THE BROADCAST ENGINEERS' JOURNAL
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The Broadcast Engineers' Journal

WNBW WRC-FM

Rigger Archie De Veau pauses in his climb to the top of WNBW WRC-FM tower which reaches 350 feet into the sky at the Wardman Park Hotel in Washington. Platform at the 250 foot level is the receiving point for microwave link to be used for television remote pickup around Washington. The fifty foot antenna atop the tower is an RCA Super Turnstile triplex antenna which transmits WNBW video and audio, and WRC-FM signal. —See page 8

AUGUST
1947

VOL. 14 NO. 8

SINCE 1934 -- THE BLUEBOOK FOR THE BROADCAST ENGINEER

A Major Advancement in the Recording Blank Field . . .

10 Year Guarantee

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THE BROADCAST ENGINEERS' JOURNAL

Ed. Stolzenberger Editor and Business Mgr.

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NATIONAL N.A.B.E.T. OFFICE
Room 501, 66 Court Street, Brooklyn 2, N. Y.
A. T. Powley, President

NABET Activity

CLIFF GORSUCH negotiated a $5./week raise at WROK, Rockford, Ill. Upon his return to New York, Mr. Gorsuch assumed the duties of New York-New England Representative. He is operating out of the National Office in Brooklyn, and is available at MAin 4-2855.

NABET V. P. Jim Brown is renegotiating contracts at KFSD, San Diego, and KFI, Los Angeles.

National Sec'y-Treas. Harry Hiller has negotiated a 6-month extension of the existing Muzak-NABET contract.

Sanders A. Chaise, C.P.A. No. 8109, N. Y., has finished checking the books of NABET and NABET Publications, and found them in good order. The C.P.A.'s report has been mimeod and sent to all NABET Chapter and Section Chairmen.

President A. T. Powley is en route to WLEE, Richmond, and WGRC, Louisville, for contract renegotiations.

Taft-Hartley Labor Act: Pres. Powley has obtained NABET attorney O'Donoghue's opinion of the 1947 Labor Act as is affects NABET; this report is published in full below. Not specifically covered, is the status of our supervisors; Mr. Powley has made the following statement covering their status:

Status of NABET Supervisors

In future negotiations, NABET will not have the right to insist on including supervisors in the Union, or of representing them in a unit of their own.

This provision will be found in Section 14 (a) of the Act, and states as follows:

"Nothing herein shall prohibit any individual employed as a supervisor from becoming or remaining a member of a labor organization, but no employer subject to this Act shall be compelled to deem individuals defined herein as supervisors as employees for the purpose of any law, either national or local, relating to collective bargaining."

Analysis of the "Labor Management Relations Act of 1947" (Taft-Hartley bill) submitted by NABET attorney O'Donoghue

Coverage of the Law

As the law is now written there is no question but that many of its important provisions explicitly cover the Radio Industry. More particularly, that section which deals with National Emergencies or Strikes, Title 2, captioned "National Emergencies." In other words, at the outset it would be advisable to call this particular provision of the Act to the attention of all of your local chapters and to all of the employees working on network owned and operated stations and network affiliates.

Under Title 2, whenever in the opinion of the President of the United States a threatened or actual strike or lockout affects a substantial part of industry or an entire industry engaged in, among other things, "communication among the several states or with foreign nations," the President may immediately appoint a board of inquiry to make a written report to him within such time as the President shall prescribe. This board of inquiry is given the power to issue subpoenas for the attendance of witnesses and for the production of all books and papers, but must not make a recommendation of any kind. Upon receiving a report from the board of inquiry, the new Act provides that the President may authorize the Attorney General to petition a District Court of the United States to enjoin any strike or lockout or the continuing of any strike provided that the communication industry or a substantial part of it is affected or it will impair the national welfare and safety. The Norris-LaGuardia Act is exempted from the coverage of this type of injunction.

After the injunction is obtained by the Attorney General, the President is authorized to reconvene the board of inquiry again, and at the end of the 60-day period the board of inquiry is to report back to the President what efforts have been made for a settlement and merely state the position of the employers and the union. The President is then to make this report available to the public. The National Labor Relations Board within the next succeeding 15 days shall take a secret ballot of the employees of each employer involved in the dispute on the question of whether the employees wish to accept the final offer of settlement made by their employer as stated by him and shall certify the results thereof to the Attorney General within five days thereafter.

Upon the certification of the results of such ballot or upon settlement being reached, whichever happens sooner, the Attorney General shall move the court to discharge the injunction. When such a motion is granted by the District Court, the President shall then submit to the Congress a full and comprehensive report of the proceedings, including the findings of the board of inquiry and the ballot taken by the N.L.R.B., together with such recommendations as he may see fit to make for consideration and appropriate action.

This new section now written into the labor laws by Congress restricts any strike by employees of network owned and operated radio stations, or, for that matter, of the network station WOR with affiliates on a nationwide basis. In substance, the Act prevents a strike in the Communications Industry, either telephone, telegraph or radio, inasmuch as the Attorney General can secure an injunction for at least 80 days enjoining a strike, and if the union and the employer do not settle the matter before the board of inquiry, then there is written in the Act that the President may submit the report and recommendations to Congress with the implied threat clearly written throughout these provisions that if the parties do not settle it, then Congress will take drastic action and force them to settle it. Thus, the National Association of Broadcast Engineers and Technicians, and all of its local chapters and local councils, should realize that the threat of a strike in the Radio Industry on any one of the networks would undoubtedly be termed a "National Emergency" in the communications field, and you would be forced to comply strictly with the provisions of the new Act. The Act is weasel-worded, particularly that part which states—"the board of inquiry shall not contain any recommendations in its report," but the next sentence says—"The President shall file a copy of such report with the Federal Mediation Service and shall make its contents available to the public." As has been argued pro and con for many weeks and months, if the board of inquiry is not to make any recommendations, and if it is not compulsory arbitration, why then is the right to strike enjoined, and why is the Attorney General given the right to enjoin a strike by the employees?

Existing Collective Bargaining Agreements and How You Must Bargain in the Future

The present Taft-Hartley bill in no way affects your existing collective bargaining agreement or agreements either of your nationwide network agreements or the contracts of

your local chapters for individual radio stations, but if and when any of your present collective bargaining agreements expire, and are reopened or renegotiated after August 22, 1947, when the law becomes effective and the law will apply to this type of an agreement. The Act will become effective 60 days after the bill is enacted into law—or August 22, 1947.

In order to adequately explain this particular section dealing with the new technique and procedure of collective bargaining, the Act makes unfair labor practice apply against labor organizations as well as against employers, and among the new unfair labor practices against labor organizations, is "*a failure of a labor organization to bargain collectively with an employer*" and the Act imposes as a matter of law an obligation on the labor union as well as the employer to bargain collectively in good faith wherever there is in effect an existing collective bargaining contract. The Act provides that if either the employer or the union desires to modify or change the terms of their existing contract they must (1) serve a 60-day written notice by registered mail upon the employer or to the other party to the contract prior to the expiration of such contract; (2) they must meet, make efforts and confer with each other for the purpose of negotiating a new contract; (3) if the parties are unable to agree upon a contract after 30 days, they must then serve a written notice on the Federal Mediation and Conciliation Service and also serve a like notice upon any state or territorial agency that is established to mediate and conciliate. Neither the employer or the union during this 60-day period can engage in a strike or lockout, all the terms of existing contract for the period of 60 days after the original notice is given must remain in force and effect or until the expiration of such contract, whichever occurs later. Any employees who engage in a strike during this 60-day period shall lose his status as an employee of the employer, and all of his benefits under the Wagner Act.

In other words, the Act sets up a 60-day cooling period during which certain conditions precedent must be carried out prior to signing a new contract after August 22, 1947. You can sign a new contract between now and August 22, 1947, even with a closed shop and you would not be compelled to follow out these provisions because the new Act becomes law, as to this particular part of the bill, on August 22, 1947. All of your local chapters must be advised of this new provision and failure to carry out these procedural steps may make them lose their rights as a bargaining agent.

Strikes

The new Taft-Hartley bill provides that:

(1) No strike may be called during a collective bargaining agreement;

(2) No strike may be called for 60 days after registered notice has been formally given to employers;

(3) No jurisdictional strikes may be called;

(4) No strikes to enforce a boycott may be called;

(5) No organizational strike may be called, if there is already a union recognized by the N.L.R.B. in existence in the plant or shop.

(6) If a strike is called by an officer of a local union and is found to be illegal under this law, the local union is liable in damages for injury or loss to the employer in the Federal courts and this is true whether or not the local union authorizes the strike. In other words, a local union or a national chapter may be held liable for a so-called "wild cat" strike of the employees.

(7) Jurisdictional strikes for a boycott as set forth in the Act are denominated unfair labor practices and the N.L.R.B. is authorized to immediately petition the Federal District Court to enjoin a jurisdictional strike or a strike for a boycott;

(8) Further, the Act not only makes jurisdictional strikes and boycotts an unfair labor practice, but declares them unlawful so that an employer or any person affected by a jurisdictional strike or boycott can sue the union for damages.

Unfair Labor Practices Against Unions

The Taft-Hartley bill makes the following unfair labor practices against a union—

(1) To restrain or coerce employees in the exercise of the rights guaranteed under Section 7.

Comment: Conceivably, this section might make peaceful picketing by a labor organization to organize the employees an unfair labor practice. It may also be considered an unfair labor practice to try to force the networks to bargain on a nationwide basis if they desire to bargain on a station-to-station basis.

(2) To attempt to cause an employer to discharge an employee because the employee failed to keep his membership in good standing in a local union. In other words, closed shops are declared illegal under the Act and an employee can only be discharged for failure to pay dues or initiation fees. While a member may be expelled by a union for disloyalty, dishonesty to the union, stealing union funds, or starting a dual organization, violating his oath of allegiance by being a member of the Communist Party, nevertheless he cannot and must not be discharged by an employer when the union asks for his discharge under the so-called union shop agreement, because the Act makes it an unfair labor practice for an employer to discharge an employee for any cause other than non-payment of dues or payment of initiation fees. This is one section that labor unions argue actually destroys discipline in trade unions;

(3) To refuse to bargain collectively with an employer, that is, taking and carrying out all of the provisions above set out in paragraph (6);

(4) To engage in jurisdictional strikes or boycotts. In other words, Section 4 may be construed that employees may have to work with non-union men and work on non-union made materials of any kind.

(5) It is an unfair labor practice to charge excessive initiation fees. The N.L.R.B. is made the sole determining agent as to what fee or initiation fee a labor union should charge.

