conducted a secondary boycott against his firm; (3) demanded an illegal closed shop contract; and (4) demanded an illegal "featherbed" payment.

The Board's order was signed by all five Board members, but two members individually dissented from parts of the majority ruling.

Board Member John M. Houston dissented from the ruling which held that the union's demand for posting of a $5,000 bond by the company violated the act.

Board Member James J. Reynolds, Jr., dissented from the majority ruling holding "hot cargo" provisions legal. He also dissented from another majority ruling that there was a valid closed-shop contract in effect between the company and the union during a strike out of which most of the charges in the case arose.

George Maher

NABET

Executive

Secretary

The results of the Affiliation vote have made it manifestly clear that the membership of NABET desires to continue the organization as an Independent. The overtones of these results are many, but there is one inescapable mandate which accrues to the present leadership of the organization. This mandate makes it quite clear that it shall be the responsibility of the leadership to find ways and means of making NABET, as an Independent Union, an even more effective and efficient organization than it has been in the past. To this end we hasten to reiterate our pledge in our capacity as Executive Secretary.

With the completion of the vote by the membership, it can truly be said that NABET has passed another mile post in its history. Whatever the future may bring, no man can say. But in order to decry the prophecies of the prophets of doom, let it be said that NABET has served a very useful purpose in the past fifteen years, and there is every reason to expect that NABET will continue to serve a useful purpose in the future. Let it be thoroughly stated also, that the ultimate strength of every union lies not alone in its leadership, but more importantly, lies within the membership itself.

It is vitally necessary that the membership continue to keep close ranks so that the leadership will thus be enabled to present a more solid front for the organization.

We should like to express our appreciation to the membership as well as the various Chapter and Section Chairmen and Officers for their great cooperation in the expeditious handling of the many details connected with the Affiliation vote.

GEORGE MAHER,
Executive Secretary.

Highlights of the 1950 IRE National Convention Technical Papers

The 1950 National Convention of The Institute of Radio Engineers was held at the Hotel Commodore, and exhibits and sessions at Grand Central Palace. More than 150 technical papers were presented by leading scientists and engineers in the radio-electronic fields from all over the United States and many foreign countries. More than 16,000 attended the thirty-ninth annual four-day conference.

Technical sessions began at the Commodore with symposiums on industrial design and nuclear science.

M. M. Hubbard of the Massachusetts Institute of Technology served as chairman of a symposium on nuclear science and the radio engineer. "News of the Nucleus" was reported by Urner Liddel of the Office of Naval Research. According to Liddel, "every radio engineer is well acquainted with the antics of electrons," but because new particles appearing on the horizon will be of importance to him during the next several years, "nuclear engineering will require a close tie with electron engineering."

Liddel told how concepts of the basic particles of matter have undergone a complete cycle in the last 2000 years and consequently the trend is always toward greater complexity until some order can be found which simplifies the ideas involved. He will discuss the evolution of some of these ideas.

M. Stanley Livingston of the Massachusetts Institute of Technology presented a paper on particle accelerators; he contrasted the relatively simple physical and engineering concepts of the standard cyclotron, the betatron and direct high voltage generators, developed before 1945, with modern particle generators based on the principle of synchronous acceleration through hundreds of thousands of small steps. The essential part of this principle, according to Livingston, "is the 'phase stability' resulting from the proper combination of electric and magnetic fields to achieve focussing both in the spatial coordinates of the orbit and in particle energy."

Consideration of the problems of radio frequency associated with particle accelerators described by Livingston was discussed by J. P. Blewett of the Brookhaven National Laboratory. He described new techniques which have been developed to meet problems in the cyclotron, the linear accelerator and the electron cyclotron in which frequency is held constant, and in the frequency modulated cyclotron and the proton synchrotron, in which the frequency changes during the accelerating cycle.

A fourth paper in the nuclear science symposium was presented by John R. Dunning of Columbia University and reviewed the basic characteristics of presently available devices for the detection of nuclear radiations. The devices included those for the detection of heavy and light charged particles; neutrons; mesons, and quanta. The limitations and future possibilities of ionization chamber systems, linear amplifiers, geiger and proportional counters, fluorescent and conductivity counters, and general multiplier techniques will be explained. He will also speak on the contrast between essentially electronic devices and non-electric devices including those based on photographic and cloud chamber methods.

A new circuit design, which results in "starved" operation of radio tubes and makes possible a new simplified three-tube radio receiver giving five-tube performance, may make possible the first $5.00 radio set of the future, according to W. K. Volkers, consulting engineer of Schenectady, speaking this morning before the annual convention of The Institute of Radio Engineers at the Hotel Commodore.

In his paper on "Ultra-High Gain Direct-Coupled Amplifier Circuits," Mr. Volkers explained that by incorporating the principle of "starvation" in a direct-coupled amplifier, there is a drastic increase of over-all gain permitting reduction in the number of amplifier tubes and reduction of manufacturing costs such as in a three-tube radio having only four resistors and four condensors.

Coaxial Cables May Go

A new type of transmission line, named the "G String" which appears certain to replace waveguides or coaxial cables in many present applications, both commercial and military, was described by Dr. G. Goubau in his paper on "Surface-Wave Transmission ines."

Dr. Goubau, of the Signal Corps Engineering Laboratories, Fort Monmouth, N. J., is one of the German scientists of outstanding reputation brought over after the war. With his development, it is quite possible that such a transmission line, coupled with the use of pulse code modulation, may be an excellent means for distributing television programs on a wired wireless basis.

Involving an ordinary wire conductor with a specially treated surface, Dr. Goubau's "G String" principle is so simple in its practical application that it can be applied directly to many microwave transmission problems without a long, expensive development. It is certain to be cheaper than any other method of transmission now employed and more efficient than most.

New Tube Keeps Receivers Tuned

R. W. Slinkman, of Sylvania Electric Products, Inc., presented a paper on "A New Type of Frequency Control Tube." He described a novel method of frequency control which will keep FM and television receivers tuned or locked in to the incoming signal, regardless of local oscillation and/or signal drifts. This will give much better performance than the average home set owner now enjoys.

Electronic Brains "Shrinking"

New, simple electronic tubes, capable of such functions as addition, subtraction, multiplication and selection, and which replace functions of complicated circuits are novel developments in the new tendency toward greatly decreasing the size and complexity of computers popularly known as "Electronic Brains," according to Josef Katz of the University of Toronto. He presented a paper of "A New Class of Switching Tubes for Digital Applications."

Mr. Katz explained that the new tubes contain one electrode for each input and one for each output channel, designed so that particular combinations of input voltages result in current flow to the corresponding combinations of output electrodes. Such tubes are already applied in nuclear discriminator counters.

According to Mr. Katz, the decrease in size and complexity of electronic computers will lead to their wider application in science and industry.

Computers For Air Traffic Control

A new use for electronic digital computers as nerve centers in real-time sys-

tems such as air traffic control, is foreseen by Norman H. Taylor, Massachusetts Institute of Technology.

In his paper on "Marginal Checking as an Aid to Computer Reliability," Mr. Taylor pointed out that deteriorating components, such as crystals and vacuum tubes, cause reduction of safety margins and hence are a source of error in digital computing and pulse communications. The marginal checking system he described can be considered as a robot physician capable of diagnosing the ills of a digital computer system. Reliability in equipment with this new feature has been improved 50 to 1 over equipment without it, in runs for as long as three weeks without computational error.

A. W. Hogan, of the Naval Ordnance Laboratory, Silver Spring, Md., described the use of a special tube in high-speed photography. In this system, the object is illuminated by a continuous light source and exposures of one-millionth of a second are permitted. Images of the object are impressed on the tube's light-sensitive element and subjected to an electric pulse for the time desired. This causes the image to appear on the tube screen where it can be photographed. The author pointed out that the method might be applied to the photography of missiles traveling at high speeds.

In a joint paper by C. F. Hobbs and W. B. Bishop, of the Air Force Research Laboratories, Cambridge, Mass., the authors described techniques that permit a more economical use of the very-high-frequency and ultra-high-frequency spectrums. They told of the results of experiments showing that voice signals from two transmitters can be operating less than 100 kilocycles apart on 100 megacycles without interference. The system calls for the use of a common reference signal in place of locally generated high-frequency oscillations.

Signals from amateur stations that enter television receivers and degrade the TV images can be filtered out at the source or at the receiver, according to A. W. Seybold, of RCA, whose paper told the results of extensive tests and effective remedies.

"MAGNETIC MEMORY"

A compact "magnetic memory," an indispensable part of a calculating machine, which has "nine times the memory capacity" of one of the latest and largest of the electronic calculators in the eastern part of the country, was reported at the Institute of Radio Engineers convention.

The speaker, Paul L. Morton of the college of engineering of the University of California, explained that his device—a drum of aluminum eight and a half inches in diameter and 27 inches long—has been found capable of storing 10,000 ten decimal digit numbers, or more than 900 informational units per square inch.

The device is coated with a magnetic material and whirled at a speed of 3,600 turns per minute. Magnetically operated recording and "pickoff" heads operated near the disks surface, but not touching it, first put on then take off the information as needed.

One such drum, Mr. Morton said, has been found to have "more money capacity" than nine similarly-operated drums in the "Mark III" computer at Harvard University, thus giving promise of materially aiding in the reduction of cost of such computers to benefit small research centers.

The assistant chief of the components parts section of the U. S. Signal Corps Laboratories, Fort Monmouth, N. J., described a new approach to "miniature electronic circuit fabrication" aimed at the problem of "simplifying the present tedious and costly hand wiring procedures," which some day not only may make the home radio set cheaper but better and more reliable in operation.

The units are built up first by printing the basic circuit on a sheet of plastic, mounting the tubes, resistors, and condensers and sealing the whole in a resinous compound. Such a unit then is plugged into the apparatus of which it is to become a part. If a failure of tube or other part occurs, the whole is unplugged and a new unit substituted.

The methods, which he called "Auto-Sembly," has the advantage, he said, of eliminating much of the costly tooling and special skills which are now a part of the factory fabrication of most electronic apparatus such as home radios and television sets.

HUMAN ELECTRICITY

A new way of "mapping" the electrical activity of the human heart and brain which may lead to a better understanding and diagnosis of ailments in these organs, was described during a symposium on Electronics in Medicine, at the annual convention of The Institute of Radio Engineers.

Dr. Stanford Goldman of Syracuse University used motion pictures depicting the electrical activity across the chest which accompanies the heart beat in normal and abnormal cases. The pictures showed striking differences between the two.

Other motion pictures clearly showed what Dr. Goldman called "traveling waves" of electricity in the brain.

"It is hoped," Dr. Goldman said, "that the new way of "electronic mapping" will become a valuable aid in diagnosing the heart and brain diseases and in studying the normal physiology of these organs."

