

RADIO, TV and RECORDING

TECHNICIAN-ENGINEER

NOVEMBER, 1954



WTOP-TV UPS POWER

See Story, Page 9

International
Brotherhood
Of Electrical
Workers (AFL)



COMMENTARY

Speaking of the NLRB . . .

CHAIRMAN GUY FARMER of the National Labor Relations Board recently made a speech before the American Society for Personnel Administration, convened in Cincinnati, Ohio.

He spoke at some length on the subject of criticism of the Board and stated that open discussion of public institutions is a healthy characteristic of a democratic society. Further, "Our institutions belong to the people and are answerable to them in all things at all times." He added, "I hope I may be permitted, however, to entertain the wish that the response to what we do might be more thoughtful, more analytical, more public-spirited and more searching."

Mr. Farmer spoke frankly and soberly of the case load of the Board and pointed out that the administration of the law in the public interest is the responsibility of the Board and that the Board is "by no means free to adopt the interpretation (of the law) which best harmonizes with our own personal predisposition."

We can find no fault with these truly noble sentiments so well expressed. Mr. Farmer's address implies, however, that the Labor Board proposes to restrict its functions only to those cases involving big business. (At this point, someone should decide whether the word "big" is to be capitalized or not, in accord with the extent of its meaning). He said that the Board's revision of its jurisdictional standards last July was expected to reduce the case load so "that the National Board could increase its contribution to the intelligent handling

of labor relations" and enable its members "to devote more time and attention to a smaller number of disputes which have a more substantial impact upon our Nation's economy."

He referred to an actual survey just completed which shows that an application of the new standards to all cases coming before the Board for formal decision during a three-month period in 1953 strongly indicates that the reduction will eliminate only about seven per cent of the cases. He appears to have completely ignored the fact that only a small percentage of the total cases handled by the Board in its Regional Offices ever get to the National Board.

We believe that a Federal law should be applied equally to all the citizens of the country. It is our view that the application of a law cannot be restricted to citizens of a particular income level or to enterprises on the basis of their volume of business. It would be equally ridiculous to apply monetary jurisdictional standards to the enforcement of Internal Revenue statutes in the fields of distillation, narcotics or income tax. The operation of a still, for example, may have only a local impact and no relationship to the flow of interstate commerce. However, we have never heard of the dismissal of a case on this basis. The Board should accept its obligation to interpret and apply the law as written and intended by the Congress and place the interests of the whole of our people ahead of its own convenience and predisposition.

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The NLRB's New Ground Rules

Recent decisions of the Labor Board equivalent to anti-labor legislation;
study by Bureau of National Affairs compares new and old Board rulings.

THE National Labor Relations Board's new rules and the subsequent decisions handed down in recent months by the Board, operating under these changed rules, are of considerable interest to members of the IBEW in the recording, radio and television industries, who frequently have problems which must be solved with the help of the NLRB.

As a result of these rules changes, the NLRB has been coming in for a good deal of criticism in recent months. Labor leaders are pointing to Board decisions which they consider to be unfavorable as proof that the Board has definite pro-employer leanings. These decisions, according to the AFL's top lawyers, have gone far "toward making employer demands for even stricter anti-labor legislation unnecessary. In decision after decision, the new majority has acceded to the very proposals which the labor-baiters were attempting to achieve by legislative action."

In reply to these charges, NLRB Chairman Farmer repeated in a recent speech that impartiality is the keynote at the Board. It would be a serious mistake, he warned employers, to believe that NLRB is pro-management. "Any employer who violates the Act," he added, "will continue to feel the full force of its sanctions."

Basically, the jurisdiction of the Board has been changed as follows:

The gross receipts from interstate sales that are required to bring a firm engaged principally in manufacturing or processing within a single state under NLRB jurisdiction have been increased from \$25,000 a year to \$50,000. If the firm acts as a supplier of materials or services to interstate companies, the value supplied must now be \$100,000 a year rather than \$50,000.