(6) It is an unfair labor practice to cause or attempt to cause an employer to pay or deliver or agree to pay or deliver any money or other thing of value in the *nature of an exaction for services which are not performed or are not to be performed.* This is called the "feather bedding section." It may abolish rest periods or waiting time that have been paid for by employers throughout all industries. Many contracts provide that where an employee is called in for work and only works one or two hours, he shall be paid one-half day's pay. This section was aimed ostensibly at a "feather bedding" practice but only the future will tell how far the N.L.R.B. will extend it.

Closed Shop

A closed-shop agreement is declared illegal and is not permitted in any collective bargaining agreement, after the expiration, reopening or renewal of the present collective bargaining agreement. A closed shop agreement may still be entered into before August 22, 1947 and would be valid and enforceable, because the law does not take effect until August 22, 1947.

Union Shops

A labor union can only obtain a union shop agreement. A closed shop agreement is where the employees are members of the union on the date of their employment. In closed shops usually the employer calls the union to send a man to the plant or establishment for employment. A union shop is an agreement where *30 days after employment,* an employee must become and remain a member in good standing of the union. Under the Act, union shops are permissible provided (1) before a local chapter or union can obtain a union shop agreement with an employer, (a) the employer must agree to the union shop; (b) the union must be certified by the N.L.R.B. as a bargaining agent; (c) after being certified as a bargaining agent, the N.L.R.B. must hold a further separate election and a majority of all employees eligible to vote do vote in favor of the union shop. (It must be noted that it is not a majority of all employees who vote in order to get the union shop, but it is a majority of all employees who are eligible to vote. In other words, you have to get a majority of all those voting and not voting as well.) There are two elections that must be held to get a union shop, — first, you must be certified as a bargaining agent of the employees, and after you win that election, you must in order to have a union shop, then hold a union shop election. Under the union shop provisions the employer, of course, can hire union as well as non-union men. A non-union employee must join within 30 days. It must be kept in mind that a union may sustain or expel a member, but an employer can discharge him only for non-payment of dues or initiation fees. Further, this new section of the Act as to union shop cannot be applied retroactively as to existing employees, it will only apply to new employees being taken into employment, who must become members of the union.

Certification as Bargaining Representative

Before a union can be certified in order to obtain collective bargaining rights under the Taft-Hartley bill, the national union as well as the local union must file with the Secretary of Labor a copy of its constitution and by-laws, and a financial report showing:

(1) The name of such labor organization and the address of its principal place of business;

(2) The names, titles and compensation and allowances of its three principal officers and of any of its other officers or agents whose aggregate compensation and allowances for the preceding year exceeded $5,000, and the amount of compensation and allowances paid to each such officer or agent during such year;

(3) The manner in which the officers and agents referred to in (2) were elected, appointed, or otherwise selected;

(4) The initiation fee or fees which new members are required to pay on becoming members of such labor organization;

(5) The regular dues or fees which members are required to pay in order to remain members in good standing of such labor organization;

(6) A detailed statement of, or reference to, provisions of its constitution and by-laws, showing the procedure followed with respect to (a) qualification for or restrictions on

(Continued on Page Twelve)

Direct Crystal Control at 50 MC!

By George M. Thurston

Bell Telephone Laboratories

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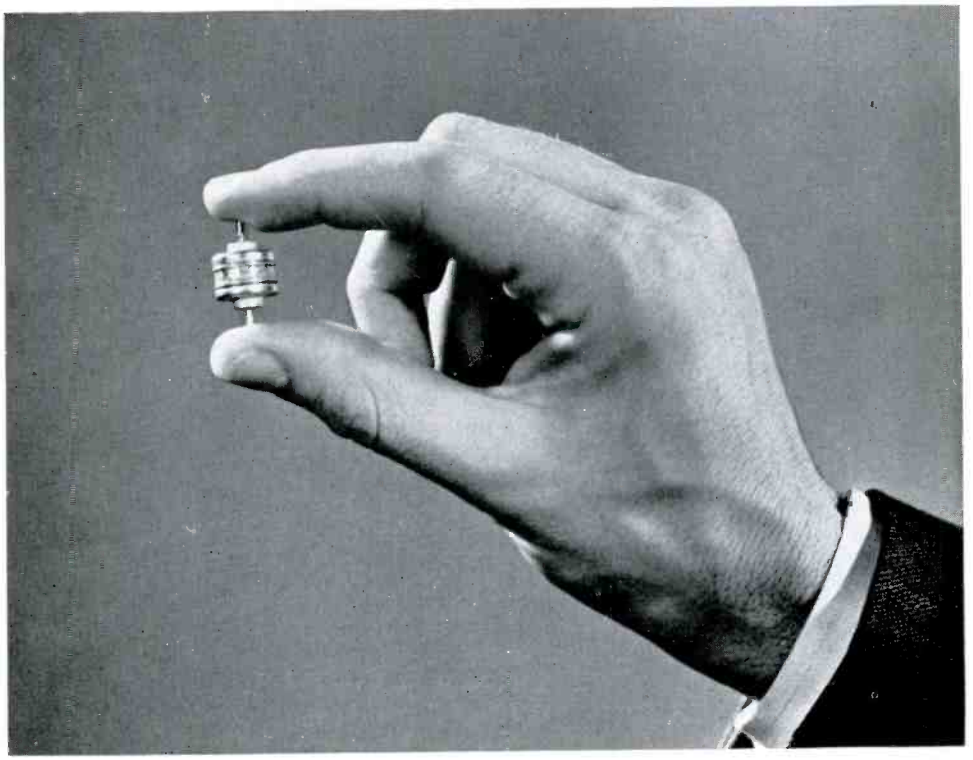
Bell Laboratories Record

A NEW crystal, recently developed at Bell Telephone Laboratories, has made it possible to simplify and at the same time increase the efficiency of Western Electric very high frequency equipment.

In the past, VHF transmission has depended upon low frequency crystals with harmonic generators to produce the carrier or beat frequencies required. But the use of a low frequency crystal with multiplier stages requires complicated equipment and also introduces a series of extraneous noises and unwanted harmonics that are difficult to suppress or eliminate.

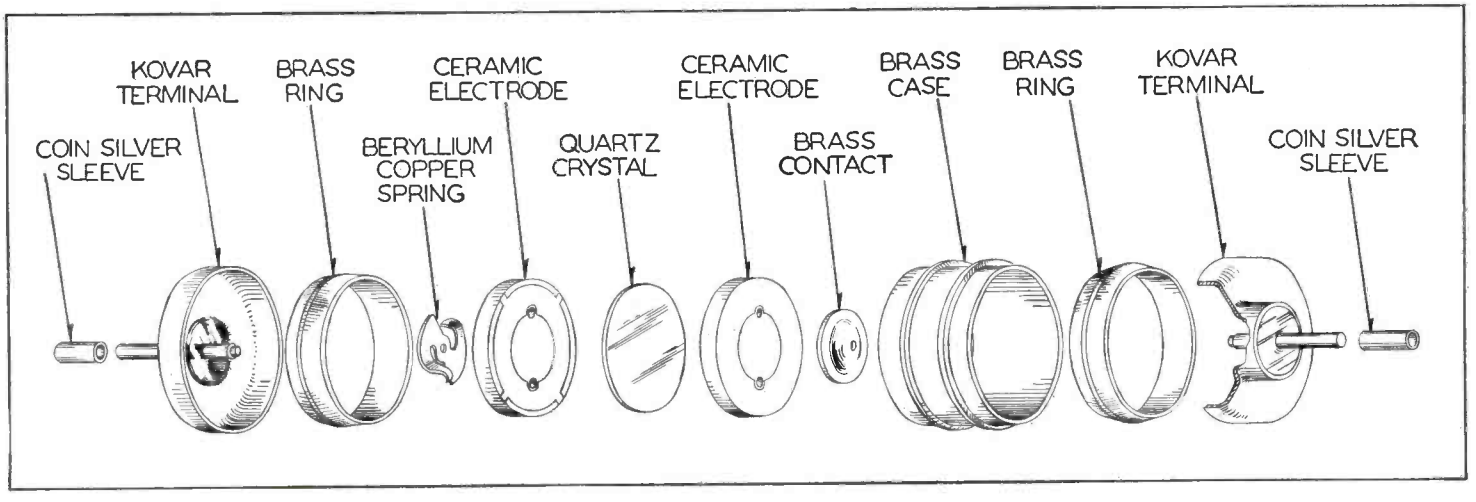
This new development, the D-153053 Crystal Unit, also called CR-9, was designed to use a crystal plate vibrating at a mode of thickness shear higher than the fundamental mode for the express purpose of eliminating the need to start the primary frequency control at the low frequencies. The quartz plate used in the overtone mode D-153053 Crystal Unit is a mechanical vibrator that has a single frequency response at the third or fifth mode of the shear. These quartz plates are made at frequencies of from 15-50 megacycles and part of the circuit can be used to multiply electronically these frequencies up to 150 mc. The advantages in using these plates in place of the conventional fundamental plates are:



The D-153053 Crystal Unit, also known as the CR-9, which gives direct crystal control from 15 to 50 mc.

1. Saving of several tubes and many resistors, condensers and other circuit elements per equipment.
2. An increase of the number of channels that are usable without obtaining any interaction between the equipments involved.
3. A reduction in both the magnitude and the number of undesirable responses which are usually present due to the harmonics of the fundamental crystal units.
4. A greater latitude in the choice of the intermediate frequency. With normal fundamental crystal opera-

Exploded view of the D-153053 Crystal Unit. Units are sealed from effects of moisture and dirt by Kovar-to-glass seal. Holder is sealed by pressure rings and neoprene gaskets. .001 in. thick. Quartz plate is excited by electrodes, separated by an air gap. The electrodes are ceramic and are silver plated.



tion the range of fundamental crystals and the amplifying factors have to be suitably chosen to prevent some crystal electrical harmonics from falling in the intermediate frequency band. This problem is entirely eliminated when higher crystal frequencies are used.

Whenever crystal controls are used for frequencies higher than ordinarily obtained by use of fundamental mode crystal units, the overtone mode crystal unit will be used. The over-all effect in using this unit will be to reduce the size and weight of the equipment, to increase the number of channels available for communication, and to eliminate the design problems involved in suppressing unwanted harmonics. The absence of harmonics is due primarily to the fact that the quartz is vibrating mechanically at only the frequency desired for operation. All other extraneous modes are suppressed by the manner of mounting the plates, by the manner of shaping the plate and the electrodes which excite the mechanical vibration.

AT Quartz Plate Used

Stability with temperature is obtained by cutting the plate at the proper angular orientation with respect to the piezoelectric axes. An AT quartz plate is used and is cut at such an angle that its temperature characteristic will never cause the frequency to deviate by an amount greater than that shown by Figure 1. The envelope of frequency deviation includes the temperature characteristics of the AT quartz plate vibrating at the third or fifth mode and it also includes the maximum and minimum frequencies to which the quartz plates are adjusted. The temperature-frequency characteristics of such a plate are accurately defined by the angle at which the plate is cut. In production, X-ray measurements may be substituted for temperature frequency measurements.