He went on to say that pictures of the electrical potential distribution on the surface of any desired portion of the body can be seen clearly on the screen of a cathode-ray tube, indicating the muscular activity beneath in the body.

John W. Clark, head of the vacuum tube and design section of Collins Radio Company, Cedar Rapids, Iowa, reporting on a study of the effects of intense microwave radiation on living organisms, said persons exposed to such waves may be permanently injured.

"This is a practical matter," he explained, "since such microwaves are widely used for radar, industrial heating, cooking, and therapeutic diathermy. We have found that a rabbit, for instance, developed a cataract of the eye through exposure to such waves."

Accordingly, he advocated the formation of standards designed to protect personnel working with high-power microwave equipment.

Stanley H. Briller, of Bellevue Hospital, and Nathan Marchand, of N.Y.U. College of Medicine, described a "differential vectorcardiograph" which depicts all the electromotive forces generated by the cardiac muscle.

NTSC

The recently authorized National Television System Committee has been fully organized and began operations on March 3, the Radio Manufacturers Association was advised by Dr. W. R. G. Baker, vice president of General Electric Company and chairman of the NTSC.

The new system committee, representative of all branches of the television industry, was created by RMA to secure general agreement on the technical developments needed

(1) to make color television suitable for home use, and

(2) to extend television service to the many areas in the country that are now denied it.

The RMA also reviewed plans for an aggressive program in opposition to the proposed new 10 per cent excise tax on television sets, which it feels might stifle the rapidly expanding industry.

The information about NTSC submitted by Dr. Baker is summarized in the following reports.

FCC Color Television Demonstration

Outstanding fundamental advantages for the public in the all-electronic, high-definition system of color television were demonstrated by Radio Corporation of America here in comparative tests of three rival color television systems before the Federal Communications Commission.

Witnessed by members of the FCC and leading executives and engineers of the radio-television industry, today's tests also revealed the great progress made in recent weeks by RCA in improving and simplifying its all-electronic color system. New experimental receivers were smaller and contained substantially fewer tubes and circuits than earlier experimental models. Color stability in the reproduced television images was complete.

Commenting on the technical status of the RCA color system, following today's tests, Dr. E. W. Engstrom, Vice President in Charge of Research, RCA Laboratories, said:

"So successful has been our work in simplifying and improving this system, as well as in designing single tri-color direct-view picture tubes, that RCA expects to demonstrate color receivers incorporating all of these advances within the next few weeks. We believe that the single tri-color direct-view picture tube, when fully developed, will represent the ultimate in color television reception for the home. This type of tube will permit the design of color reecivers similar in appearance to those used in black-and-white television, unencumbered by mechanical parts or large revolving color filters.

Further Improvements Expected

"The smaller three-picture-tube color receivers used by RCA in today's tests demonstrated some of our major technical advances. Significant reductions in the receiver tube complement were made possible by the elimination of two of three separate video amplifier channels and a substantial reduction in the complexity of color sampling circuits. These experimental receivers used only about two-thirds the number of tubes that were required in earlier models. Still further improvements and simplifications can be expected."

Material used in today's comparative tests, held in the Laurel laboratory of the FCC, was planned for the purposee of helping the FCC to measure the relative merits of the competing systems. It consisted largely of various types of charts and diagrams, live performers and studio properties designed to test such factors as picture definition and brightness, flicker, color break-up and color fringing. Other important points involved were compatibility with black-and-white television and picture size.

Advantages of RCA System

Dr. C. B. Jolliffe, Eecutive Vice President in Charge of RCA Laboratories Division, pointed out that the RCA all-electronic system is the only one demonstrated thus far that has all of the following advantages:

1. High-definition pictures.
2. Unlimitel picture size.
3. Unlimited picture brightness.
4. Flickerless pictures.
5. No color break-up or fringing.
6. Complete compatibility with present black-and-white television system (color telecasts are reproduced in black-and-white by receivers now in use without any modification).

Emphasizing their basic importance to the problem of providing a service of color television to the public, Dr. Jolliffe said that three or more of these advantages are lacking in the two other systems demonstrated in the comparative tests. The RCA system alone, he explained, offers high-definition pictures, unlimited picture size and brightness, and flickerless pictures with no color break-up or fringing.

"When translated into the day-to-day problems of a regular color television service," Dr. Jolliffe said, "the advantages of the RCA system as demonstrated, have highly practical implications for the public. They affect the scope and realism of programs and, therefore, their impact.

Importance of High Definition

"For example, only a color television system of high picture definition and brightness can be expected to reproduce satisfactorily the full detail and pictorial interest of people, theatrical sets, scenery, 'props,' architecture, paintnigs, art objects, and other graphic material. This fundamental requirement also applies to the readability of lettering on package goods and in various types of documents, as well as to the discernability of the texture and pattern of fabrics and other materials."

Picture flicker in any type of television —color or black-and-white, Dr. Jolliffe commented, constitutes an unnecessary annoyance to viewers and places undue strain on the eyes.

Color Break-up Limits Programs

"Color break-up creates serious limitations for television programs," he continued, "and, like flicker, it is annoying to the viewer. Even when the object being televised is stationary, in a system characterized by color break-up, the colors of the object will fall apart into their primary components every time the viewer takes his eyes momentarily from the screen.

"This unwanted effect is much more pronounced when an object, such as a dancer or an athlete, clothed in materials of light mixed colors, moves quickly across the color television camera's field of view at fairly close range. At no time during these tests did the RCA system show any evidence of color break-up.

"From the practical viewpoint, it would be extremely difficult, if not impossible, in a system affected by color break-up, to present satisfactory close-up views of individual participants in high-speed sports such as racing, basketball, baseball, fencing, and tennis unless the participants used unmixed primary colors only. Neither would it be feasible to show rapidly twirling dancers, acrobats, and jugglers if they were clothed in white or multi-colored costumes."

The further advantages of unlimited picture size and compatibility, which are inherent in the RCA system, Dr. Jolliffe said, are self-evident. The public has already shown a preference for flexibility in picture size in black-and-white television system that meets this specification has the obvious merits of representing no loss of programs to owners of present sets and no loss of audiences to telecasters.

RCA Uses Six Color-Receivers in Tests

In these comparative tests RCA used six experimental color receivers and two standard black-and-white receivers. Four of the color sets had 10-inch direct-view screens, one had a 16-inch direct-view screen, and one was a projection-type receiver with 15x20-inch screen. Of the two black-and-white standard receivers, one had a 10-inch direct-view screen and the other was a projection set with 15x20-

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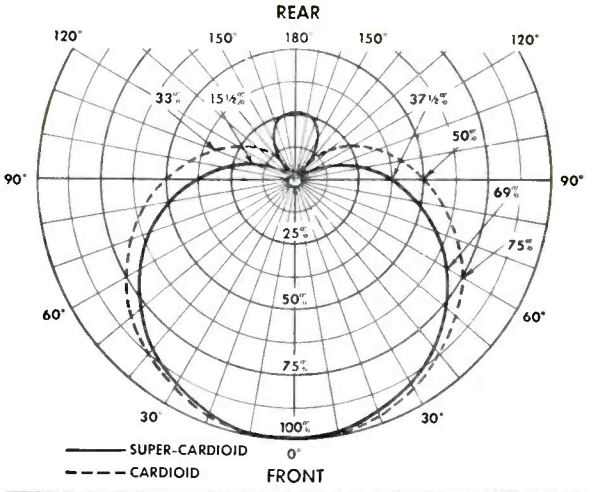
Broadcast Radio Engineers who want this → specify this →



because the Shure Super-Cardioid Broadcast Dynamic Microphone has a super-cardioid pickup pattern which reduces the pickup of unwanted random noise energy by 73%. It is twice as unidirectional as the cardioid. In the super-cardioid pattern, the ratio of front-to-rear pickup is 14 to 1—in the cardioid, 7 to 1. There is a wide, useful pickup angle at the front of the microphone while the rear response is down of the order of 15 db over a broad range of frequencies. Reverberation energy pickup is decreased over two-thirds. The microphone can be placed close to the reflecting surfaces without objectionable effects if the rear side of the microphone is toward the reflecting surface.

The Shure "556" Dynamic Microphone has an Acousto-Mechanical circuit containing a single moving-coil element, which operates in conjunction with a high flux magnet and provides high efficiency and smooth peak-free response from 40 to 10,000 cycles. The super-cardioid pattern is achieved in a single unit, due to the "Uniphase" principle —a patented Shure development. The moving-coil unit is provided with a double wind-screen to permit quiet outdoor operation. As a precaution against mechanical vibration pickup, the unit is spring-suspended inside the microphone case, which in turn is floated in live rubber in the special Vibration Absorbing Unit, which eliminates reproduction of vibration transmitted through the stand. The microphone also has a standard ⅝"-27 thread which permits mounting on any Shure desk or floor stand. Adapters to other stands are obtainable when needed. Case dimensions: 4¼" high, 3¼" wide, 3½" deep. Shipping weight, 4½ lbs.

Patented by Shure Brothers, Inc.

SHURE SUPER-CARDIOID DYNAMIC MICROPHONE

MODEL "556"

Code: RUMUB • List price $92.50

MULTI-IMPEDANCE SWITCH ON MODEL "556"

IMPEDANCE TABLE	OUTPUT LEVEL
L—35-50 ohms	56.1 db below 1 Milliwatt per 10 microbar signal
M—150-250 ohms	56.8 db below 1 Milliwatt for 10 microbar signal
H—High Impedance	57.5 db below 1 volt per microbar

SHURE BROTHERS, Inc.

MICROPHONES AND ACOUSTIC DEVICES

225 W. Huron Street Chicago 10, Illinois

CABLE ADDRESS: SHUREMICRO

DETROIT

By WALT BAKER

Hi, Everybody! Things have been going very well for Detroit since you last heard from us at Xmas. Organizing activities are up to expectations and the outlook keeps brightening day by day. And since "Stolzie" keeps sending us threatening letters, perhaps we had better tell you about them in detail.

Negotiations with the UAW-CIO owned station, WDET, which started at Xmas, are drawing to a close and the formulated contract is very favorably compared to WWJ's. The work conditions are almost identical, maybe better. The wage scale top is expected to be 95 with only a three year escalator. Not bad for a starter!!

The WWJ negotiations also are now in progress, and here, too, things have been going very well. The negotiations have had their lighter side. The other morning Bob Miller, Chapter Secretary, rushed out of his house enroute to an early meeting and sped the twenty-three miles downtown in record time. While parking his car he heard a scratching noise in the back seat and investigating found that a Saint Bernard belonging to his neighbor had crawled into the car during the night for warmth. The neighbor, who had to come all the way downtown on his day off, still thinks something's fishy about the whole deal.