Intrastate trucking companies and other firms which act as connecting links in the flow of interstate commerce must now do at least \$100,000 a year business with interstate firms in order to come under Federal jurisdiction. The Board will no longer combine the dollar-volumes of the above categories, as with a company which meets 75 per cent of the dollar-volume qualifications of one category and 25 per cent of another, in order to take jurisdiction.

The table below shows how management and union rights and obligations have changed as a result of the new Board's actions. Each rule listed represents either a reversal of an existing policy or the establishment of a new policy where none existed before. The table compares the new Board's decisions with those of its forerunners and cites cases to bear out the contrast.

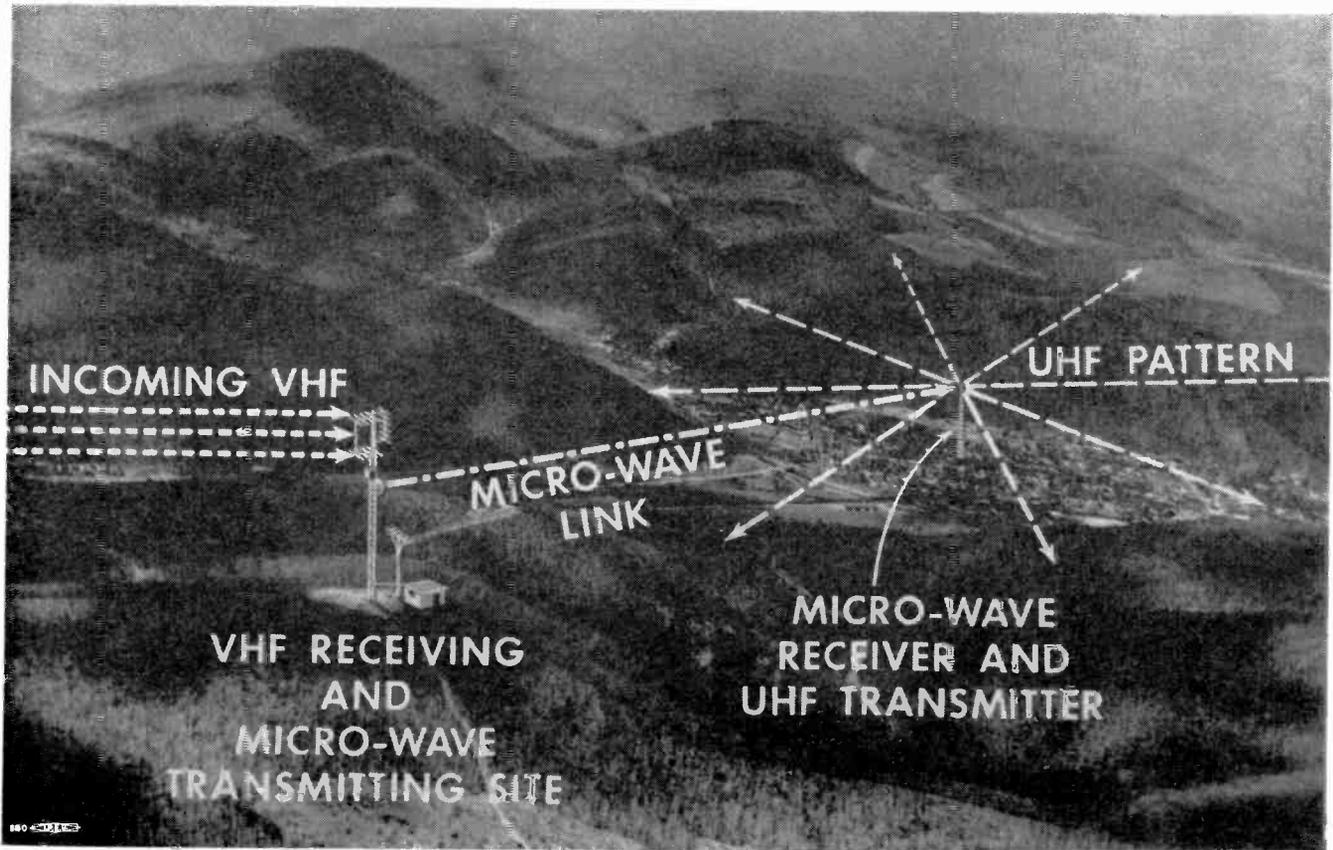
Most of these cases can be found in Volume 33, Labor Relations Reference Manual, published by the Bureau of National Affairs, Inc., Washington, D. C.