The design of this unit was separated into: the development of a quartz plate, the development of an electrode, the development of a sealed holder with Kovar-to-glass sealed pins, and the development of oscillator circuits that could be used to excite the overtone frequency.

The D-153053 Crystal Unit developed from the solution of these problems is shown on page 5 in the exploded view. The units are sealed from the effects of moisture and dirt by means of Kovar-to-glass seal. The holder itself is sealed by means of pressure rings and neoprene gaskets which are approximately .001 inch thick.

The electrodes are made of ceramic and are silver plated. They must be optically flat and are made in this manner by lapping them with equipment ordinarily found in crystal cutting shops. The quartz plate is excited by electrodes that are separated by an air gap. The ceramic electrodes are plated with silver in order to provide the proper electrical excitation of the crystals. The air gap is obtained by plating along the periphery of each electrode face a sufficient amount of silver to provide a space between the electrode face and the crystal. The thickness of this raised portion of the silver on the face of the electrode maintains an air gap only a few hundred thousandths of an inch thick. As may be seen from the exploded view, contact to the outer pins of the holder is made through a spring and a brass disc which serves to clamp the electrodes upon the quartz plate. The quartz plate is circular—about ½ inch in diameter—and varies in thickness from 0.006 inch to 0.015 inch.

Electrically the crystal unit itself provides a configuration of static capacitances as shown in Figure 2. Inherently the crystal unit has minimum capacitance between pins and from each pin to ground. To use such a configuration of capacitances and at the same time utilize the quartz crystal as a series resonance electrical element, a circuit such as shown in Figure 2 may be used. In this circuit the quartz plate operates very close to its series resonance point, and the holder capacities are absorbed by other elements in the circuit.

To adjust such a circuit, the procedure is as follows:

1. Insert at Q a capacitance equivalent to the crystal capacitance. This may be simulated quite accurately by placing a dummy CR-9 holder having a static capacitance equal to an operative crystal unit.
2. Adjust C_1 to minimum capacitance with C_2 at mid-scale. Oscillations as evidenced by grid cur-

(Continued on Page Sixteen)

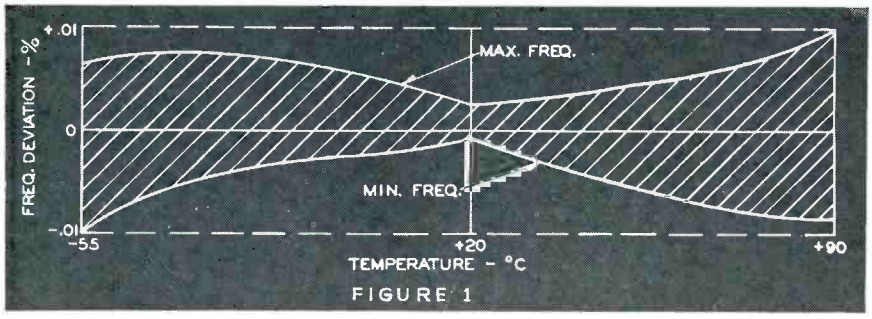


FIGURE 1

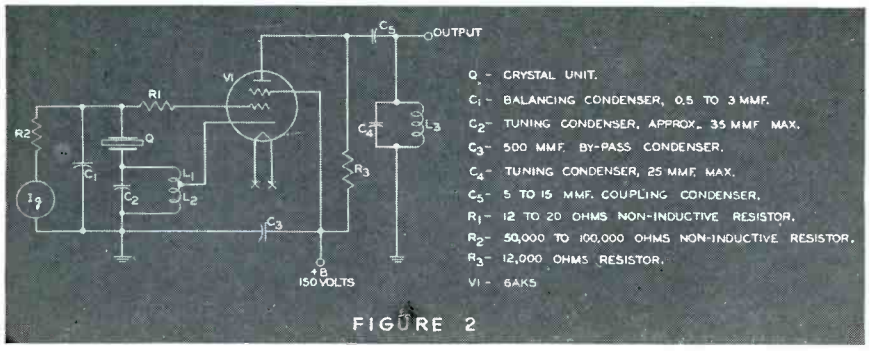


FIGURE 2

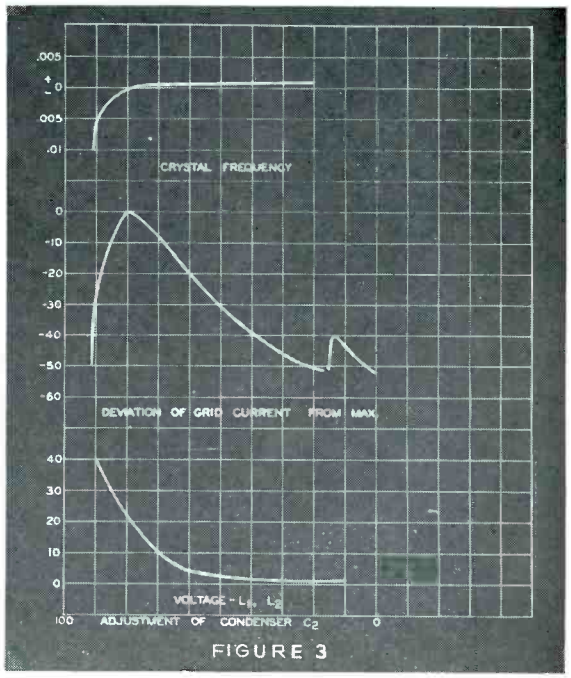


FIGURE 3

The Sun never sets on Presto Recording Equipment

▶ There's hardly a spot on the globe that isn't within hearing distance of Presto equipment. The reason lies in the unadorned merit of the equipment itself. Engineers are not easily taken in by fine phrases relating to the equipment they use. It is always the performance that counts.

▶ The record of Presto firsts in the recording field is long and imposing. Presto creative engineering plus precision manufacture have kept Presto in the forefront for more than a decade. This is evidenced by the high regard in which Presto equipment is held, not only in this country, but everywhere in the world. It all adds up to this supportable statement: Engineers prefer Presto for performance.

PRESTO

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Walter P. Downs, Ltd., in Canada

WORLD'S LARGEST MANUFACTURER OF INSTANTANEOUS SOUND RECORDING EQUIPMENT & DISCS

WNBW ~ Washington

By L. A. McClelland

ON JUNE 27th the National Broadcasting Company inaugurated television broadcasting service in Washington, D. C. The formal dedication was held at the Wardman Park Hotel and was attended by three hundred invited guests including Chairman Charles R. Denny and members of the FCC, President Niles Trammell of the National Broadcasting Company, and high officials of Congress, the Army, Navy, and the Marine Corps.

Formal dedication of station WNBW meant the commencement of NBC network television operations between Washington and station WNBT, New York. The Washington and the New York stations will exchange television programs via the Bell System coaxial cables.

The facilities of WNBW are located at the Wardman Park Hotel on Woodley Road in the Northwest part of the city. The transmitter is installed in the former Garden Room which also houses the transmitter of Station WRC-FM, NBC's FM outlet which began operations simultaneously with WNBW.

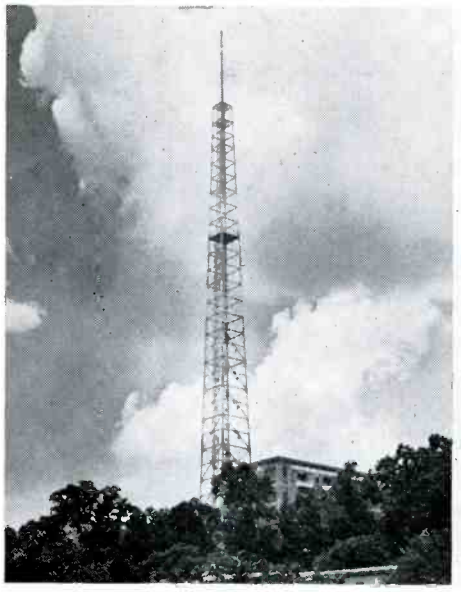
Prior to the opening of WNBW, television set owners in the Nation's capital were served by DuMont station WTTG. Present plans call for the construction of two additional television stations in Washington before the end of 1947, one operated by the Evening Star, and one operated by the Bamberger Broadcasting System.

In the past several months, NBC television crews have participated in the televising of many important Washington events, including addresses of President Truman, and Mexican President Aleman's appearance before the joint meeting of Congress.

WNBW's television transmitter was delivered in May, 1947, and is the first postwar television transmitter built at the RCA plant in Camden, N. J. Transmitters of this type, the TT-5A, five kilowatts, are now in quantity production and are to be shipped at the rate of several each month. WNBW's transmitter is operating on channel 4 and is fed to an RCA Super Turnstile mounted atop the 350 foot tower on the hotel grounds. The effective radiated power of the antenna is 20.7 kw.

The FM transmitter for station

(Continued on Page Fifteen)



(Left): WRC-FM and WNBW television antenna—350 feet high, at the Wardman Park Hotel. The triplex antenna at the top of the tower handles the sight and sound of WNBW, and the FM programs of WRC-FM. At the 250 foot level of the tower there is a platform where television microwave receiving equipment will pick up signals from remote television pickup points in and around Washington. (Right): Station Engineer John B. Knight checks video monitor in the WNBW control room.

(Left): Ass't Station Engineer Robert Barnes checks the FM transmitter. Its 3 kw output becomes an effective 15 kw through the use of a high-gain super-turnstile triplex antenna. (Right): Transmitter Engineer John Rogers adjusts the flying spot scanner, used to "pick up" test patterns, slides, and may be used to superimpose a still picture on any other television picture, still or moving. The cathode ray tube above Rogers' hand is the source of the flying spot. The scanning light beam from the C-R tube focus through a slide-type picture mounted in the slide viewer in front of the tube; passing through the slide, the light focuses on a photo-electric cell, whose output constitutes the video signal representing the slide picture.

Television Clinic

THIRTY-THREE of the nation's top-ranking broadcast engineers, representing the major radio networks and leading independent stations which are operating or planning television service, recently attended the first television engineering clinic ever conducted in the industry. The five-day clinic was sponsored by the RCA Engineering Products Department.

The visiting engineers came to Camden from all parts of the United States, and were launched on a training program which included technical discussions, demonstrations, and practical experience with RCA television broadcasting and studio equipment.

Designed to give the participants a comprehensive understanding of the theory, operation, and maintenance of this equipment, the program was conducted at the top engineering level, with a staff of instructors made up of the same RCA television engineers who designed and developed the equipment.

Lecture classes, employing the latest techniques of audio-visual instruction, including motion pictures and slides, were supplemented by "on-the-job" training with television production units identical to those which the broadcasters may soon be using in their own stations.