We would like to greet Grand Rapids, Michigan station WLAV-TV-AM-FM which will form the nucleus of a Grand Rapids section of NABET-Detroit Chapter, and we hope that it will soon encompass all the stations in that area. Their contract has been drawn and is awaiting the manager's return from the south for signature.

The Dearborn, Michigan station, WKMH, on the other hand, has given nothing but trouble. The Chapter is endeavoring to bring friendly CIO influence to bear as this station is situated in the heart of the Ford empire and serves the interests of its workers. In like manner, WTAC, one of the Flint stations has been stalling negotiations, giving rise to a poor situation since two other local stations have already joined NABET.

Well, we know summer is just around the corner now because programming has already been around nervously waving beer baseball commercial copy in the air and acting slightly hysterical. Isn't it strange how such commercials affect them? Which reminds us of a rival network station's trials and tribulations with one beer commercial.

During one of the blurbs the talent was supposed to climax his spiel by pouring and drinking a delicious draught in front of the cameras—AND HE CHOKED! They promptly fired him and got somebody else. This character informed them that he couldn't drink beer, so it was arranged that he would go thru the motions and they would switch away from him so he could get rid of it without actually drinking. Everything went well on the air, but when it came time for him to dispose of the beer he stepped over to a potted palm and calmly poured the glass into the urn—RIGHT IN THE SHOT OF THE ON-AIR CAMERA!!

S. K. Heffernan

S. K. "Heff" Heffernan was born in Salem, Mass., Feb. 11, 1901. Characteristically, Heff was totally devoted to the technical side of radio—on and off the job.

Heffernan's ham radio career dates back to 1917, and was one of the first American

radio amateurs to be heard in England. He held the following calls: W1AKG, W1QD, W9OG, W2KDF, and W6OJ.

His commercial radio career started in 1925 at WNAC, now the Yankee Network. In 1929, he left WNAC for WCKY Covington, Kentucky, until 1936 when he joined the NBC Engineering Department in New York. With the separation of the Red and Blue NBC Networks and the formation of the American Broadcasting Company, Heffernan was assigned to ABC and he has been with ABC Engineering in Hollywood since October 1942.

Heffernan died in Hollywood on Feb. 5, 1950, and was buried in Danvers, Mass, on Feb. 11th, 1950, his 49th birthday.

Broadcasting continues as usual . . . and we sincerely regret to have to report the passing of another fellow worker and friend.

—Ed Stolzenberger.

WASHINGTON

By W. D. DEEM

At the February NABET meeting we had the representatives of the three major unions that would like to have NABET affiliate with them. First to speak to the members of NABET was Mr. Holt and Mr. Lawson Wimberly of IBEW. Mr. Wimberley explained the structure of IBEW, about the nine sections in the U. S., about the seven sections that have broadcast representatives, about the meet-

To Page 14

The electron tube that rivals the human eye

Invention of the iconoscope—TV's first all-electronic "eye"—led to supersensitive RCA image orthicon television cameras

No. 3 in a series outlining high points in television history

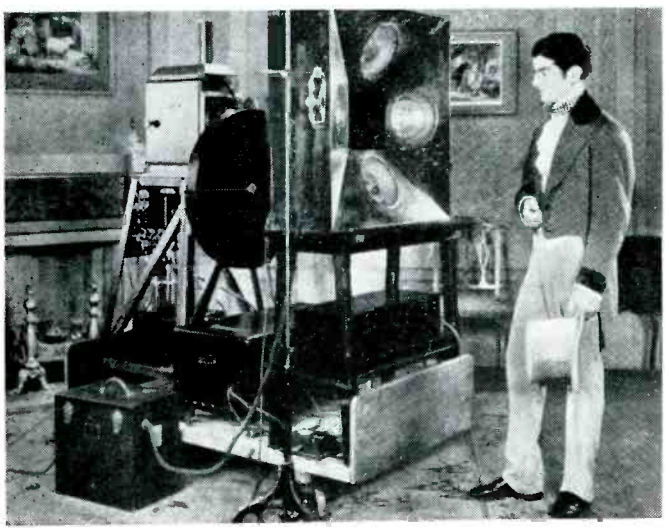
Photos from the historical collection of RCA

Dr. V. K. Zworykin *of RCA Laboratories with his iconoscope tube. Its successor, the image orthicon, has been developed by RCA scientists to have up to 1000 times greater sensitivity.*

● Had you attempted to invent a television camera from scratch, odds are you'd have followed the same path as early experimenters—and tried to develop it on mechanical principles.

Illogical? Yes, in the light of what we now know about electronics. But electronics was young in television's infancy. At that time the best way to take television pictures was with a mechanical scanning disk, invented in 1884.

Revolutionary was the invention of the *iconoscope* by Dr. V. K. Zworykin, now of RCA Laboratories. Here was an all-electronic "eye" for the television camera . . . no moving parts, no chance of mechanical failure!



Mechanical scanning equipment, *used at RCA-NBC experimental television station W2XBS in 1928, long before the present RCA image orthicon camera came into existence.*

Carrying forward the development of television pick-up tubes, RCA scientists have developed the image orthicon—eye of today's supersensitive RCA image orthicon television camera. So keen is this instrument's vision that it sees by candlelight or by the faint flicker of a match.

Despite its simplicity of operation, the RCA image orthicon tube is a highly complex electronic device. Integrated, within its slim 14-inch length, are the essentials of 3 tubes—a phototube, a cathode ray tube, and an electron multiplier!

The phototube converts a light image into an electron image which is transferred to a glass target, and scanned by an electron beam to create a radio signal. The electron multiplier then takes the signal, and greatly amplifies its strength so that it can travel over the circuits which lead to the broadcast transmitter.

Inside the tube itself, more than 200 parts are assembled with watchmaker precision. For example, a piece of polished nickel is pierced with a hole one-tenth the thickness of a human hair . . . a copper mesh with 250,000 holes to a square inch is used . . . and the glass target is bubble-thin! Yet all are assembled and made to work—at RCA's Lancaster Tube Plant—with precision.

Actually 100 to 1000 times as sensitive as its parent the *iconoscope*, RCA's image orthicon pickup tube literally rivals the human eye. And when an outdoor telecast may start in daylight and wind up in the dim light of dusk—that's a necessity!

Radio Corporation of America
WORLD LEADER IN RADIO—FIRST IN TELEVISION

CHICAGO —By DICK DAVIS

After so long a time, the winter weather has finally hit Chicago. A couple of weeks ago a few of the guys were seriously thinking about getting the golf clubs out and cleaning them up, but we finally got our Christmas snow. What with all the rock salt strewn around, the streets resemble the contents of a huge ice cream freezer.

I won't mention any names (by request), but one of the guys recently took a trip to another city to visit his daughter in school. He spent the night driving back to Chicago in order to do Breakfast Club the next morning. He arrived panting just about the time rehearsal was scheduled to start only to find that the schedule had been changed and it was his day off.

This column, in behalf of the Chicago Chapter NABET, offers congratulations and well wishes to George Maher, our new Executive Secretary.

Two other members of this chapter recently received promotions. Joe Alusic of the Penthouse Studio was recently made a Technical Director and George Smith, former Chapter Secretary, has been elevated to Chapter Chairman. Although with the headaches involved in both jobs, I'll bet either one of them would give you an argument as to whether or not they were promoted.

Owen Rogers, one of the crack?—cracked? Television engineers, recently got himself engaged and has been walking around in a daze for the past month. Couldn't have happened to a more deserving fellow.

Last month the vacation schedule was posted and of course there have been the usual number of gripes. With all of the swaping and trading that was going on, I doubt if anyone has the period which they originally signed up for.

Fred Slinkard of Maintenance became a suburbanite the other day. He and his family moved to Brookfield. That's where the Zoo is. No offense, Fred. Being just a little disgusted with the high cost of living, he decided to take matters into his own hands and proceeded to cut his son's hair—(without a union card yet). Everything started out all right, you know, a little off here, a little there. But when he finished Junior didn't have any hair left and wasn't a bit happy about the situation. He promptly retaliated by taking a slice of bread, butter and jelly and smearing it all over Papa's good suit!

When the price of coffee went up this last time the TV engineers said "That's all." All three studios are now equipped with coffee pots. For one nickle you can purchase any of three different brews, depending on which studio you happen to be in. Almost any time of the day you can walk in and smell that delicious aroma. Which reminds me, it's about coffee time now.—So long.

MOHAWK

By JOHN F. McMAHON

Well here we go again fellows. I don't have much to say this month and am sending in a column in order to avoid Editor Stolzenberger's bloody dagger!

I heard that the boys at the South Schenectady transmitters (WGEA, WGEO, WGEX and WGY) are going all out in order to get male companionship for their mascot, Beaulah. I want them to know that we all wish them luck and congratulate them for this great humanitarian effort. (Hi).

While I am on the subject of dogs, I might add that someone put a mutt in Newt Barnes car, presumably as a joke and it backfired. Newt has been wanting a dog for his youngsters and took the hound home with him. After giving him (the dog) some food, Newt found out that SHE was fairly well house broken and even knows a few simple tricks.

When this hits print, Spring should be upon us. I imagine that everyone in this chapter will be very glad of that. The last month or so has been a bit rough, as far as weather is concerned. I think we'll have snow on the hill till the Fourth of July. One thing about it though is that the Hill climbing we've been doing will get us in shape; for what, I don't know.

The affiliation votes should all be in and counted by now and I hope everyone sent in a ballot; the boys certainly made it easy enough for us. The committee did a fine job and all the lads who had anything to do with it are deserving of a hearty vote of thanks from the entire membership. I know I can speak for the Mohawk boys and say THANKS A LOT FELLOWS.

Anyone know what all the noise is, about the I.R.E. meeting at WGY in February? I can't seem to get much information about it.

Carl Youngs is knocking himself out, getting his new house in shape for the arrival of the papoose. The first is always the

W2PGV

Left to right, Don Morey wasting time on his day off. DB-22A for the weak ones; HQ-129X with speaker and Modulation Monitor on top. Collins 32-VI held down with a card file, mostly empty. How about a call, OM, and help fill it up?

hardest, Carl; an old bachelor like me should know, huh?

Yours truly has come to the conclusion that NFM is no match for AM, on twenty-one and I guess I'll have my plate modulator on the air, any day now.

You will please note that we have included a picture in this issue, thanks to Don Morey. If any of you lads have pictures of your ham stations, I would really like to have a copy for the journal. I hope some of the other chapters will take up along the same line and send in pictures also, to their associate editors.

I hope to have a picture of the WRGB location (with snow) in the next sisue.

Gus Coopersmith has calmed down about ham radio (temporarily) and is concentrating on a new car. He also is wearing television shirts, as is Frank Boudreau. I don't know where the TV comes in, but the shirts are a pale pink, (they show up white on TV).