	New Board's Rule	Old Board's Rule	Case
Bargaining Units	Permits severance where true craftsmen are involved and where union has traditionally bargained for craft; applies similar standards to departmental units.	Granted craft severance liberally on case-by-case basis; banned severance in four highly integrated industries.	American Potash & Chemical Corp.; 107 NLRB #290
	Excludes from rank-and-file units employees who spend <i>any</i> time on plant protection or guard duties.	Included in rank-and-file units employees who spent less than 50 per cent of their time on guard duties.	Walterboro Mfg. Corp.; 106 NLRB #241
	Includes relatives of management personnel in bargaining units unless they enjoy special status allying interests with management.	Automatically excluded close relatives of management people from unit.	International Metal Products Co.; 107 NLRB #23
Election Procedures	Requires union which withdraws request for election after hearing has been held to wait 6 months before filing new petition.	Had no restriction on filing of new petition.	Sears, Roebuck & Co.; 107 NLRB #162
	Bans distribution of marked sample ballots prior to election.	Allowed distribution of marked ballots if they were labelled "sample" and didn't carry name of Board agent.	Allied Electric Products; 109 NLRB #177
	Allows union's majority to be challenged during first year of certification if contract expires or is subject to renewal.	Held that any contract executed during certification year barred election for its full term.	Ludlow Typograph Co.; Adm. Dec. (1954)

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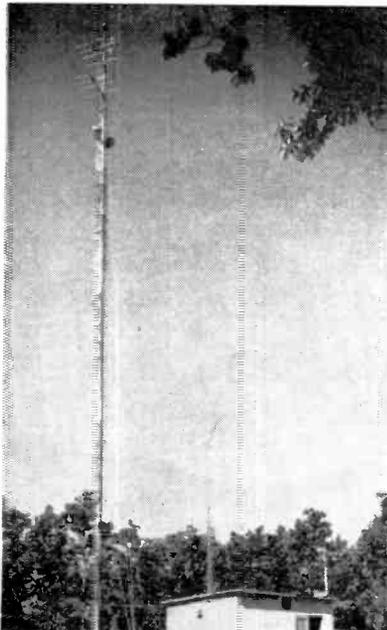
THE NLRB'S NEW GROUND RULES, continued from Page 3