A specially written 200-page text containing all the material covered by the clinic was prepared in a leather-bound edition for each of the broadcasters, for later use as a reference guide.

In Camden, the visitors saw RCA's new 5-kilowatt television transmitter in production and gained practical experience in transmitter tuning, operation, and maintenance. A visit to the television receiver assembly section enabled them to witness the mass production and testing of home receivers.

At the RCA Laboratories, the broadcasters heard a technical discussion on the Kinescope, iconoscope and other television picture reproduction tubes, by Dr. Albert Rose, co-inventor of the Image Orthicon pickup tube. Dr. P. T. Smith, who developed the revolutionary new 8D21 tube, discussed the research aspects of this high frequency duo-tetrode power tube, which is used in the RCA 5-kilowatt television transmitter.

Broadcasters who attended the conference were: Howard L. Bergmann, WBEN, Buffalo, N. Y.; J. L. Middlebrooks, G. O. Milne, Frank Marks, American Broadcasting Company, N. Y.; Paul Wittlig, Philip A. Goetz, Orville J. Sather and John G. Wilner, Columbia Broadcasting Company, N. Y.; Lewis R. Tower, Mutual Broadcasting System; Cliff Denton, N. Y.; Daily News, N. Y.; Lester H. Gilbert, WNBF, Binghamton, N. Y.; Frank W. Harvey, Dan Hunter, and J. Robert Harter, WMAL, Washington; A. E. Evans, ABC, San Francisco, Cal.; T. B. Palmer, ABC, Hollywood, Cal.; Robin D. Compton, WPEN, Phila.; Charles W. Burtis, WPEN, Phila.; Sidney Stadig, WBZ, Boston; W. H. Hauser, WBZ, Boston; E. C. Horstman, ABC, Chicago; George S. Johnson, KOB, Albuquerque, N. M.; Robert A. Fox, WGAR, Cleveland; William Clancy, WTIC, Hartford; John M. Sherman, WTCN, Minneapolis; Orrin W. Towner, WHAS, Louisville; J. Duncan, WLW, Cincinnati; C. B. Lau, WMAR, Baltimore, L. L. Caudle, Jr., WSOC, Charlotte, N. C.; Wilfred Wood, WMBG, Richmond, Va.; Glenn Boundy, The Fort Industry Co., Detroit; Wm. M. Stringfellow, WSPD, Toledo; John Fricker, KSTP, Minneapolis, Minn.

Group of broadcast engineers, attending the industry's first television engineering clinic at the RCA plant in Camden, N. J., are shown inspecting a section of the world's largest television receiver production line. The week-long intensive training program was sponsored by the RCA Engineering Products Department. Shown, left to right, are: W. L. Lawrence, of the RCA Television Equipment Sales Section, H. L. Bergmann, WBEN, Buffalo; Cliff Denton, New York Daily News; J. R. Harter, WMAL, Washington, D. C.; M. A. Trainer, Manager of the RCA Television Equipment Sales Section; Dan Hunter, WMAL, Washington, D. C.; O. W. Towner, WHAS, Louisville, Ky.; W. M. Stringfellow, WSPD, Toledo, Ohio; and R. A. Fox, WGAR, Cleveland.

The comprehensive week-long program of instruction was as follows:

MONDAY

- General TV Theory
- Complete RCA TV studio system
- TV Field Equipment
- TV Relay Equipment
- The Mobile TV Unit

TUESDAY

- TV Film Camera Chain
- TV Film Projectors
- Tour of TV receiver production line
- TV Studio camera chains and equipment

WEDNESDAY

- TV studio Camera demonstration
- TV transmitter equipment
- R.F. Circuits
- Video Circuits

THURSDAY

- Super Turnstile Antennas
- Installation of Antennas
- Demonstration of TV Transmitter
- Tour of TV production area

FRIDAY

- TV System detail discussion period
- TV test and measuring equipment
- Visit to RCA Laboratories

New Image Orthicon Camera

THE first studio type image orthicon television camera, requiring only one-tenth the amount of light needed with present day iconoscope cameras, has been developed and made available by the RCA Engineering Products Department.

Producing pictures with excellent half-tone shading and with lower noise level than the field type image orthicon, the new unit is expected to simplify television studio operation.

Eliminating the need for expensive and uncomfortable studio lighting, and its attendant oversize air-conditioning plants and eye straining glare, the new RCA camera produces brilliant, sharply defined pictures at light levels of 100 to 200 foot candles. It will function at light levels down to 25 foot candles. By comparison, Iconoscope cameras require 800 to 1200 foot candles.

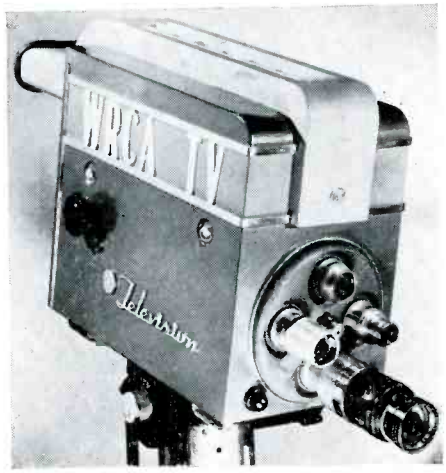
The new camera will substantially reduce the cost and complexity of electric wiring and air conditioning units in new studio construction. It will also lower the cost of studio operation by reducing power consumption for both lighting and air conditoning.

The "eye" of the new RCA television studio camera is a new studio-type image orthicon pickup tube which combines the light sensitivity of the original RCA image orthicon tube with the sharp resolution and contrast of the iconoscope. A feature of the new tube is the elimination of the spurious "black spot" signals which occur in conventional camera tubes and require constant manual "shading' adjustment by the video control engineer, in addition to his constant technical chore of riding contrast and brightness controls on *each* of the cameras in operation.

Slightly larger than the portable image orthicon television field camera, the new studio camera is designed for use on a dolly or pedestal. It has a battery of four lenses mounted in a rotary turret, the necessary circuits for deflecting the scanning beam, and video amplifier to increase the amplitude of the signals obtained from the pickup tube. The new camera also has a self-locking screw focusing mechanism and a built-in electronic view finder and hood.

The lens turret is rotated by turning a handle located on the rear of the camera. A trigger switch is incorporated into the turret control handle to cut off the picture signals while the turret is being turned. The lenses used in the turret are of the Ektar type, and are available in sizes from 35mm F:2.8 to 135mm F:3.8 adequately covering all studio requirements. Changing from one lens to another requires only 1½ seconds, and the depth of focus is such, that continual refocusing is minimized.

Optical focusing of the studio camera is accomplished by rotating a large knob



The new television studio camera employs a new studio-type image orthicon pickup tube which produces pictures with excellent half-tone shading and lower noise level than the field type of image orthicon camera. The lens turret is rotated by turning a handle located on the rear of the camera. The lenses are of the Ektar type and are available in sizes from 35mm F:2.8 to 135mm F:3.8. The depth of focus is such that refocusing is minimized.

on the right side of the camera, which moves the pickup tube backward or forward, together with its focus and deflection coil assembly. In this way, the scene is brought into focus on the photocathode of the tube without having to move the lenses.

A wide range of adjustments is possible with the combination of this focusing mechanism and the focusing mounts of the Ektar lenses. Each lens may be pre-set individually to focus on a given scene with the same setting of the main optical focusing mechanism. This arrangement minimizes readjustment of focus when switching from one lens to another during the show.

The cameraman focuses the picture in the camera by observing the image on the screen of the electronic viewfinder. This viewfinder employs a 5-inch Kinescope which permits the cameraman to see the exact image that his camera is picking up. Since this picture is identical to that which is being transmitted to the camera control equipment, the cameraman is able not only to accurately frame and focus the picture, but also to monitor its quality, anticipate maintenance requirements, etc.

The electronic viewfinder eliminates the need for a complete set of duplicate lenses, which would be required for an optical view-finding system. Limitations such as parrallax, dimness of image, and necessity for a system of synchronizing camera lens and view-finder lens, which would be required in an optical view-finder system, are also eliminated.

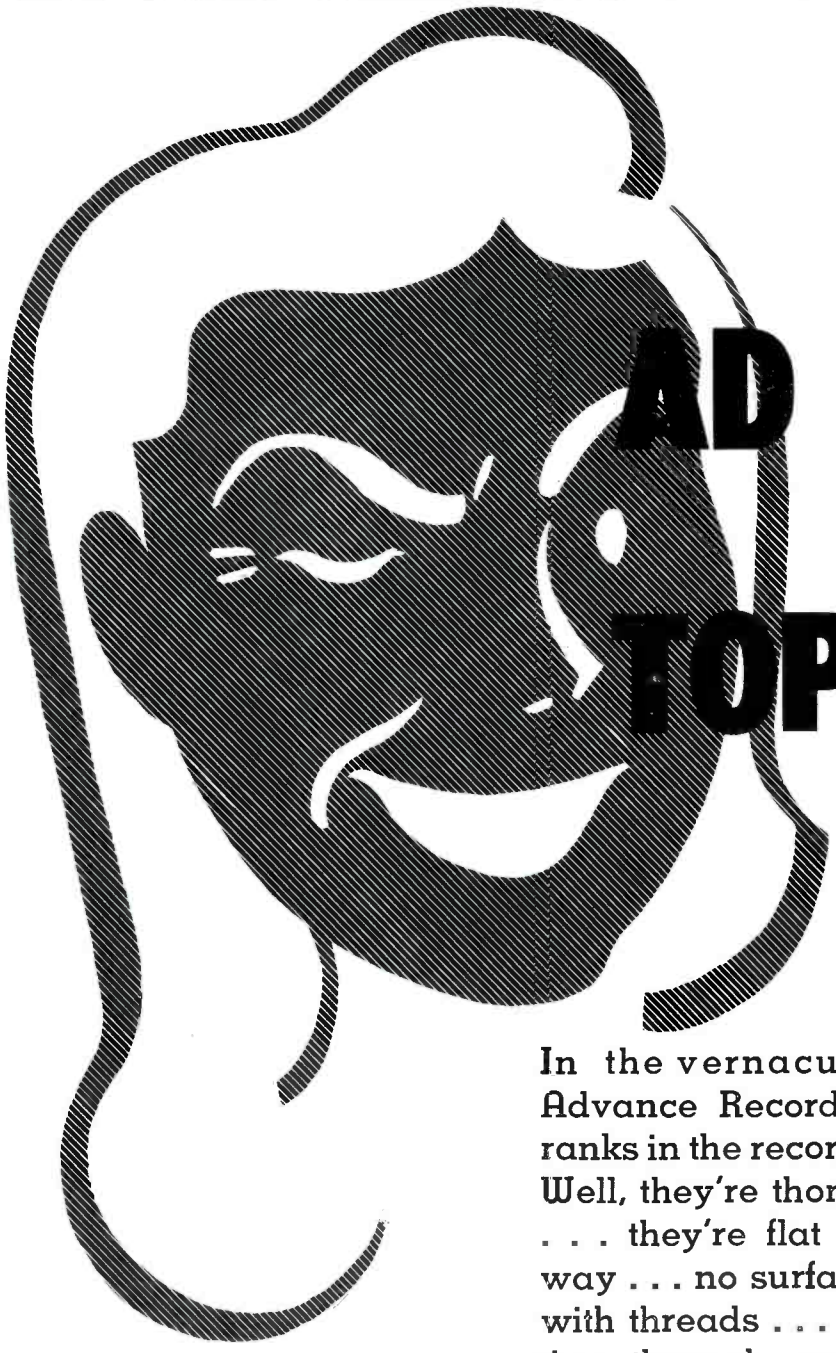
A viewing hood extends over the face of the picture tube to shut out external light. This hood can be tilted up or down to enable the cameraman to view the kinescope from different operating positions.