Jack Hahn is looking forward too, to mild weather so he can do a bit of work on his car. Hope it goes OK Jack.

Charlie Lewis now at WGY control room for a rest from the Madhouse of the WRGB (TV) studio, is getting caught up on some of his ham activities.

Hort Mosher is knocking 'em dead on eighty CW.

Newt Barnes had his ten watt exciter on eighty CW and optimistically called a VP7. A big grin spread over his face when he heard the guy come back to W2GML, until he heard the L. Newt's call is W2GM period. Tough luck Huh?

Well, I guess that's about all the time I have now, so I'd better get out while I can take things easy and CUL.—Mac.

—o—

SAN FRANCISCO

By M. A. DWYER

News—An H bomb, Ingrid has a baby, and San Francisco, for the moment has a column in the Journal. Your writer is new at this kind of thing, and a little pressed for time at this writing, so please excuse any omissions, I'll try and make up for it next month.

To begin at the beginning, and I can't go back any further than the Christmas season—the SF Chapter had a Christmas dinner meeting—the ABC gang well fortified before by the company party. There was little business taken up that night, but a good dinner and plenty of laughs was certainly had by all.

The night watch over at the Claremont Hotel has finally changed hands—Red Sanders for lo these many years the "Chief Mixer" over there, has returned to us at 420 Taylor and Frank Bindt now makes the trek across the bay. Red by the way, is still working on that house over in Marin.

In February we had the pleasure of playing host to George Maher for a few days. For many of us it was the first time we had the pleasure to meet George, but for others it proved to be a delightful reunion and the renewing of many old memories.

KRON-TV (non Nabet, unfortunately) the NBC affiliate went on the air in November from San Bruno Mountain; so that brings the number of TV stations in the Bay area up to three.

The rumblings of vacation talk has been heard faintly with J. McDonnell taking one for the first in April. Why—by the time this appears in print the reason should be obvious—a third McDonnell heir!

Alan O'Neil, NBC recording supervisor, has been busy these past months installing the new RCA tape recorders.

And speaking of installations, Bobby Woods, NBC, getting ready to install his family in a new house down the peninsula.

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LABOR - MANAGEMENT NEWS

The Secretary Says:

President Truman has said that we can attain an annual national output of 300 billion dollars in five years. Is that a pipe dream? It is a pipe dream only if the gross national product of 269 billions for 1949 is a pipe dream. It is a pipe dream only if all the indicators of our current prosperity are a pipe dream.

But it can turn out to be a broken reed if we fail to effectuate certain requirements to which President Truman has directed our attention. What are these requirements?

We must regain maximum employment. We must spread the benefits of economic growth to all Americans. We must improve productivity and promote an atmosphere in which business, labor, and agriculture can work together for the good of all. We must have fiscal policies which will help our economic growth. We must get rid of trouble spots in our economy.

In his State of the Union Message President Truman said: "Free collective bargaining must be protected and encouraged. Collective bargaining is not only a fundamental economic freedom for labor. It is also a strengthening and stabilizing influence for our whole economy. The Federal statute now governing labor relations is punitive in purpose and one-sided in operation. The statute—Labor Management Relations (Taft-Hartley) Act—is, and always has been, inconsistent with the practice of true and effective collective bargaining. It should be repealed and replaced by a law that is fair to all and in harmony with our democratic ideals."

———o———

EMPLOYEE BENEFIT PLAN REVIEW

BETHLEHEM STEEL CORP. in a proxy statement estimates that its annual charge to current earnings of its new pension plan will be $7,500,000 to $10,000,000 if it is continued until Oct. 31, 1954. This compares to $5,500,000 to $7,500,000 under the old plan. Estimates are based on the current social security benefits (effective Jan. 1, 1940) and include the cost of funding pensions for life at the time the employee retires.

It is important to keep this funding provision of the Bethlehem type plan in mind when comparing costs. Under the most pension plans the past service liability is *funded at the time the plan is adopted* and the employer contributes so much a year over a period of at least 10 years (tax requirement) to past service liability costs. Under the Bethlehem plan the company contributes enough to the trust fund when the employee retires to *guarantee payment of the pension for life,* but no past service liability payments are made to the trust fund on the employee's behalf prior to the time he retires.

REPUBLIC STEEL CORP. estimates its annual cost of pensions in its proxy statement at $9,100,000 on a five year basis and $13,700,000 if its union agreement is terminated after two years. On the five year basis Republic estimates net cost after taxes (38% corporate rate) at $5,642,000 annually. This is *nearly* $160 *a year per employee* or 8c an hour on 2,000 hour work year. Cost of Republic old pension plan *for salaried workers* earning more than $3,000 a year for 1949 is estimated at $3,026,000. Republic proposes to pay into a trust fund each year for five years one-fifth of the amount necessary to fund pensions for those eligible to retire when new plan goes into effect March 1. *Other pensions will be fully funded as they become payable.*

YOUNGSTOWN SHEET & TUBE CO. reports in its proxy statement that it will cost $953,000 to provide pensions for employees retiring before March 1 plus $2,097,000 more a year for 1950 and 1951. Estimates are based on average retirement age of 68.

THE CHRYSLER SITUATION, as we go to press, is that the company has offered United Automobile Workers-CIO a $100 a month pensions, including social security, starting at 65 after 25 years' service. Union rejection of first offer is due to absence in proposal of a fixed contribution by the company into a jonitly administered trust fund. Union estimates cost to Chrysler at 5c an hour, compared to Ford's 8¾c. UAW has been asking Chrysler 7c for pensions. UAW is reported to be seeking a basic pension guarantee of $68 a month, irrespective of social security. Other non-pension factors appear to be involved in the dispute. Chrysler is criticizing strike on grounds that the vote was taken before pension plan was submitted.

* * *

PENSION PLAN DIGEST

Gannett Newspaper-Radio Chain Pension

Gannett Co., Inc., Rochester, N. Y., has estabilshed a contributory pension covering 3,000 employees of its chain of 21 newspapers and six radio stations. The basic plan provides for .75% past service credits (first five years excluded) which is estimated will cost the company $6,000,000. Under the future service annuity plan employees will contribute 2% of basic earnings (overtime and shared profits excluded). The pension credit will be 1% annually of total earnings since joining plan. The company's contribution will be about twice that of the employees.

Under a supplemental annuity plan employees earning $3,600 or more are eligible for both pension and life insurance benefits. Retirement income under this benefit will be 20% of annual earnings over $3,600 at the age of 60. Life insurance benefits are $1,000 for each $600 of annual earnings above $3,600. Employees contribute 2% of earnings over $3,600 to the cost.

Employees become eligible for the plan after five years' service. Employees over 64½ are not eligible, a separate provision being made for this group. It is estimated that employees retiring after 25 years service will receive a retirement income, including social security, of about 50% of earnings. Pension benefits are guaranteed for 10 years in event the employee dies after retirement. Contributions are refunded with interest if the employee leaves before retirement. The Gannett Co. also had a profit-sharing plan which will be continued.

* * *

"All-Government" Pension Advocates Make Serious Mistake

Business men who seem to favor an all-government pension plan are making a "very serious mistake," Marion B. Folsom, treasurer Eastman Kodak Co., declared before the American Management Association. Business has not paid enough attention to pension financing or to the industrial relations results of a good pension program, he said.

Mr. Folsom considered H. R. 6000 and various ways in which pension plans can be integrated with it above and below

the $3,000 salary bracket. In sections of the country where living costs are cheaper a company may modify its pension plan according to salary brackets, he suggested. Under the new bill low income groups may receive sufficient benefits under social security so that no supplementary private plans are needed, although they will be necessary in industrial centers, and for higher salaried employes, he said.

The extent of the government's obligation is to provide only minimum protection to prevent dependency, he declared.

Ford Plan Is Criticized

The Ford type pension plan is not good from the over-all national viewpoint, according to Mr. Folsom. Social security should be broadened and greater benefits provided for all rather than for special groups. Congress may think that in increasing social security benefits under a Ford-type plan it is helping the employer and not the employee. He said he did not favor any reduction in any private pension plans even if social security benefits are increased because most of them at present do not provide adequate benefits.

He noted the recent discussion about the great increase in reserves that will be needed to fund greatly expanded pension plans but said that it will be a long time before the investment problems from that cause alone become serious. He indicated that investment in equities might eventually have to be considered.

Will Still Have Incentive

"With a program of basic protection from the government plan and supplementary benefits from the company plan, the income to the retired person would still be well below his pay while employed," he said. "He would still have a strong incentive to save more during his working career so that he could live more nearly on the same scale when retired. If these plans, both government and private, can be kept on a reasonable basis, they should prove to be strong adjuncts to our private enterprise system."

* * *

First Decision Under Revised Tax Act

The U. S. Tax Court has rendered its first decision under the new Sec. 165 (d) of the Internal Revenue Code added under the Technical Changes Act of 1949 (approved Oct. 25, 1949). The change applies to the tax status of employees' annuities made under agreements entered into prior to Oct. 21, 1942. The court upheld the tax exemption of contributions made by the employer, the Berg-Allenberg Corp., in 1942 and 1943 to an employees' pension trust (Bertram Allenberg v. Commissioner, 13 TC., No. 125, CCH Dec. 17, 318). The taxpayers were not entitled during their lifetime to any payments under the annuity contracts purchased by the trustees other than annuity payments, it was held. For 1944 and later years, it was conceded by the Commissioner that the trust was exempt under Sec. 165 (a).

* * *

Minimum of $70 Month After 25 Years Sought By UAW-AFL

Minimum retirement income of $70 a month starting at 65 after 25 years' service, regardless of the amount the pension formula might guarantee, is sought by United Automobile Workers-AFL in its new old-age security program adopted by its executive board. The absolute minimum for retirement shall be $50 per month provided a member has at least 10 years of service.

Vesting Is Sought

If any employee leaves the company for any reason, all deposits shall be vested in the employee at the rate of 10% per year. At the end of 10 years service each member will have all rights to all deposits made in the plan.

In the event of a member's death before retirement age is reached, all deposits in the trust vested in him shall be paid to his bneficiary at the rate of $100 per month.

Disability Provisions Cited

A member with 25 years of service shall receive, in case of total and permanent disability, benefits of $100 a month. A proportionately reduced income will be available if he has less than 25 years service but at least 10 years minimum.

All members up to 55½ years of age shall have included in the pension plan, over and above retirement, $2,000 of life insurance.

Board Will Administer Plan

Administration of the plan shall be in the hands of a retirement board consisting of an equal number of members from management and the union. It will be this board's responsibility to govern and interpret all questions concerning retirement pay, eligibility and any future changes that may be advisable.

All employees should be eligible for membership after the completion of one year of service. Upon admission to the plan, all service should be retroactive to the actual date of employment.