	New Board's Rule	Old Board's Rule	Case
Free Speech	Permits employer to make anti-union speeches before an election on company time and property without permitting union to reply, unless company has broad no-solicitation rule.	Held that employer who made anti-union speech on company time and property had to grant union's "reasonable" request for chance to reply under similar circumstance.	Livingston Shirt Corp.; 107 NLRB #109
	Forbids speeches to "massed assemblies" of employes on company time during 24 hours preceding election.	No ruling.	Peerless Plywood Co.; 107 NLRB #106
Grievances	Holds that company can't take up employe's grievance with union which isn't his bargaining agent.	No ruling.	Federal Telephone & Radio Co.; 107 NLRB #146
Jurisdiction	Raised minimum standards to exclude firms whose operations are primarily local in character.	Accepted all cases affecting interstate commerce, provided operations of companies met minimum dollar standards.	NLRB Statement; July 15, 1954
Lockouts	Holds that company belonging to employer association can lock out its employes in face of strike against another member.	Considered it illegal for company to lock out its employes in answer to a strike against another member of association.	Buffalo Linen Supply Co.; 109 NLRB #69
Picketing	Permits discharge of employes who refuse to perform duties requiring them to cross picket line at another firm.	Held that company could replace, but not discharge, employe who refused to cross picket line at another plant.	Auto Parts Co.; 107 NLRB #78
	Forbids picketing directed at public which has the effect of persuading employes of other companies not to service struck company's customer.	No prior ruling.	Brewery & Beverage Drivers Union; 107 NLRB #104
Questioning	Permits questioning of employes about union activities if "under all the circumstances" it doesn't interfere with their rights.	Ruled that interrogation of employes about union activities was in itself a violation of the law.	Blue Flash Express Co.; 109 NLRB #85
Recognition	Allows company to insist on election even though union offers to prove its majority through card check.	Often considered refusal to accept authorization cards as proof of majority a refusal-to-bargain where company was guilty of other unfair practices.	Walmac Co.; 106 NLRB #244
Responsibility of Union Members	Holds that company can fire members of militant union who don't disavow union's illegal conduct.	No ruling.	Marathon Electric Co.; 106 NLRB #199
Slowdowns	Says that union which conducts a slowdown during contract negotiations is guilty of refusing to bargain.	No ruling.	Textile Workers, CIO; (C. A. 4) (1954), 106 NLRB #95
Strikes	Permits discharge of employes who participate in hit-and-run strike.	No ruling.	Pacific Telephone Co.; 107 NLRB #301
	Allows discharge of employes who walk out suddenly, knowing their action might result in serious damage.	No ruling.	Marshall Car Wheel & Foundry Co.; 107 NLRB #100
	Holds that union can't lawfully strike over contract issues unless it waits 60 days after giving notice to company or until expiration or modification date of contract, whichever occurs later.	Held that union which waited out 60-day notice period could strike at any time thereafter even if its contract was still in effect.	Lion Oil Co.; 15-CA-488
Union Control Of Seniority	Considers strike to compel contract modification unlawful if union failed to notify Federal Mediation Service.	No ruling.	Retail Clerks, AFL; 9-CA-211
	Holds that contract clause giving union right to settle seniority disputes is illegal in itself.	Considered such clauses legal if they didn't require union to base decision on union affiliation.	Pacific Intermountain Express Co.; 107 NLRB #158



This is Sylvania's satellite Channel 22 transmitting site overlooking Emporium, Pa. Ground elevation at the left of picture is 2,120 feet. The small box directly behind the parabolic microwave antenna contains the microwave transmitter.

Satellite Television Transmission



This is Sylvania's installation atop the mountain which overlooks Emporium. Mounted on the large tower are the Channel 22 transmitting antenna, Channel 6 (Johnstown, Pa.) receiving antenna, and the microwave link transmitting antenna.

Many small towns across the nation cannot support their own local commercial television broadcasting station. There are, for example, 7,459 communities in the USA with less than 10,000 people. Many of these communities can afford to construct and operate a satellite TV station, of the type now being developed by major manufacturers.

An example of a successful satellite operation, just completing its second year as an experimental station, is Sylvania's KG2XEL operating on UHF Channel 82 in Emporium, Pa., and on UHF Channel 22 as KG2XDU on a hill overlooking the Pennsylvania community. The two are linked by microwave and pick up and rebroadcast WJAC-TV, Johnstown, Pa.; WFBG-TV, Altoona, Pa.; and WBEN-TV, Buffalo, N. Y. Both stations operate with a transmitter output of 10 watts and approximately 175 watts

Continued on Page 6



Mounted on a 60-foot tower atop a building in the valley town of Emporium is a microwave receiving disc and the UHF Channel 82 transmitting antenna. Lower on the tower are two Channel 22 receiving antennas for feeding lab receivers.