Controls for centering, linearity, brightness, contrast, and picture height and width are adjusted when the camera is first set up. Controls for adjustments necessary during actual operation are located on a remote camera control unit, which is under the control of a video control engineer.

An "on-the-air" tally light inside the view finder hood flashes red when the camera is supplying vido signal to the transmitter. Red signal lamps on either end of the camera indicate to the studio personnel and actors which camera is "on-the-air."

Two sets of telephone jacks in the camera provide communication facilities for the cameraman and producer or dolly operator. A headset provides program sound in one ear and communications in the other, while a microphone allows the cameraman to communicate with the other personnel on the line.

All electrical connections are carried through a single 24-conductor cable which plugs into the bottom of the camera. This cable, which is less than one inch in diameter and contains three coaxial lines and twenty-one separate conductors, carries the video signal, power supply, synchronizing monitoring, and inter-communications circuits.



AD BLANX

TOP RANX

In the vernacular of "Variety," Advance Recording Blanks top the ranks in the recording field. Reasons? Well, they're thoroughly dependable . . . they're flat and they stay that way . . . no surface noise, no trouble with threads . . . just clear reproduction through and through. Orders filled promptly.

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New York Notes

By Gil McDonald

AS HIS first official act as the new Chapter Chairman for the New York Chapter, **Clarence Westover** called a general meeting on June 28, 1947, which convened at the Hotel Victoria in New York City. The meeting was well attended in spite of the fact that such short notice was given. **Mr. Charles Bennis,** as retiring chairman, was given a rising vote of thanks for all the splendid work he did for the chapter during the last two years. The members bombarded Mr. Westover with various suggestions for improving our organization, to which he added several ideas of his own.

CLARENCE WESTOVER

One big thing to remember, fellows . . . just because you have a new chairman and have already told him what you expect of him, don't expect miracles to happen without you putting your shoulder to the wheel and helping, too. **You** are NABET and if you sit by, don't attend meetings, and take no interest in the organization, don't blame Westy. Let's make this council system really work now. Give your ideas to your councilman prior to all Council meetings and they will be considered fully by the council. DON'T LET JOHN DO IT — DO IT YOURSELF!

Councilman elections are being held at this writing and we can only report the results in a few groups. Complete results will be tabulated next month.

Recording—**Neil McCarroll**
NBC Studio Day—**C. P. Dickson**
NBC Studio Nite—**D. Connolly**
ABC Studio Day—**Pat Simpson**
ABC Studio Nite—**Gil McDonald**
Master Control—**Ed Stolzenberger**
NBC Maintenance—**G. Windham**

Frank Thielker, formerly NBC SE, and more recently of Muzak, joined ABC as SE for the summer.

George Vose spends most of his spare time in the Central Park Zoo, taking movies with his new Bolex 16 mm camera. Ask him to tell you about his first effort. He started to take a picture of the front view of an elephant but when he got done he was surprised to see Niagara Falls staring him in the face through the finder.

Gil McDonald reports birth of fourth offspring. John Francis, on May 8th. Mother and baby in good shape.

Ditto for the **John Nortons** on July 8th. This is their third. JN reports all is well.

Beginning next issue the New York column will be split up to accommodate the news for both nets. **Mr. Pat Simpson** will report the ABC stuff and **Mr. Dud Connolly** will handle the NBC affairs. Deadline is the first of each month, so if you have anything of interest, give it to Pat or Dud before that. 73—Gil McDonald.

Nabet Activity

(Continued from Page Four)

membership, (b) election of officers and stewards, (c) calling of regular and special meetings, (d) levying of assessments, (e) imposition of fines, (f) authorization for bargaining demands, (g) ratification of contract terms, (h) authorization for strikes, (i) authorization for disbursement of union funds, (j) audit of union financial transactions, (k) participation in insurance or other benefit plans, and (l) expulsion of members and grounds therefor.

Further, before the N.L.R.B. may certify a local union or a national chapter, the local or the national must show—

(1) That it has filed with the Secretary of Labor a financial statement and a report with the Secretary of Labor in such form as the Secretary may prescribe, a statement of all its receipts of any kind and the source of such receipts;

(2) Its total assets and liabilities as of the end of 1946;

(3) The disbursements that it has made during such fiscal year including the purposes for which they were made and further, *furnish to all of the members of such labor organizations copies of the financial report required by paragraph* (1) *hereof to be filed with the Secretary of Labor.*

Communistic Affiliation

Every local chapter of the National Association of Broadcast Engineers and Technicians must file with the N.L.R.B. an affidavit immediately after the passage of this law that no officers of a local union affiliated with NABET and no national officer of NABET is a "member of the Communistic Party or affiliated with such Party and that he does not believe in and is not a member of or support any organization that believes in or teaches the overthrow of the United States Government by force or by any illegal

or unconstitutional methods." Falsification of the affidavit is made a criminal offense under Section 35 (a) of the Criminal Code and before any of your local chapters of the National Association can be certified, or before the Labor Board will process any petition for certification, or any complaint of an unfair labor practice, such affidavit must be filed contemporaneously with your petition or complaint, or must be on file by such officers of your local chapter or national chapter at least within the year preceding the filing of the petition for representation or the complaint for an unfair labor practice.

Statute of Limitations

The Taft-Hartley bill makes a six months statute of limitations for filing an unfair labor practice. You must now file a petition for unfair labor practice within six months or the Board cannot entertain a petition. The Board must observe the strict rules of evidence applicable in the U. S. District Court. The original Wagner Act now provided that the rules of evidence prevailing in the courts of law of equity shall not be controlling. The Taft-Hartley law now makes the rules of evidence applicable and binding on the Board.

Political Contributions

No contributions or expenditures can be made to political parties in connection with any election to public office or in connection with any primary election or political convention or caucus to be held to select candidates for any political office, or for any corporation whatever, or any labor organization to make a contribution or expenditure in connection with any election at which Presidential, Vice-Presidential, Senators, Representatives or Delegates or Resident Commissioners to Congress are to be voted for. No publication urging the election of one candidate or the defeat of another can be printed in any bulletin, paper or magazine at the expense of a local or national union. No voting records of Senators or Representatives can be printed at the expense of the local or national union.

Craft Rights

Under the Taft-Hartley bill a craft bargaining unit must be set up by the Board wherever a craft unit exists in a plant, shop or establishment. Under the new Act the Board is compelled by mandate to set up craft groups as separate bargaining units unless a majority of employees in the proposed craft unit (not merely a majority of those actually voting) votes against separate representation. In other words, craft units must be set up by the Board whenever a bargaining unit is set up in a plant, shop or establishment.

Grievances

Under the new Act any individual employee may present his grievance personally to the employer, provided, however, a representative of the union or bargaining agent is present when such grievances are presented and settled. Of course, the individual settlement by the employee and management must not undercut or deviate from the terms of the existing collective bargaining agreement.

Free Speech by Employer

The new Act further provides that the employer may express any views, arguments or opinion, or disseminate his views, opinions or arguments whether in written, printed, graphic or visual form, and they shall not constitute an unfair labor practice as long as there is no threat of reprisal or force or promise of benefit.

State Anti-Closed Shop Laws

Where States have enacted laws prohibiting the closed shop, the constitutionality of such laws may not be attacked on the ground that they conflict with the National Labor Relations Act. In other words, the Taft-Hartley bill recognizes the right of States to enact anti-closed shop laws. The following eleven States have already enacted anti-closed shop laws: Arizona, Arkansas, Delaware, Georgia, Iowa, North Carolina, North Dakota, South Dakota, Tennessee, Texas and Virginia.

Losing Bargaining Rights

Bargaining rights when certified by the National Labor Relations Board shall last for the period of one year. However, the new Act provides that when 30% or more of the employees in a bargaining unit covered by an agreement made between their employer and a labor organization after being certified for a union shop, may petition to have such authority rescinded and to set aside the bargaining rights of the union and the Board will conduct a decertification election. The process of decertification is carried out by the N.L.R.B. by a secret ballot vote.

Checkoffs

Checkoffs are permitted under the new Act if each individual employee certifies in writing to his employer that his union dues may be deducted from his pay.

Conclusion

I would immediately have each local chapter prepare within the next 60 days to be ready to file with the Secretary of Labor an affidavit of non-Communistic affiliation of any of its officers and also be ready to file official reports as provided by the new Act. Undoubtedly the Secretary of Labor will have forms that each local chapter must fill out and file. The national office will send out to each local chapter the form of affidavit to be filed, as well as the form for the filing of official information, with instructions as to where and when to file it. If any local chapters have any questions concerning the new law and its application to the present collective bargaining agreements, please write to the National Office at 66 Court Street, Brooklyn, New York.

NABET Employment Service

Due to the day-to-day changes in status and availability of unemployed NABET members, President Powley has deemed it impractcial to publish such a list of names in each issue of the Journal. Instead, each available member should immediately notify the National Office, with copies to his Chapter Chairman, of availability together with brief resume of experience, etc., and notify them immediately of any change in status or availability. The Chapter Chairman for the area, and the National Office, each of whom are called upon to fill vacancies, will thus be kept up-to-date to the mutual advantage of all concerned.

Trade News

* **RCA Miniature Tubes.** Tube Dept. of RCA has just brought out a revised edition of the "Quick Reference Chart on Miniature Tubes." Covers RCA line of 48 miniatures to date, with functional classifications, illustrations, tabulated data, etc. A copy of the new chart, Form MNT-30A, may be obtained from RCA Tube Distributors, or upon request to RCA Tube Dept., Harrison, N. J. Since issuance of this chart, the RCA Tube Dep't announces that RCA has recently supplemented its Miniature Tube Line by adding three types — 1U5, 6BJ6, and 12AL5. With these types, the line consists of over 50 different types.