Retirement at 65

The normal retirement age is 65 with full participation in the pension benefits after 25 years of service. Employees may retire at 60 with reduced pensions.

A standard pension formula is to be used to determine benefits based on both past service and future service.

* * *

BETHLEHEM VIEWS PENSION COSTS

In analyzing the cost of pensions under the new Bethlehem Steel Corp. pension plan in a proxy statement sent to stockholders, Eugene G. Grace, board chairman, pointed out that the costs (see page 1) are "small when compared with the total payroll of Bethlehem: approximately $490,000,000 in 1948."

Mr. Grace first compared costs under the new and old plans for persons already receiving pensions. These were:

	1948		1949 (1st 10 mos.)	
Payments to	Old Plan	New Plan	Old Plan	New Plan
Pensioners	$2,523,267	$3,504,453	$2,287,948	$3,134,516
Payments to Trust Fund	3,544,738	4,507,163	4,468,402	5,585,125

Mr. Grace explained Bethlehem's funding method as follows: "It is the practice . . . when an employee becomes entitled to a pension, to charge to current earnings and to pay into the pension trust fund . . . an amount, determined on an actuarial basis, which is estimated to be sufficient to provide for the payment to him of the amounts that he will become entitled to receive as a pension during the remainder of his life."

Wage Rates a Factor

Even under the old plan there would have been substantial increases in costs, Mr. Grace points out. This is due to the very substantial increases in wage rates and in the number of employees that have taken place during the past 10 or 15 years.

In addition to the above costs, Mr. Grace explained, "it will be necessary in the near future to make an unusual charge in earnings" to provide for those not previously eligible for pensions under the old 25 year eligibility limit (now 15 years) and the old $50 minimum after 25 years' service (now $100). Those with 15 or more years of service receive a pro-rated mini-

SAN FRANCISCO— From page 10

Jane Saulsbery, ABC Traffic, announced her engagement to Wally Johnson on Christmas Day. Most of the noises coming from Traffic these days concerns receipes, the cost of draperies, and finding an apartment. What can you expect—with four gals, two married, and one engaged. The fourth—oh, she's a hold out—what for—ask her, maybe a raise!

All hail the champ!!! Lloyd Creekmore, NBC Sound Effects, won the championship in the NBC-AA Bowling League—understand it was quite a finish, he and his partner went into the last round three games behind, but they came through to win the play offs.

And so, with "deadline" breathing down my neck, we'll wind this up for this month.—M. A. Dwyer.

LABOR-MANAGEMENT— From page 12

mum. For example, 15 years is 3/5 of $100 or $60. He estimated that it will cost as much as $10,000,000 to fund these pensions under the usual method and that most or all of this contribution will have to be made in 1950.

Total Cost Estimated

This will bring the total cost to be charged to current earnings up to the $7,500,000 to $10,000,000 a year whether the plan is terminated on Dec. 31, 1951 or Oct. 31, 1954, the alternatives in the contract with the Steelworkers-CIO.

Points to HR 6000 Changes

Mr. Grace pointed out that the expansion of social security benefits under HR 6000 will change the cost situation but he made no estimates of the savings.

"If, as expected, the bill shall be passed by the Senate and become law, such increases in benefits will increase the amounts to be deducted in computing the amount payable under the Bethlehem pension plan, and those increased deductions will be made in the case of substantially all pensions payable under the plan to pensioners who shall have attained the age of 65 years, whether the gross amount thereof be more or less than $100 per month."

* * *

Savings & Loan Firms Have New Pension Plans

Pacific First Federal Savings & Loan Association, Tacoma, Wash., has adopted a non-contributory pension plan providing retirement income of 30% of current salaries, along with $1,000 life insurance for each $10 of monthly pension income. The association has numerous offices on the West Coast. Tacoma Savings & Loan Association, Tacoma, also has a new plan similar to the above but with pension benefits producing 35% of current salary.

* * *

Social Security Deducted Under Bethlehem Plan

Under the Bethlehem plan the primary social security benefit is deducted from the primary pension obtained under the 1% per year of service times average of last 10 years of pay formula. We regret that an error was made by the author of "How to Apply Bethlehem Formula" in the January, 1950, issue of this letter. In effect, this means that under Example A $37.86 social security is deducted from the $51.75 primary pension leaving a net of $13.89. To this is added a $86.11 supplementary pension to bring the total up to the $100 a month minimum. Example B should read: $62.50 primary pension less $41.65 social security equals $20.85 plus $79.15 supplementary pension for a $100 total. Example C should show: $66.25 primary pension, less $44.65 social security with a net of $21.60 plus a $78.40 supplementary pension or a total of $100. In all three cases the retired worker with a wife also 65 would receive a total of $118.93 a month or 49.5% of final pay (adjusted for taxes).

Assuming that an employee has earned an average of $250 a month under social security, he would have had to have averaged more than $600 a month for the last 10 years if he retires after 25 years' service to secure more than a $100 a month pension. On the same basis, he would have had to have averaged more than $506.66 a month after 30 years and $440 a month after 35 years' service to receive more than $100 a month.

Wage-Hour Adopts Revised "White Collar" Regulations

Revised regulations establishing tests of duties, responsibilities, salary levels, and other requirements which determine exemption from minimum-wage and overtime provisions of the Fair Labor Standards Act for "white collar" employees went into effect at midnight on January 25.

The "white collar" group includes the "executive, administrative, professional, local retailing, and outside salesman" type of employee.

The new regulations were issued by Wm. R. McComb, Administrator of the Wage and Hour and Public Contracts Divisions of the Department of Labor, and concern Part 541 of the Code of Federal Regulations. They represent only minor changes from proposed revisions of existing regulations he made known on September 10. The revisions were issued at that time in a report and recommendation following a lengthy hearing held to consider changes. The regulations were last substantially revised in 1940.

The revised regulations will continue to apply to about 2,500,000 employees. They provide a salary and five tests for "executive" employees; a salary and four other tests for "administrative" and "professional" employees; and two tests each for "local retailing" and "outside salesmen" employees, for whom there are no salary tests.

The tests for exemption under the revised regulations include among their basic requirements:

1. That 'executive" employees must perform managerial duties;

2. That "administrative" employees must perform office or nonmanual field work of substantial importance in the management or operation of the business;

3. That "professional" employees must perform work requiring advanced knowledge in a field of science or learning, or perform creative work in an artistic field;

4. That "local retailing" employees must make local retail sales of goods or services, or perform work immediately incidental to such sales; and

5. That "outside salesmen" must be engaged to sell, away from the employer's place of business.

Formal notification of the adoption of the revised regulations was published in the Federal Register on December 24, 1949.

WASHINGTON—From page 7

ings and about the pension plan and of the death benefit policy. One of the points in his address was that no matter what the feelings were between IB and NABET members before affiliation that nothing would be held against any member should we choose to affiliate with them. He went on to explain the way the dues were broken down and distributed. A point that attracted my attention was that we could still publish our little magazine if we chose to do so. At the conclusion several questions were asked by the members present and all were answered as briefly and straightforward as possible.

The next address was from the IATSE representatives Mr. Jack Wilson and Mr. Richard Scott. They had several facts on which to back up all statements made by their Union and explained how we would benefit by joining with them. TV engineers, they explained, would keep on with their present jobs whether it be cameraman, projectionist, lighting engineer or any other job now regularly performed by any NABET member.

Last to speak was the representative of CWA, Mr. William Dunn. His proposal was essentially the same as outlined in the last issue of the Journal. This concluded the regular February meeting. Affiliation is a very important step in the history of NABET.

* * *

Wayne Bates, TV engineer at WNBW, is really an ambitious man. He completes from two to three hours of college classes each week day morning before coming to work and is getting "A's" and "B's" for his efforts. He is doing all this on a "Doodle Bug" motor scooter. Wayne weighs over 200 pounds and the scooter weighs less than 100 pounds so it must be a good one to take care of Wayne satisfactorily.

* * *

Dale Applegate has left WRC-NBC in Washington and has gone back to his home town of North Platte, Nebraska. That is where his folks live and is the reason for the change. He will be helping to operate one of the local stations there.

* * *

Keith Price, formerly of WRC, is now riding gain out at WNBW-TV studios. He is replacing Ed McCaul who transferred from the NBC-TV studios to the WNBWs transmitter—because Walter Godwin, local chapter secretary-treasurer transferred from there to WRC—which leaves us where we came in so—on to something else.

Nick Close, WRC studios, is back on the night shift after doing a stretch of morning shows.

* * *

Now with the color TV tests out of the way we can settle down to working out the bugs of the various systems. Speaking of bugs, one was very considerate on the day of the final FCC color tests back in February. This little bug was in the form of a bad regulator tube in the camera bias supply and chose the time to start acting up just two minutes before the color tests concluded. Leon Chromak and Bill Wells were at the camera controls at WNBW and just as FCC gave permission to conclude the transmitting of color tests, Leon, who was on the line with them, hastily said thank you, hung up the receiver and switched to a black and white test slide. As for the little bug, he was tracked down, eliminated and replaced by a new tube in a matter of a few seconds. 'Twould be nice if all radio troubles were that considerate.

* * *

WOIC reports that they have a new "super pro" to receive time signals on now. Up to the first of the year they had a very touchy time of keeping track of the correct time. They were promised a Western Union cable, but it never came into being. Another addition was the installation of a new monoscope test pattern system.

In WOIC's new contract effective Feb. 1st, a couple of dollars advance in salary was one gain, another gain was lunch money and meal period adjustments, and some streamlining in the wording of the contract to bring it up to date. The old contract concerned mostly radio and not TV engineers. It is felt that WOIC engineers now have one of the finest contracts in Washington.

At WMAL the biggest news was the invasion of CTI from California. NABET men were loaned to the California outfit to assist in operations. Camera men and video men plus audio men went down to the Statler to help out. CTI's equipment took a pretty rough beating on its long trip from the West Coast and many long hours were spent in whipping it into shape for the February color tests. The men at WMAL deserve a word of praise in their ambitious efforts in helping the CTI engineers. 73's.—Warren D. Deem.

COLOR TV—From page 5

inch screen. Use of these two black-and-white sets proved the compatibility of the RCA color system.

Dr. Engstrom emphasized that the color receivers demonstrated by RCA were experimental models and should not be regarded, either in outward appearance or performance, as being representative of the design that will be achieved when the RCA system reaches the commercial stage of development.

"The primary function of these experimental models," Dr. Engstrom said, "is to demonstrate the basic soundness of the all-electronic, high-definition system of color television. They have performed this function with outstanding success."

BOOK REVIEW

Radio Technology

Author: Ernest J. Vogt, published by Pitman Publishing Corporation, New York. 556 pages, approx. 6x9 inches, $6.00.