Satellite Television

Continued from Page 5

ERP. Transmissions have been on both the low and high ends of the UHF spectrum.

The satellite can provide acceptable service within a radius of six miles without any appreciable change in the interference conditions of existing broadcast stations. It has been shown that satellite stations may be operated either attended or unattended. For instance, Emporium's KG2XDU runs unattended approximately 85 per cent of the time.

The Emporium experiments have indicated that satellite stations will not be expensive to build and operate. It is estimated that they might be constructed for between \$15,000 and \$20,000. Because of the low-power requirements, operating costs would be correspondingly low.

No interference to existing or potential TV broadcast stations is anticipated, since use of regular TV broadcast channels, where available, is contemplated. Where no regularly assigned channels are available, the low-power requirements of satellite stations will permit the use of virtually any channel without risk of creating interference to other stations on the same or adjacent channels.

Sylvania engineers point out a possibility of the future: the establishment of a group or "cluster" of satellite broadcast stations designed to furnish service to several nearby communities located in "poor reception" terrain within a radius of 30 miles of the principal community to which a TV channel has been assigned.

Second Conelrad Test Shows Mixed Results

Reports indicated that the second nationwide test, held this month, of a radio broadcasting plan for fooling enemy bombers during an air raid was not a complete success.

The system, known as "Conelrad," was tested between 1:30 a. m. and 4:30 a. m. in each time zone across the country. Participating radio stations, all broadcasting on either 640 or 1240 kilocycles, merged their schedules into a single program with only one station transmitting at any one time.

At Chicago, "Conelrad"—short for "control of electromagnetic radiations"—worked smoothly, participating stations reported. American airlines pilot Charles Lippincott, flying into the city from New York, said his two radio compasses "kept going around in circles."

At Washington, Ross H. Beville, technical director for WWDC and industry coordinator for "Conelrad" in the capital city area, said the test "was a tremen-

dous improvement over last year's" and that he was "generally well pleased."

But in Massachusetts, Civil Defense officials said the test was not satisfactory and there were things still to be worked out.

"It's a good thing we had this test," Schuyler Van Ness, public information officer for the State Civil Defense Agency, said. "It is workable, all right, but there are things that must be fixed."

Company Can't Drop Christmas Bonus

An instance in which a company suddenly decided to discontinue a long-standing bonus practice, but was not permitted to do so because of the presence of a union contract, is reflected in a recent arbitration decision.

The union involved was Local 234 of the Ladies' Garment Workers, AFL. The company was the Nazareth Mills of Nazareth, Pa.

For many years this company had paid a bonus each Christmas but in 1951 suddenly announced that it would not pay one that year. The union protested against this unilateral dropping of the bonus. The disagreement was taken to arbitration.

Arbitrator G. Allan Dash decided that the bonus was not a gift or a matter of employer discretion, as the company contended, but rather that it was an integral part of the wage structure and could not be eliminated while the union contract was in effect unless the union agreed to do so.

It made no difference that the bonus was not specifically mentioned in the union contract, the arbitrator ruled. According to him, the fact that the bonus practice had been in effect for many years and that its continued payment had led workers to regard it as a normal part of their earnings, made it a basic part of the wage structure which the company could not, in the face of the existence of a union contract governing wages, change on its own. He upheld the union and ordered the company to pay the customary bonus.—From *AFL Research Report*.

HAROLD L. WINSOR

1908-1954

With deep regret, we record the passing of Brother Harold L. Winsor, Business Manager of Local Union 1217, St. Louis, Missouri. Brother Winsor was initiated in Local Union 1225, Indianapolis, Indiana, on June 8, 1939, and transferred to Local Union 1217 early in 1947. We join his friends in St. Louis and Indianapolis in extending our heartfelt sympathy to his family.