RCA-1U5 is a diode-pentode for use in portable receivers. It is similar to the 1S5 but has a different basing arrangement, and utilizes an improved structure which greatly reduces any tendency toward microphonic effects. In addition, the diode unit is effectively shielded from the pentode unit to prevent "play-through" when the volume control of the receiver is set for minimum gain. The 1-U5 is recommended in place of the 1S5 for new equipment design.

RCA-6BJ6 is a remote-cutoff amplifier pentode particularly useful in mobile equipment where heater-current drain is an important consideration and in ac/dc FM and AM receivers. It features a 6.3-volt, 150-milliampere heater, high transconductance, and low grid-plate capacitance. The 6BJ6 in conjunction with other miniature tubes having the same heater-current rating of 150 milliamperes, facilitates the design of ac/dc receivers having more than the conventional 5 tubes. With this tube, it is now possible to design a typical ac/dc FM receiver utilizing 8 tubes without exceeding a heater-string voltage of 117 volts.

RCA-12AL5 is a high-perveance twin diode like the 6AL5, but has a 12.6-volt, 150-milliampere heater, and is intended especially for use as a ratio detector in ac/dc FM receivers. In circuits utilizing wide-band amplifiers, the low internal resistance of the 12AL5 makes it possible to obtain increased signal voltage from a low-resistance diode load.

* Shure Brothers announces its new 1947-8 catalogues of microphones and crystal pickups. Catalogue 157 illustrates the microphones, and Catalogue 158 illustrates the pickups. Write direct.

* At the annual Confectionery Industries Exposition recently held in Chicago, RCA described its new electronic metal detector, designed to detect tramp metal particles and other impurities, both in materials and packaged products. Individual candy bars or whole cartons can be passed through the inspection aperture by conveyor belt or chute, at rates up to 600 feet per minute. The detector will ring a bell, mark the package, stop the conveyor belt, etc. The device is used at the RCA-Victor record plant to detect impurities in the "bisquet" disc compound, and avoids damage to expensive matrices.

* Latest issue of Philips Tech Review contains articles on **Color Stimulus and Color Sensation. Stereophonic Sound Reproduction, Stabilized Amplifiers,** and several others.

* The Daven Company, of Newark, N. J., announces that oilite bearings are now supplied on their standard units. Two bearings are provided one at the switch end, and the other at the detent end. These bearings are permanently lubricated, a characteristic of "oilite."

* RMA Committee has recommended that FM dial markings use megacycle listings instead of FCC channel numbers. Recommendation is optional with set manufacturers.

Television and FM News

* FCC has terminated its FM channel-reservation policy as of July 1st.

* CP for commercial television has gone to Yankee Network, Boston, for Channel 7, 174—180 Mc.

* RMA announces that sales of AM and FM transmitter and studio equipment has increased $400,000 during the 1st quarter of 1947 over the last quarter of 1946.

* US Television reports tavern owners equipped with television receivers say that the set has jumped bar receipts from 100% to 500%.

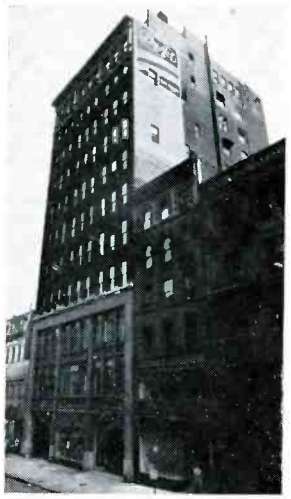
* First Annual Convention of FM Ass'n will be held in Washington, D. C., Sept. 11-12, a week prior to the NAB Convention.

* Philco unwrapped its Model 2500 projection television receiver at the Waldorf, New York, recently. Its 15 x 20 inch picture is claimed to be brighter than any other on the market. Cost: $795, plus $85 warranty and installation.

* San Francisco will welcome members of the electronic industry from Sept. 24 through 28, for the three-day IRE regional session combined with three days of exhibits staged by the West Coast Electronic Mfgrs Ass'n (WCEMA). IRE Convention, Palace Hotel, 24-26; Electronics Trade Show, Hotel Whitcomb, 26-28.

* RMA announces May production of FM-AM sets dropped 25% from April, while television set production increased 10% to 8,700 units for May.

* GE Transmitter Division, Syracuse, N. Y., announces availability of a 12 page booklet describing its new Type BA-5-A limiting amplifier. Booklet states that initial development work was done by CBS technical staff.



A contract has been signed for the purchase of the building at 245-9 West 55th Street, by Preview Theatre, Inc., 1600 Broadway, an associate of Reeves Sound Studios, Inc., it was announced by William Gullette, president of Preview Theatre. The building, consisting of eleven stories and penthouse, has over 60,000 square feet and it is the intention of Preview Theatre to utilize over one-half of the facilities, the rest continuing to be used by film concerns. "Preview Theatre plans to set up the most modern screening rooms, cutting rooms and similar facilities available anywhere in the east after extensive alterations have been made," it was stated by Mr. Gullette. "It will be our purpose to offer the latest in equipment and facilities ranging from projection rooms to film vaults for our clients in the motion picture, industrial film and television fields."

On the occasion of the Dayton, Ohio, flood of 1913, a feature writer on an eastern paper was assigned to "cover" the catastrophe and the first article he sent to his paper began in this fashion: "God stands tonight on the hills above this flooded city, surveying the havoc His elements have wrought." The managing editor—so the tale goes—refused to read further. Instead he reached for a telegraph blank and sent the following message: "Forget flood story—stop—interview God—stop—get pictures if possible."

WNBW

(Continued from Page Eight)

WRC-FM is an RCA BTF-3B model, and is installed adjacent to the television transmitter. The effective radiated power of the FM set is 15 kw, while the operating frequency is 93.9 megacycles which corresponds to Channel No. 230. Initially, WRC-FM is operating on a daily six hour schedule offering a wide choice of musical programs and comprehensive news coverage.

Engineering personnel of the Television and FM stations include the following:

Albert E. Johnson, Engineer in charge of all NBC Washington operations.

Harold P. See, WNBW Operations Supervisor.

John B. Knight, WNBW Station Engineer.

Robert B. Barnes, WNBW Assistant Station Engineer.

P. E. Anderson, Transmitter Engineer.

S. E. Newman, Transmitter Engineer.

J. G. Rogers, Transmitter Engineer.

W. H. Bostwick, Transmitter Engineer (Relief).

Archie M. DeVeau, Rigger, (Antenna maintenance)

H. C. Gronberg, Maintenance Supervisor.

C. H. Colledge, WNBW Assistant Field Supervisor.

J. M. Weaver, Video Control Engineer.

L. A. McClelland, Field Engineer.

W. L. Simmons, Field Engineer.

W. C. Ward, Field Engineer

W. M. Vossler, Field Setup Man.

Initial programming will consist of film, studio programs, and special events of a political nature; the schedule will be augmented and expanded with the delivery of additional technical facilities. Several hours programming per week of WNBT (NBC-NY) originated programmes will be made available to the WNBW television audience via the Bell System, New York-Washington coaxial cable.

The 1947 Winter I. R. E. Meeting

Summaries of Technical Papers — Continued From Last Issue

By Ed Stolzenberger

No papers are available in preprint or reprint form nor is there any assurance that any of them will be published in the "proceedings of the I.R.E.," although it is hoped that many of them will appear in the subsequent issues.

OSCILLATOR CIRCUIT THEORY

Chairman, H. M. TURNER
(Yale University, New Haven, Connecticut)

81. Limitations of the Super-Regenerative Circuit.

H. Stockman

(Cambridge Field Station, Army Air Forces, Cambridge Massachusetts; formerly Cruft Laboratory, Harvard University, Cambridge, Massachusetts.)

The superregenerative circuit gained tremendously in importance during the war, particularly as part of beacon and identification-of-friend-or-foe equipment. This paper describes prerequisites for research work on superregeneration, some viewpoints on superregeneration theory, and some of the important applications. Limitations of the circuit are pointed out and conclusions drawn.

82. Theory of Amplitude-Stabilized Oscillators.

P. R. Aigrain and E. M. Williams

(Carnegie Institute of Technology, Pittsburgh, Pennsylvania)

A general theory of amplitude-stabilized oscillators is described and merits of various regulating elements, such as lamps and thermistors, are compared in terms of an asymptotic amplitude-stability factor. A new circuit is described which permits stabilization at a very low level with continuous adjustment of amplitude.

83. Synchronization of Oscillators.

R. D. Huntoon and A. Weiss

(National Bureau of Standards, Washington, D. C.)

Oscillator synchronization behavior is explained in terms of the variation of its frequency with changes in load impedance. Mutual interaction of 2 to N oscillators is treated briefly. The theory is applied to a number of practical applications including: linear voltmeter, amplitude-modulation demodulator, frequency-modulation demodulator, and synchronous amplifier.

84. Operating Characteristics of Coupled-Circuit Oscillators.

D. K. Cheng

(Cambridge Field Station, Army Air Forces, Cambridge, Massachusetts)

Coupled-circuit oscillators exhibit certain operational peculiarities. This paper investigates the wavelength and loading characteristics, the "drag-loop" phenomenon, the branch of oscillation instability, the region of oscillation stoppage, and the best conditions of operation. Under suitable adjustments, they can be used to produce wide-band frequency modulation.

BASIC ELECTRONICS RESEARCH

Chairman, F. B. LLEWELLYN
(Bell Telephone Laboratories, Inc., New York, N. Y.)

85. The Electronic Research Sponsored by the Office of Naval Research.

E. R. Piore

(Office of Naval Research, Washington, D. C.)

The philosophy and the basis of operation of the Office of Naval Research in supporting fundamental and basic research in the field of electronics in laboratories outside the naval establishment will be discussed. The current program, broken down into propagation, the interaction of radio radiation and matter, the physics of components, systems, and instrumentation, will be presented. Deficiencies in the program will be indicated.

86. Noise-Suppression Characteristics of Pulse Modulation.

S. Moskowitz and D. D. Grieg

(Federal Telecommunication Laboratories, Inc., New York, N. Y.)

The results of tests conducted to determine empirically the signal-to-noise ratio improvement obtained by the use of several types of pulse modulation are discussed. In addition to inherent noise-reducing properties, pulse modulation allows the use of noise-suppression circuits. Tests made with fluctuation-noise and impulse interference in conjunction with limiters and differentiators are described.

87. Field Emission Arc as an Electron Source.

C. M. Slack and D. C. Dickson

(Westinghouse Electric Corporation, Bloomfield, New Jersey)

A source of electrons of extremely high capacity is obtained by striking an arc between two closely spaced electrodes in a high vacuum. Such a source depends on metallic ions vaporized from the electrodes to relieve space charge and has an extremely rapid deionization time. Some control of tube characteristics can be obtained by varying electrode design spacing. Its principal uses to date have been for short-time pulse applications.