In a single volume, this book has included the whole background of radio with a minimum of mathematics. The subject matter includes magnetism, electricity, radio mathematics (high-school algebra and trigonometry), primary and secondary cells, DC theory and Kirchoff's Laws, AC theory, motors and generators, inductance, capacitance, advanced AC theory, motors and generators, inductance, capacitance, advanced AC theory, the vacuum tube, the vacuum tube oscillator, receiving circuit principles, transmitting circuit principles, sound conversion (various types of microphones, and other sound transducers including the loud speaker), antennas, radio aids to navigation, measurements in radio, studio and control equipment, television and facsimile, and tables of log. and trig. functions, etc.

This text offers a complete self-study opportunity, with the usual higher mathematics eliminated. An ideal text for the student, which the author has been using successfully in his classes in the form of lecture notes.

ARBITRATION

Should Labor arbitrators play follow-the-leader? Professor William H. McPherson of the University of Illinois Institute of Labor and Industrial Relations asks this question in a recent article published in the Arbitration Journal, and reprinted by the Institute.

The author points to a growing tendency on the part of arbitrators and parties to consider precedents in grievance arbitration cases. He analyzes the "doubtful benefits" and concludes there are far

greater dangers than benefits in this new trend.

Some of the dangers are that arbitration would become more legalistic, more costly, and less likely to yield an equitable ruling that would help to maintain good relations between the parties, who must continue to live and work together. The author emphasizes also that each case should be settled on its own merits, and within the framework of the particular situation.

Nor, Professor McPherson points out, is the arbitrator's award subject to appeal as are court decisions. For this reason "an inept award might be cited as well as an apt one."

As a remedy the U. of I. professor urges that arbitrators and the parties recognize the dangers of considering the decisions made in unrelated cases, otherwise he suggests it may soon become necessary to seek understanding among arbitrators that citation of cases involving different parties is inadmissible as evidence.

A.R.R.L. DX MAP

A new and completely-revised edition of the Amateur Radio Map of the World is announced by the American Radio Relay eague of West Hartford, Conn. This four-color map, a special projection by Rand McNally, has been especially prepared for use by amateur radio stations primarily in their "DX" activities, and is completely different from any other map now on the market.

Measuring 30 by 40 inches in size, the ARRL Map clearly shows the various countries of the world together with the call sign prefixes used by the radio amateurs of those countries. Prefixes shown are not only those assigned by international agreement at Atlantic City but also those used by the various military occupation forces throughout the world.

This map is a modified equidistant azimuthal projection, centered on Wichita, Kansas, allowing distance measurements of reasonable accuracy between points in North America and the rest of the world. In addition, the map may be used for determining great circle bearings from most points in the U. S. A.

Besides the country boundaries, the map also shows time zones, principal cities, and International Amateur Radio Union continental subdivisions. Around the border of the map are indexed the countries of the world according to the latest ARRL official countries list for amateur achievement awards, there being some 270 countries in the list. The border of the map also contains an explanation of the world's time zones and instructions on how to measure distances and bearings.

The ARRL Amateur Radio Map of the World is large enough to be read easily from the operating position, and will be an attractive and useful addition to any amateur's radio room.

The ARRL Amateur Radio Map of the World, 30 by 40 inches in four colors on heavy map paper, listing amateur radio call sign prefixes and 270 countries on ARRL countries list. Revised postwar edition, $2.00.

1949 TV SET PRODUCTION BRINGS POSTWAR TOTAL NEAR 4,000,000

Almost 4,000,000 postwar television receivers had been produced in the United States by the end of 1949, the Radio Manufacturers Association said today in a report on television and radio set production for the year.

Total industry production for 1949 was estimated at more than 2,800,000 television receivers and in excess of 10,000,000 radios on the basis of RMA reports projected for all set manufacturers. TV set production in 1948 was estimated at 975,000 and radio output at about 16,500,000 sets.

Manufacturers reporting to RMA made 292,061 TV sets in December despite a slow-down in assembly lines due to the Yule holidays and a change-over by most manufacturers to 1950 models for January showings. The December figure was under the production of the same companies in November and October.

Fourth-quarter television receiver production represented 42 per cent of the year's output and exceeded the combined production figures for both the first and second quarters of the year.

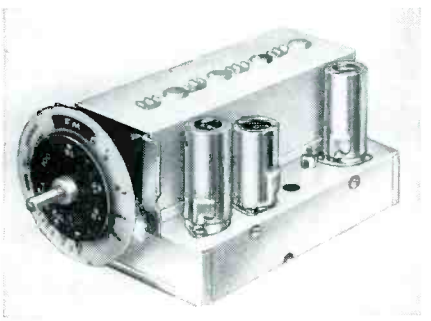
Radio receiver production, while showing a strong revival during the fourth quarter, was only about two-thirds of that in 1948 and little more than half of the industry's record output in 1947. FM and FM-AM receivers reported by RMA member-companies totalled 875,505 sets in 1949 or about 56 per cent of the 1,590,046 FM and FM-AM receivers reported to RMA in 1948.

Following are the month-by-month tabulations on radio and television set production reported to RMA during 1949:

	TV	*FM-AM, FM*	*AM Only*	*All Sets*
January	121,238	147,733	561,900	830,871
February	118,938	98,969	498,631	716,538
March (five weeks)	182,361	71,216	607,570	861,147
April	166,536	37,563	468,906	673,005
May	163,262	28,388	449,128	640,778
June (five weeks)	160,736	40,512	471,342	672,590
July	79,531	23,843	318,104	421,478
August (five weeks)	185,706	64,179	559,076	808,961
September	224,532	70,936	461,532	757,000
October	304,773	83,013	587,267	975,053
November (five weeks)	414,223	122,603	787,533	1,324,359
December	292,061	86,550	620,382	998,993
Total	2,413,897	875,505	6,391,371	9,680,773

New DuMont Four-Section Spiral-Type Inputuner

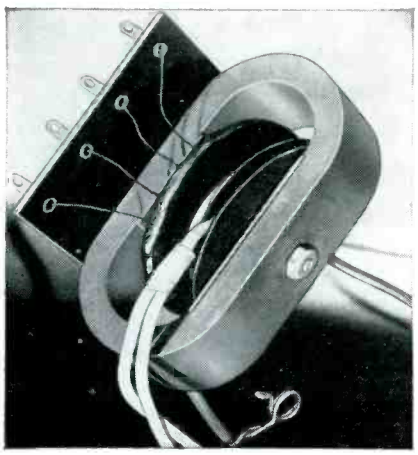
A new Du Mont four-section Inputuner incorporating the latest Mallory-Ware spiral-type Inductuner, is announced by the Electronic Parts Division of Allen B. Du Mont Laboratories, Inc., 35 Market St., East Paterson, N. J.



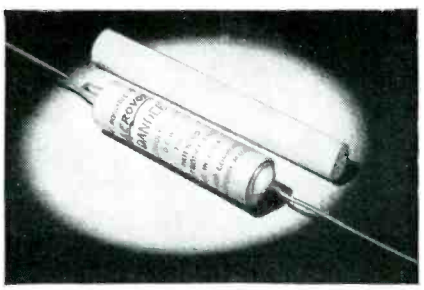
First and foremost among its many advantages is the doubling of the gain over previous Du Mont Inputuners, together with greatly improved selectivity in keeping with the advent of more and higher powered TV transmitters, local FM stations, amateur radio and other services, thereby permitting satisfactory TV recep-

tion in many areas heretofore considered unsuitable. The tuning range is continuous from 54 to 216 megacycles, inclusive, covering the TV channels 2 to 13 as well as the FM band. This new Inputuner which requires only 5.9 turns of tuning motion as against 10 turns for previous models, provides an improvement in the high-band spread. Further operating convenience is realized with a new type dial which illuminates the TV channel numerals on an outer circle and then automatically switches the illumination to the FM designations on an inner circle where the tuner traverses the FM band.

Another notable refinement is efficient operation on otheer 300 or 72 ohm antenna systems, by means of an input transformer incorporated in this latest Inputuner. The unit is completely shielded. It is supplied complete with tubes, new-type dial and escutcheon. Even though it is a four-section tuner for improved gain and selectivity, it is considerably smaller than previous three-section models, while the selling price is about 40% of that of the earlier tuner. Low oscillator frequency drift, greatly reduced harmonic generation susceptibility and improved band-pass characteristics round out this notable advance in TV head ends.



TV transformer size and cost are significantly slashed with a new powdered-iron core material known as Croloy 597, announced by Henry L. Crowley & Co., Inc., West Orange, N. J. Typical of such economies in core and winding is the new horizontal output transformer utilizing an elliptic closed core with center slug, appearing in current-production TV sets. Due to higher permeability, the Croloy 597 core mass can be kept at a minimum. Considerable economies are also realized in cost of windings, both as regards copper and labor. Further cost reduction is effected through use of paper-insulated layer-wound coils. Properly designed coils in conjunction with Croloy 597 cores permit TV set designers to operate a 16" picture tube with a single rectifier stage at an anode voltage of about 14 KV yet with adequate sweep to satisfy usual performance standards. There is no need for a voltage doubler. Core losses are sufficiently low for a marked lowering in operating temperature, and same can be further reduced by taking advantage of the "chimney effect" when the transformer is mounted with winding axis horizontal and a chassis hole, for free flow of air. A single screw and nut holds the transformer assembly and can also be used for mounting.



Still Smaller Electrolytic Capacitors

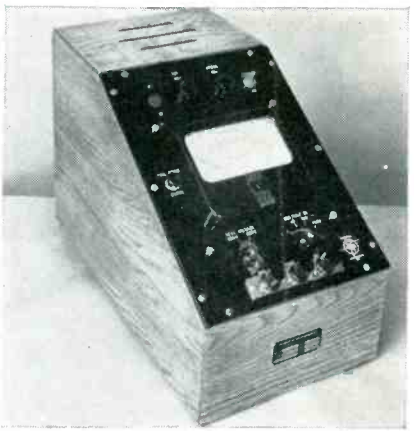
Miniaturized electrolytic capacitors handling full-sized functions, known as the Bantam or Type SRE, are announced by Aerovox Corporation of New Bedford, Mass. Bantams are especially suited for hearing aids, cathode by-pass applications, screen filter circuits, personal radios, and similar purposes, particularly where space is at a minimum and usual-sized capacitors are just too big.

Improved processing combined with more efficient utilization of space results in greatly reduced sizes. Bantams are hermetically-sealed in tubular aluminum cases. Wax-impregnated cardboard insulating jackets. New stud terminals provide maximum creepage distances between terminals and can. No. 18 gauge tinned-copper leads assure positive mechanical and electrical contacts even with smallest units. Despite diminutive size, these electrolytics do not have to be "babied." They comply with RMA tolerance requirements, D-C leakage-current limits, surge-voltage ratings, operating-temperature ranges, etc. Used within standard limits, their life is comparable with that of larger electrolytics.

New CB Coil Checker Announced

By CLOUGH PRENGLE CO.

The new CB Model 301A combines a vacuum tube voltmeter, a calibrated variable capacitor and an amplifier tube into a single instrument. When coupled with any RF oscillator, the 301A measures inductance, distributed capacity and the "Q" of any inductor as well as the capacity of mica condensers.



An improved and simplified circuit as well as the omission of a built-in oscillator have resulted in a moderately priced instrument which has a wide range of application in coil design and production, and one which is particularly adaptable to the rapid production testing of coils.

Complete technical data is offered by the manufacturer, Clough Brangle Company, 6014 Broadway, Chicago 40, Illinois, in bulletin No. 34B.

Constant Source Voltage Maintained by Megohm Meter

Two new Megohm Meters are announced by Industrial Instruments, Inc., 17 Pollock Ave., Jersey City 5, N. J., manufacturers of precision electrical and chemical measuring and control instruments.

The Model L-4A and Model L-6A feature an internal circuit assuring the user that the applied voltage is the specified voltage as long as the resistance of the piece under test is within the range of the meter. In this manner tests may be conducted with a known voltage.

Model L-4A contains an internal 500 volt measuring source, as well as a 200 volt source. Model L-6A features a continuously variable measuring source ranging from 100 to 600 volts DC. A volt meter is provided for checking actual voltage being applied to test. With this model it is possible to test a piece for actual resistance changes as the voltage varies.

These models are designed for production as well as lab. work. Inclined control panels with easy-to-read meters and control markings facilitate accurate, quick readings.

The Phonograph Needle -- Bulletin II.

By ARTHUR J. OLSEN

President, Permo, Incorporated

Thomas A. Edison chose the diamond for the first phonograph needle.

The hard, dense diamond needle, highly polished before use on the phonograph, served Edison's purpose. His prime consideration was reproduction of sound; cost was not an essential factor.

Edison's wax cylinder-type record . . . the hill and dale method of recording, the absence of tracking error, screw feed movement of the playing needle under very light weight unit pressure . . . provided the highest quality of reproduction attainable at that time. The problems Edison encountered, however, were far different than those which confront the industry today.

SUBJECTS OF BULLETIN No. 2

Part I.

INTRODUCTION

History repeats itself in that we have run the gamut of experience from the original diamond long-life phonograph needle to the short-life needles and then back to the long-life needls in five decades. The modern phonograph needle point must have a long life expectancy, that is, be wear-resistant and stand up under high unit pressure and temperature. It must do a universal job on every type of shank, record, record player, tone arm and pickup. This bulletin presents factual information regarding point materials and the unit pressure and temperature conditions under which the needle tip must function.

Development of Phonograph Needles

Part II—1900 to 1925

The emphasis on reproduction dominated choice of phonograph needles for use on both cylinder and disc-type records during this period. The cost of the diamond and its rapid breakdown of records created demand for a less expensive and more practical needle. The Pathe Company first introduced a natural sapphire needle which was not practical due to fabricating difficulties and end use fracture failures. Varying lengths and diameters of steel needles, to achieve "soft," "medium" and "loud" reproduction, held the market for a long time although it was necessary to change the needle after one or two record plays. The split bamboo and cactus spine needles entered the market in response to demand for a needle that would mask record scratch and acoustical resonance which the steel needle emphasized. The next step was toward increased needle life by using tungsten wire held in a rigid shank. The organic bamboo, cactus, steel, and tungsten wire needles were widely used over a long period of time in spite of their short life and damage from shock.

Part III—1926 to 1949

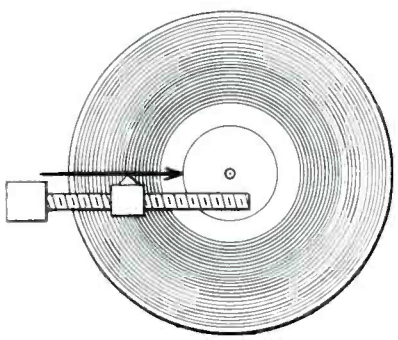
Extension of the range of frequencies and over-all improvement in recording created by the electronic pickup, vacuum tube amplifier, microphone and loud speaker call for a better phonograph needle. The diamond needle, for the reasons stated in Part II, was not practical for the new type record player. The absolute necessity for a long-life and practical point material was created with the introduction of automatic record changers for commercial and home use. Steel needles were chromium plated and needle life extended to approximately 25 plays at the expense of record life.

Engineers and metallurgists next explored the possibilities of the natural occurring platinum group alloys, and thus began the period of greatly extended needle life. The next step was the development of water-resistant osmium alloyed with other metals to provide a single purpose, specific material for long-life phonograph needle points. Synthetic sapphire has also been widely used for point materials although it duplicates the public usage problems present in the natural jewel. Synthetic sapphire is more uniform than the natural jewel and is more adaptable to commercial fabrication.

Part IV

Figures and a Graph, With Explanatory Data, Covering Needle Operating Conditions

The three point materials used generally in the manufacture of long-life phonograph needles today are the diamond, the sapphire and the osmium alloys. The conflicting conditions that influence professional choice and public acceptance of point materials are multiple and all directly affect the tonal quality of sound reproduction (see Bulletin 1 items numbered 1 to 11). The graphic and explanatory data which follows is an evaluation of the effects that result from unit pressure and temperature upon the diamond, the sapphire and the osmium alloys point materials. The data presented in the following is proportionately applicable to needle point tip sizes for both 78 r.p.m., and the 33 1/3 r.p.m. and 45 r.p.m. microgroove records.



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Figures 1 and 2

Tracking, the physical tracing of the needle point in the record groove, is a subject in itself which will be discussed in complete detail in a future bulletin of this series. It is necessary at this time, however, to direct attention to the fact that records are recorded one way and played another. Figure 1 shows how the master record is professionally cut—the arm holding the cutter maintains a *straight line movement.* This is accomplished by screw feed movement of the cutter as shown by arrow. Figure 2 por-

CHECK CHART AND RATINGS* OF PHONOGRAPH NEEDLE POINT MATERIALS

NEEDLE POINT MATERIAL	(1) Approximate Melting Point (Degrees F.)	Approximate Maximum Knoop Hardness in the Hard Condition	Does It Tend to Oxidize When Used On Records	Does It Conduct Heat Easily	Will It Chip Under Normal Play Conditions	Is It Fragile Under Normal Play Conditions	Does It Favor Long Record Life	Does It Wear-in Quickly and Compensate For Tracking Error	Does It Have Long Life Expectancy	Is It Metallic	Does It Favor Low-Mass One-Piece Needle Design
Bamboo	(2)	(3)	Yes	No	No.	Yes	Yes	Yes	No	No	No
Cactus	(2)	(3)	Yes	No	No.	Yes	Yes	Yes	No	No	No
Steel	2800	700	Yes	Yes	No.	No	Yes	Yes	No	Yes	Yes
Bronze	1980	450	Yes	Yes	No.	No	Yes	Yes	No	Yes	Yes
Gold Alloy	1945	450	No	Yes	No.	No	Yes	Yes	No	Yes	Yes
Chromium Plate	3430	1000	Yes	Yes	Yes	No	No	Yes	No	Yes	No
Tungsten Carbide - Cobalt Alloy	4700	1800	Int.	Yes	No.	No	No	No	Int.	Yes	Yes
Platinum Alloy	3225	450	No	Yes	No.	No	Yes	Yes	Int.	Yes	Yes
Iridium Alloy	4450	950	No	Yes	No.	No	Yes	Yes	Int.	Yes	Yes
Ruthenium Alloy	4500	950	No	Yes	No.	No	Yes	Yes	Int.	Yes	Yes
Rhenium Alloy	5740	500	Int.	Yes	No.	No	Yes	Yes	Int.	Yes	Yes
Tantalum Alloy	5425	700	Int.	Yes	No.	No	Yes	Yes	Int.	Yes	Yes
Tungsten Alloy	6170	600	Int.	Yes	No.	No	Yes	Yes	Int.	Yes	Yes
Topaz	3000	1300	No	No.	Yes	Yes	No	No	Int.	No	No
Ruby	3700	2000	No	No.	Yes	Yes	No	No	Yes	No	No
Sapphire, Natural or Synthetic	3700	2000	No	No.	Yes	Yes	No	No	Yes	No	No
Diamond	6700	6500	No	No.	No	No	No	No	Yes	No	No
Osmium Alloy	4900	1300	No	Yes	No	No	Yes	Yes	Yes	Yes	Yes

(1) Designates melting point of main constituent.

(2) Decomposes below a red heat.

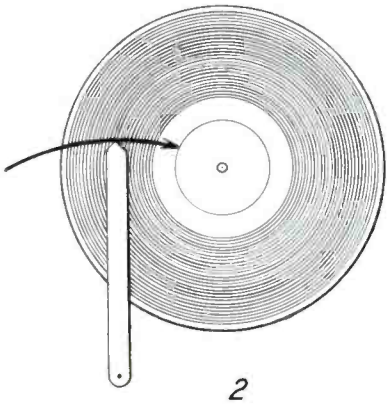
(3) Not measured, but relatively soft.

Int.—Intermediate, depending on specific conditions.

(*) Compiled and rated from accumulated experience and best available data. Ratings are based on normal, average, commercial conditions.

Detailed explanatory information will be furnished upon request.

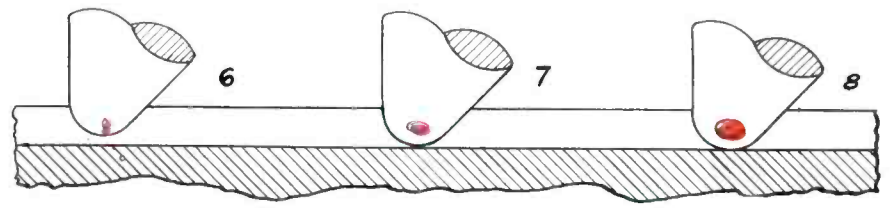
trays how a record is played by the needle point moving *in an arc* as shown by curved line. All modern record players employ a pivotally mounted tone arm



adapted to swing the needle across the record in an arc. The tracking error that results from this difference in cutting and playing the record is one of the conflicting conditions that influences choice of point material.

Figure 3

The needle point rides on the side walls of the record groove. Figure 3 shows the position of the needle in the groove. The area of contact of the needle and groove are subject to very high unit pressure and temperature under playing conditions (see paragraph 2, column 2, page 2 of Bulletin No. 1 of The Permo Reporter).