88. Response of a Thermionic Vacuum Tube to the Sudden Application of an External Voltage.

E. H. Gamble

(Polytechnic Institute of Brooklyn, Microwave Research Institute, Brooklyn, New York)

From a computation of the initial space-charge distribution before voltage is applied, one may determine the build-up of the current in a diode upon application of an external voltage. One may determine the transition from the initial distribution to that associated with the temperature-limited and space-charge-limited cases, in addition to the thermionic emission at weak fields.

89. Spherical Aberration of Compound Magnetic Lenses.

L. Marton

(National Bureau of Standards, Washington, D. C.; formerly, Stanford University, California)

K. Bol

(Stanford University, California)

A reduction of the spherical aberration of strong electron lenses can be achieved by a strong lens as a virtual-image former and transforming the image into a real one by one or more weak lenses. Calculations are carried out for bell-shaped magnetic fields of the axial field distribution $H(z) = H_0/1 + (z/a)2$, and numerical values of the achieved reduction of the aberration are given.

(Continued next month)

Control

(Continued from Page Six)

rent should appear at this adjustment.

3. Increase C_1 to the point where zero or no change in grid current is obtained.
4. Replace the dummy crystal holder by the test crystal unit, adjust condenser C_2 for maximum grid current at the frequency stamped on the unit.

If in step 2 oscillations do not occur, the coil ratio L_1/L_2 should be changed slightly. In extreme cases C_1 may be omitted.

A typical tuning curve obtained in an oscillator such as shown in Figure 2 appears on Figure 3. The change in grid

current I_g, the change in frequency F, and the change in voltage E across L_1L_2, is given for various settings of the tuning condenser C_2. If the tuning range of the oscillator is sufficiently large, it is possible to obtain two maximum grid current readings. Each maximum represents a different mode of vibration and care should be taken to operate the crystal unit at the correct overtone. This is easily determined by taking the precaution to check the frequency by the use of an absorption type wave meter.

A variation of the D-153053 crystal is the D-153441. This is a similar unit except that it is intended to operate as a temperature controlled unit at 70° C ± 10° C and to have a frequency accuracy of ± .005 per cent.

CHICAGO HAM CALLS

W9AAM	F. E. Golder
W9AFA	R. E. Brooks
W9AL	T. G. Bombaugh
W9BGI	V. D. Mills
W9BRX	E. G. Squires
W9BU	W. K. Cole
W9CIU	F. C. Shidel
W9CP	J. R. Miller
W9CTN	C. V. Corliss
W9DBT	R. B. Whitnah
W9DVW	W. T. Anderson
W9EN	M. J. Wilson
W9KFT	H. L. Cavanah
W9FQ	W. H. Cummings
W9FVV	J. V. Lato
W9GG	R. D. Wehrheim
W9GN	R. S. Davis
W9GY	J. H. Platz
W9HIY	I. Wrablik
W9HZD	R. E. Hunt
W9IT	E. A. Holm
W9IVD	Gale Swift
W9IWV	M. W. Rife
W9KDI	R. H. Parker
W9LEC	W. W. Schooley
W9LEP	H. T. White
W9MV	P. J. Moore
W9NKY	G. F. Kemp
W9OOT	D. R. Fitch
W9QHX	H. D. Royston
W9RUK	M. H. Eichorst
W9SBC	T. E. Schreyer
W9SGM	Jules Herbuveaux
W9SKX	H. C. Eckland
W9SOK	Lorne Balsley
W9VGA	E. A. Golec
W9VNW	Rex Maupin
W9VWU	H. F. Kohnitz
W9WRB	R. A. Limberg
W9WS	R. B. Sturgis
W9WXZ	Howard Newbouer
W9YMZ	K. A. Slobb

Chicago Chapter News

By Minor Wilson

Arthur Hjorth has been elected chapter chairman of the Chicago Chapter and has appointed Hugh Abfalter Secretary-Treasurer. More about Art in a forthcoming issue.

There are a number of new faces around the studios and transmitters. Among them are: **Al Osterhoff, Ivan Wrablik, Ed Wollenhaupt, Pete Peterson, Bill Casse, Bruno Klimas and Robert Daly.**—Welcome!

Woody Lahman advises us that ex-NBC engineer **Charlie Butler** has accepted the position of Commercial Manager of KTRI in Sioux City, Iowa.

Dave Kempkes, also an ex-Chicago NBC engineer, is busy working overtime (on his own time) installing his new radio station in Sioux Falls, S. D. The Chicago gang wishes these long time members of the Chicago Chapter a world of luck and success in their new work.

Pete Cavanah seems to be having his troubles getting grass to grow around his new house. Latest rumor is that having given up hopes of getting it to grow from seed, he has his wife **Peggy** working overtime sodding the yard with creeping bent. One way or another, looks like the Cavanahs will have a lawn, maybe.

Actually, ham activity seems to be the chief activity of the Chicago engineers. **Frank Golder** placed his country estate at the disposal of the York Radio Club for field day. Fifteen antennas and all the associated gear scattered all over the place kept Frank so busy coordinating activity that he didn't get in a minute's operating himself. He says he is still getting hunks of wire out of his power lawn mower!

Don Fitch never stops acquiring more and more surplus equipment for his basement apartment rig, transmitter, antenna and all being located about ground level. Maybe we had better return to Texas, Don, where we can raise a regular antenna farm.

Harold Royston and **Pete Cavanah** are feuding over who can work the greatest number of States on ten. Pete seems to have the lead at the moment.

We all hope that **Lester Washburn's** vacation wasn't all a total loss; after buying Michigan fishing licenses for the entire family, he discovered that they were worthless as the fishing season started the week after his Michigan vacation ended! Wonder what happened to his slogan of "Back to heaven by '47" meaning California!

Art Johnson made Lt. Commander in the Naval Reserve.

Thurber Baumbaugh was elected commissioner of streets and improvements of Downers Grove. Looks like the WENR transmitter men are doing alright.

Jim Lato is just back from vacation after getting the best of a water moccasin that had the bad luck to bite him. Jim caught the snake and took him along to the doctor's office. All goes to prove every one should always be prepared with a bottle of "cure"; rumor says Jim was well equipped.

Odds and ends: **Chuck** "snake" **Corliss** happy over the results of a 16 element beam. **Al Otto** arguing over whether it took 10 or 15 seconds to patch out a bad amplifier in channel 16. **Paul Moore** talking about the wonderful time he had at and after the annual NBC 10 year party. **Joe Alusic** looking in vain for more checker victims. Joe learned the book too well and no one can give him much competition. **Herb Wyers** telling tall (?) tales of strawberry yields in his back yard estate. **John Martin, Lou Heiden** and **Minor Wilson** shopping around for cigars they expect to be passing out soon now. More next month.

Hudson Chapter News

By Al King

Hanks Hadden M/C got the radio bug after fifteen years layoff and is now on the air with the new call of W2VFM with six watts—should be "planting" instead of "planning" for better results.

Howard Donniez also M/C and amateur call W2KPG, has a fine new speech amplifier ready for his rig except for a transformer that SE **Campbell** has failed to get for him. P. S.—The amplifier is now finished, and he finds that he needs a step-ladder to get the RF over the back fence!

Bill Boher M/C active with his artistic and useful manipulations in rope and cordage—to date the Boher enterprises are a non-profit organization "New grommets for old sailors."

Dennis Connor M/C, "the smiling Irishman" back from his vacation in the Bahamas looking great with a fine tan—said the three weeks went by too fast.

Jim Carter SE, "selling placques"—ahem! Doing okay, too. In fact, so well that he now has a new super-pro receiver . . . what a racket!

Jim O'Connor M/C, forming a Radio Club to have our own "ham station" at WOR. Has it OK'd by WOR—so let's get it going (Editor). P. S. Wen'r we gonna have time to run it?

SE **Harry** "Butterball" **Bryant,** teaching his new offspring of two months, which, incidentally, is a HE, the fundamentals of television! Gonna retire, Harry?

SE "Weepy" **Don Williamson** upset over something—three guesses on what it is—need I elaborate???

SE "Sphinx Face" **John Garlinger** has a different suit for each day—quite a "Sharp" character. Also interested in photography! . . . it's a "broad" field. Ahem!

SE **Pat Miller** complaining about DX . . . can't seem to work any South Americans on 40 meter c.w. Gotto get up around 4:00 a.m. or 5:00 a.m., Pat.

SE **Gene Clark,** W2HTA, contemplating a new beam for 20 meters and 10—me too!

SE **Dick Quodomine** just got a '47 Pontiac—quite happy with it and who wouldn't be?

SE **Gordon Shaw** practicing his trombone like mad—says it's just for "kicks." I wonder! We think he has a "mad on" against **Teagarden** who is coming along.

SE **Walter Payne** now out of pain if you gather what I mean. Happy now, Walter?

Ye Editor, W2JW, rebuilding rig and increasing power to 300 watts. Hope you NBC—ABC—CBS can hear me now on ten meters.

"Loose Talk"—heard on ten meters. One station: —I understand WOR is cutting expenses by taking clocks out of studios. Other station: What are they going to do, use hour glasses? Cute stuff, eh wot! You're missing plenty if you don't listen on "ten!"

We Studio Engineers here at WOR are quite proud of the fact that we believe we are the only group boasting of a real hep jazz band. At the 25th Anniversary of WOR, party for which was held at the Waldorf-Astoria Hotel on February twenty-first, this seven piece band knocked them in the aisles and was the hit of the night. They are all professional musicians pre-engineering and have all been with name bands. For your cusiosity's sake, here they are by name. **Dick Quodomine,** and **Walter Payne** (alto sax); **Carl Berry** (clarinet); **Gordon Shaw** (trombone); **Al King** (trumpet); **Walter Shaver** (bass); **Gene Clark** (piano); **Ronnie Harper** (drums). P. S. All 802—A. F. of M.—"need a band?" NBC?? ABC?? CBS?? Ahem!! "No outside activity!!"

Boys here at station WOR glad to see **Mac Benoit** back. Mac argued with a gobo—and lost . . . fell on his foot and broke it—the foot, not the gobo!

SE **Bob Albrecht** on vacation. According to a post card, Bob is having a wonderful time in Chicago.

Also on the vacation "having a wonderful time" list, is SE **Ed King.** (P. S. No connection—Ed.)

On June 13th, many of our engineers went on the WOR-Mutual boat ride to Bear Mountain. From all reports, everyone had a very nice time. . . . Plenty of dancing, refreshments, contests . . . provided an enjoyable evening. Ye Editor is back from vacation. Spent part of it in Massachusetts. That's the life!—More next month—Al King.

from San Francisco

Dear Ed.:

It's going to be a little bit "skimpy" this time. Nobody tells me anything, and I'm not very good at guessing.