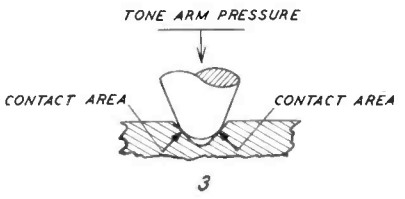
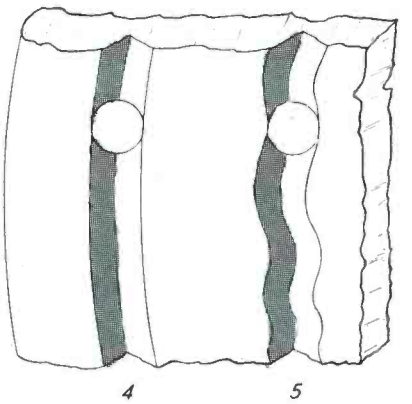


Figure 4

Figure 4 shows the shape of the record groove without sound recorded and needle tip in position.

Figure 5

Figure 5 shows the shape of the record groove when sound is recorded and needle tip in position. The serpentine shape of the groove is the recorded pattern of the original sound or music. The revolving record forces the needle point to-and-fro laterally and thereby transmits a to-and-fro mechanical movement of the needle shank to the electronic pickup. The pickup responds to the mechanical movement of the needle and translates this motion into an electrical pattern. This pattern is transmitted to the sound system to be amplified and reproduced through the loud speaker. The needle point must complement the groove and should be free of sharp areas on the leading and lagging edges of the needle point in contact with the record.



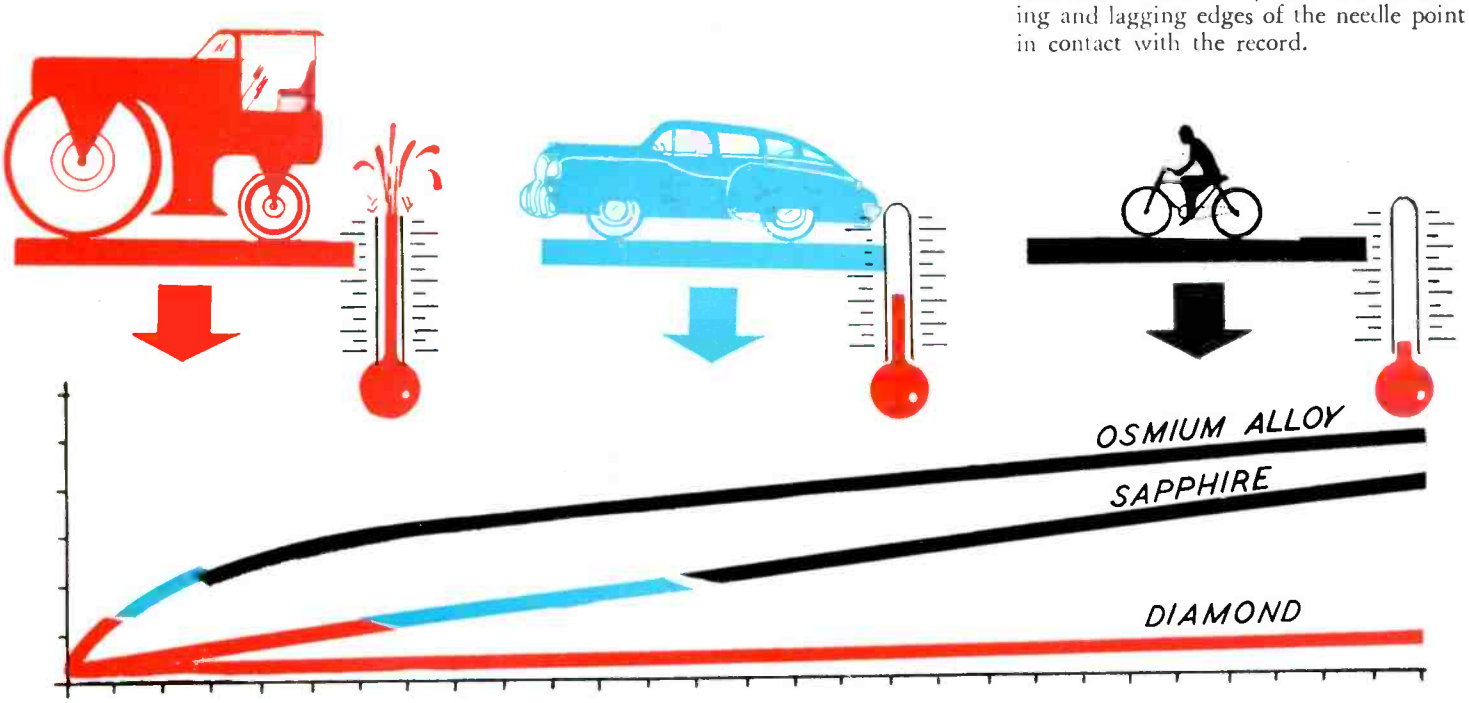


Figure 9

Graph 9 symbolically portrays the relative effects of high unit pressure and temperature upon the diamond, the sapphire and the osmium alloys. The sooner the "steam roller" and "automobile" unit pressures are reduced the better it is for the life of both the record and the needle.

Figure 6

The small red area in Figure 6 represents one of the two sides of the needle in contact with the record groove before appreciable wear is apparent. The unit pressure in the order of 25,000 pounds per square inch and temperature in the order of 2000° F. on these minute contact areas cannot be long sustained without early break-down of the record groove.

Figure 7

The red area in Figure 7 shows a larger area of wear than shown in Figure 6. This increase in contact area decreases the unit pressure to the order of 6,000 pounds per square inch and reduces the temperature to the order of 1000° F. Wear on the record groove is consequently reduced although reproduction efficiency of the needle point is not impaired.

Figure 8

The red area in Figure 8 shows a larger area of wear than that shown in Figures 6 and 7. This further increase in contact area further decreases the unit pressure and temperature and further reduces wear on the record groove. The amount of needle wear represented by the red area in Figure 8 might suggest that the needle point is worn out. *That is not true.* While the needle will eventually wear out, and distortion become discernible in high frequency reproduction at varying periods of life depending on individual ratings, needle wear is safely extended far beyond the area portrayed. Note: The effect of needle wear on sound reproduction is a subject in itself which will be discussed in complete detail in a future bulletin of this series.

Part V

The Diamond, the Sapphire and The Osmium Alloys

The Diamond

The diamond is the hardest and most wear-resistant material known. It could logically follow that it would be the ideal phonograph needle point tip. The conflicting conditions under which the needle tip must function and the very hardness and wear-resistance of the diamond creates a paradox which limits its practical public usage. The long wear-in- of the diamond sustains the very small contact area (Figure 6) which results in rapid wear of phonograph records. Broadcasting stations and other professional installations, where the accent is on sound reproduction rather than record life, use the highly polished diamond needle to advantage.

The Sapphide

The sapphire, in reality a substitute for the diamond for needle point material, has a high degree of hardness and resistance to wear. It is more fragile than the diamond and frequently fractures from shock in normal public use. The synthetic sapphire has substantially the same chemical and structural properties of the natural jewel except that it is more uniform. The wear-in of the sapphire needle point, while shorter than that of the diamond, sustains the very smal lcontact area (Figure 6) over a long number of record plays. The resultant wear on the record groove is further increased because the microscopic crystal fragments that have worn off the needle and deposited themselves in the groove creat a phenomenon known as secondary abrasion. The sapphire point, riding in the groove in which the loosened crystal fragments have become deposited, accelerates both needle and groove wear. The brittle nature of sapphire also causes the leading and lagging edges of the contact areas of the needle point to become sharp, resulting in further breakdown of the record groove.

The Osmium Alolys

Osmium, in its elemental form, is dense, hard and wear-resistant. This rare, natural elemental has been alloyed with other metals to further increase its hardness and wear-resistance, thereby producing an alloy specifically designed and manufactured for phonograph needle point tips. These alloys are comparable to the diamond in toughness and resistance to fracture; they are self-polishing in use on phonograph records; they are fine-grained, homogeneous and ductile enough to prevent sharp leading and lagging edges developing on the needle point.

A unique quality of phonograph needle points made of osmium alloys is that they wear-in rapidly and wear-out slowly. The quick wear-in increases the area of contact (Figure 6, 7 and 8) and reduces unit pressure and temperature (Graph 9). The gradual wearo-ut extends over a very long period of record plays, resulting in prolonged record and needle life.

Summary

A long-life phonograph needle point, to resist high unit pressure and temperature, must have each and every one of the attributes of a high melting point, hardness and resistance to oxidation. The diamond, the sapphire and the osmium alloys possess these qualities. The osmium alloys, man-made exclusively for point tip material, possess the additional metallic properties of ductility, toughness and frictional compatibility; that is, quick wear-in and slow wear-out.

BOOK REVIEW

Video Handbook

Co-authored by Morton G. Scheraga and Joseph J. Roche, published in 1949 by William F. Boyce, Boyland & Boyce, Inc., Montclair, N. J. 892 pages, approx. 5x7 inches.

Authors Scheraga of DuMont Labs. and Roche, editor of Radio Maintenance Mag., have admirably covered the scope. The Chapter headings are:

1. Television—Past, Present, and Future—24 pages.
2. Fundamentals of Electronic Television—84 pages.
3. The Television Receiver—174 pages.
4. The Television Station—140 pages.
5. Television Antenna Systems — 90 pages.
6. Creating a Television Show—52 pages.
7. Descriptions of Modern Television Receivers—78 pages.
8. Installing Television Receivers—60 pages.
9. Servicing Television Receivers—110 pages.
10. Television Test Equipment — 24 pages.
11. Building a Television Receiver—8 pages.
12. Data Section—10 pages.
13. Television Terms—10 pages.
14. Bibliography—4 pages.

Index—9 pages.

Section 4. The Television Station, is very comprehensive, and includes all forms of TV camera tubes. The overall text is profusely illustrated with photos, graphs, and circuit diagrams. The only noticeable departure from the standard engineering handbook is the almost complete absence of mathematical treatment, which doesn't at all detract from the author's successful coverage of this vast subject matter. The handbook sells for $5.00, and you will find the cost well justified.

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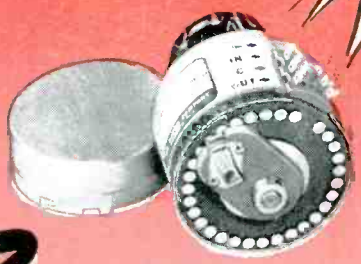

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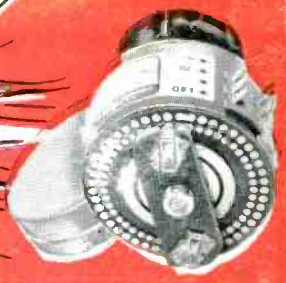

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