The "hog" that was the KGO 50-kw transmitter is now taking definite shape, — a big shindig last week, when the first pile was driven, under the direction of ABC chiefs Evans and Dunton, ably assisted by such lesser luminaries as Grubb, Middlebrooks, Searle, Palmer, etc. Work is now progressing rapidly, with opening date set, tentatively, of course, for January 1st. (1948, that is). KGO-FM also coming right along, with Jim Middlebrooks on hand to see all's well, etc.

Visitors for the month included Stewart from NY Recording, who was duly impressed with the Recording Room set-up here, and its efficient operation under Supr. J. O'Neil, and Glen Glasscock from KOA, looking just the same as he did when I first met him many years ago. His many months in the South Pacific, for Uncle Sam, didn't change Glen's cheery smile a bit. Also in town, fresh from

(Continued on Page Twenty)

SAN FRANCISCO

(Continued from Page Nineteen)

a successful invasion into the realm of directive arrays, etc., at WEEK, Peoria, Ill., is ex-NABET chairman, Ed Callahan, who is now working with ex-NABET man "Buddy" Sugg, with the WKY-KVOR-KLZ-WEEK outfit in Olkahoma City. Ed is in town for a short vacation, his first since Pearl Harbor, incidentally, and while here is disposing of his property, and making arrangements to become a full-fledged "Oakie." We all miss Ed and Miriam, and will continue to do so more than ever, now that he is leaving us "for good." I'm betting that he will be back, though, sooner or later. California is like that.

Sam Melnicoe busy'n'er you know what, getting his radio KEEN under way at San Jose. Dead-line was made, and the big switch thrown on time, at 8 p.m. on June 21st. Poor Sam had a few bad hours, since just a couple of days prior to opening date, his chief operator was seriously injured in an auto accident, leaving Sam with plenty of loose ends to unravel and tie together in the last hours before start-up. But, he made it, and KEEN took the air as scheduled, with the usual Little Brass Band, Big Brass Mayors, champagne-over-the-bow, etc., far into the night.

Another ex-NABET boy, Al Isberg, is about ready to take the air with KRON-FM, the San Francisco Chronicle station, which Al has designed, and supervised the construction of. Al used to pay us an occasional visit, but I suppose KRON takes more than all his spare time.

Congratulations are in order for Steve and Alice Stephens, on the arrival of their new baby boy, their second. And condolences to Russ Butler on the death of his mother.

Let's go back to the visitors for a moment, and mention the flying one of Ed Doty, up from Hollywood overnight for a Breneman hassle, and back again, with scarcely a hello-how-are-you-good-bye. But 'twasn't his fault, other duties, etc., etc.

The NBC-AA, under the able leadership of chief-anner. Hal Wolf, is up and coming again. Latest activity included an all-day outing across the Bay at Marin County Country Club. The affair, while possibly not worthy of society page note, was a big success.

Well, once a ham, always a ham, I says. Andersen, W6BRR, sold several hundred dollars worth of extra-deluxe photographic equipment, and came up with a KP-21 receiver, and a Supreme transmitter, both of them equipped with every gadget possible to confuse even an old hand like Andy. Other ham activities hereabouts rather quiet, with the summer-time slack season, etc. Incidentally, thanks for printing that latest list of NY area stations, I have it posted in my own shack, and am keeping an ear open for a possible call from any of them.

Vacationers this month include Jefferson, yachting off the Southern California coast, Dewing, row-boating on the Russion River, and O'Neil, probably not boating at all, from NBC; Dunnigan, road-cruising to nowhere in his new Chrysler, and Jacobs, sail-boating on the Bay, in his 18 foot Mercury-type craft, called, for no good reason, "NEMO"! Harry and his boat are entered in the Independence Day Regatta, and we all wish him good luck and good sailing. Dunnigan and Jacobs, of course, are with ABC.

Added to the ABC studio crew for the vacation period is Howard Fast, formerly of KFSD, San Diego, and more recently employed by Uncle Sam. Welcome, Howard, and we hope your stay becomes permanent.

No word from KPO, or from Dixon, and Ken Martin over at KGO is strangely silent. 'Smatter, gang?

—73, E. L. Parkhurst.

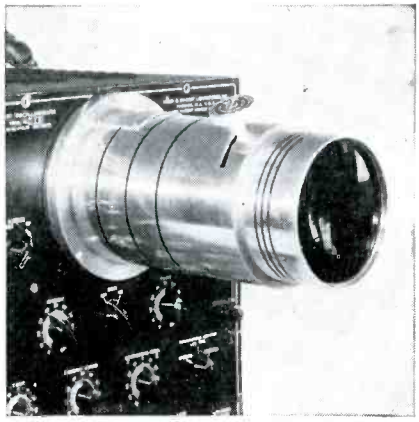
NABET Ham Calls

NBC New York

W2SPK	C. E. Read, NBC Telev. Engr.
W2CRA	A. J. Waddell, NBC Master Control
W2LJQ	Robert Potter, NBC Telev. Engr.
W2GVP	T. Danielson, NBC Boundbrook xmtr.

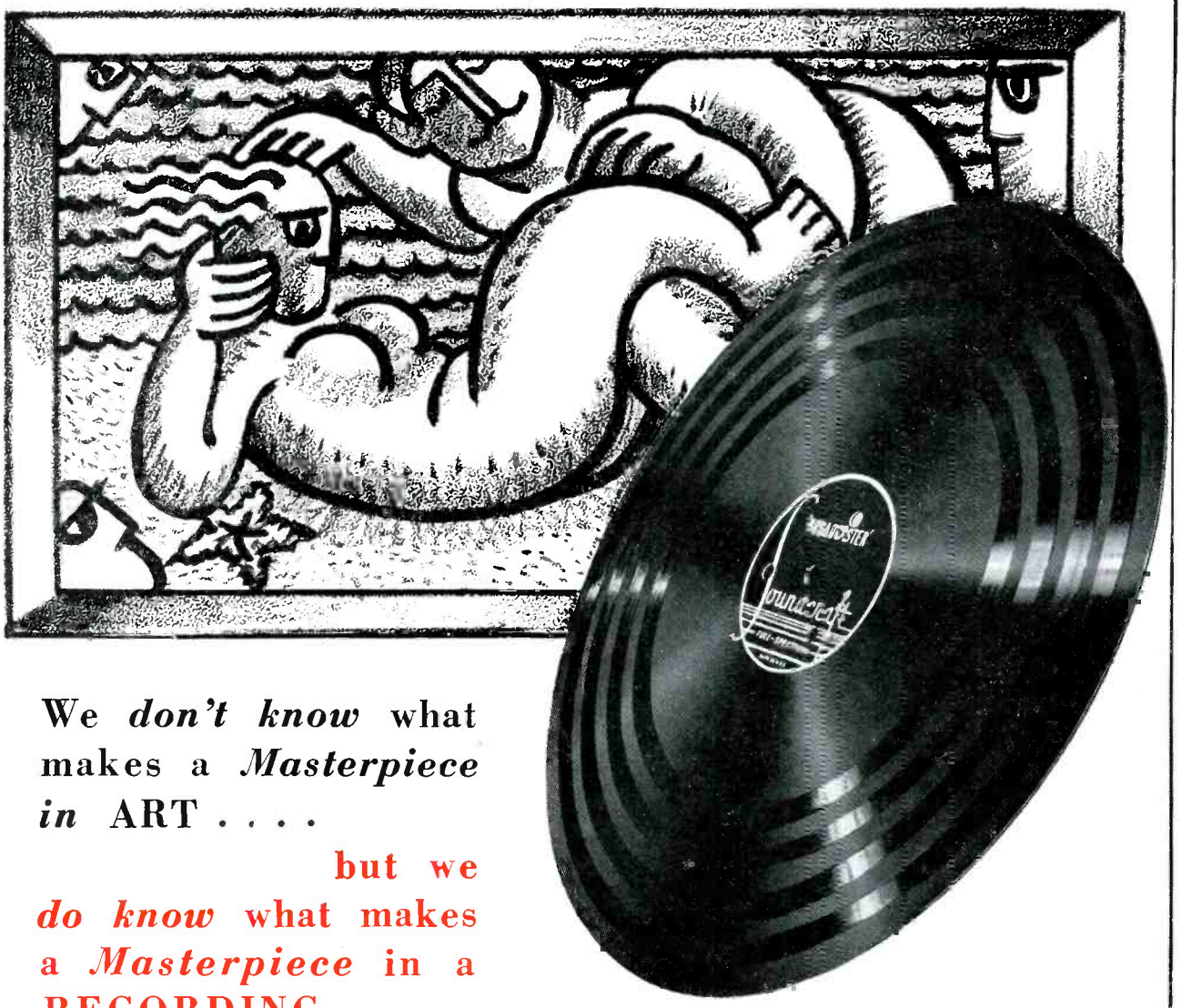
Projection Lens for C-R Tube

LARGE-SCREEN oscillograms for lecture and demonstration purposes are now obtainable with the Du Mont Type 2088 projection lens. This accessory is intended for use with oscillographs employing the Type 5RP-A high-voltage cathode-ray tube with extra-brilliant images. The lens flange has four mounting holes aligning with threaded holes in the front panel of Du Mont oscillographs designed or adapted for the 5RP-A tube and this lens. Mounting screws are supplied.



This projection lens is a two-element, symmetrical, objective lens with relative aperture of f:3.3 and focal length of 7.7″. It projects an oscillographic pattern of an area up to 3″ x 3″ from the cathode-ray-tube screen to distances beyond 8′, resulting in a screen image up to approximately 12′ x 12′. The axial light transmission is about 85%. A directive projection screen is recommended under conditions of high ambient light.

To focus the image on the large screen, the focusing knob is unscrewed, the telescopic lens barrel is slid back and forth for an approximate focus, the focusing knob is inserted in the nearest threaded hole in the barrel, and the focusing knob is then shifted along the diagonal slot until sharpest focus is obtained. Since the image on the projection screen is reversed with respect to the image as viewed on the oscillograph screen, it may be necessary to reverse the deflection plate leads.



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4. Play competitive disc using same settings.

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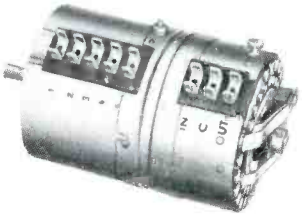

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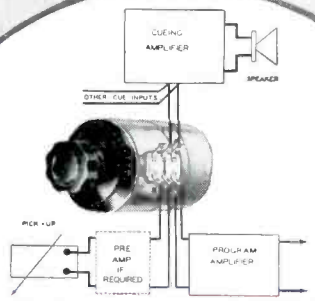

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