International Office Educational Course Begins



Foreground, backs to camera: Representatives W. J. Cox, Elmer Kelly, A. F. Wright. At head table, H. H. Broach, Secretary, International Executive Council; Standing, Representative Frank W. Graham. Far side, foreground table, Representatives George Dengel, W. J. Kenefick, R. E. Cline, and E. A. Benz, with back to camera. At far table, Representative James May (back to camera); at far right, Representative Art Matthews.



Fifteen members of field staff participate in full schedule of study

THE first study class for the International Staff was opened on November 15th at the International Office in Washington. The first class is made up of fifteen members of the IBEW field staff, representing all of the twelve Vice Presidential Districts.

This educational program includes courses in Effective Speech, Human Relations, History of the Labor Movement, Organizing Methods, National Labor Relations Act, Procedures of the NLRB, Study of the AFL-CIO No-Raid Pact, Finance, Research, Pension Plans, Incentive Systems, Job Evaluation, Council on Industrial Relations, Local Union Officers and Steward Training, Parliamentary Law and International Office policy.

Each session of the course is scheduled for six weeks. Such courses will thus run consecutively for approximately two years so that all members of the Staff will eventually have had the opportunity to participate. At a later date, the Brotherhood will endeavor to begin a course of study to be made available to Business Managers of its Local Unions.

Shreveport Strike

KRMD in Shreveport, La. summarily terminated its agreement with Local Union 1178 and the affected announcers and technicians had no choice but to strike on November 16th for the maintenance of their wages and working conditions. A request for moderate increases had been made by the Local Union and the employer contends that demands of the Union would force the station out of business. The Local Union has the full support of organized labor in the area and, at

press time, the employer was standing pat on a refusal to meet with either the Federal Conciliation Service or the Union.

KRMD is an affiliate of the ABC radio network and the Congress of Industrial Organizations has lent its support in a very tangible way; the CIO-sponsored news program featuring John Vandercook has been removed from the station for the duration of the dispute.

Progress in Kansas

Business Manager Malcolm of Local Union 271, Wichita, Kans. and Seventh District Representative Forrest C. Conley report good progress in organization in the Wichita area. A recent NLRB election at KTVH-TV resulted in a victory for the IBEW at Hutchinson, Kans. KTVH-TV operates on Channel 12 and is an affiliate of the CBS and DuMont television networks.

Negotiations are currently in progress at KEED, a Channel 16 affiliate of the NBC-TV network.

202 Manager Resigns

It is with sincere regret that we announce the resignation of Brother John J. Dunn from the office of Business Manager of Local Union 202, San Francisco, effective December fifteenth.

Jack has done an outstanding job and will be sorely missed. His host of friends join us in wishing him all the success in his future endeavors. "There is a tide in the affairs of men which taken at the flood, leads on to fortune."

Three groups of employees involved in dispute over provision in previous agreement regarding the operation of incidental equipment

Local Union 45 Strikes KHJ, KHJ-TV

LOCAL UNION 45 struck the Los Angeles operation of the Don Lee Division of General Teleradio, Inc., at 10 p. m. on November 18 and is picketing KHJ and KHJ-TV in Hollywood.

General Teleradio, Inc., is owned by the General Tire and Rubber Company and in turn, owns the majority interest of the Mutual Broadcasting System, Inc.

Three groups of employees are involved in the dispute; (1) building engineers, consisting of air-conditioning men and maintenance electricians, (2) stage employees; stage hands, lighting men, carpenters, scenic artists, floor managers, etc., and (3) technicians and engineers; all technical operations personnel, excepting engineers-in-charge and similar executive personnel.

The building engineers have long had a provision in their previous agreement which states:

"Section 14. So long as any major building maintenance is in operation, an engineer shall be present."

There is no disposition on the part of Local Union 45 to quibble over the operation of small air-conditioning units, accessory blower units and the like; the operation of such incidental equipment has been and will be accepted as not requiring the attendance of an engineer. The Company, however, now stoutly maintains that the whole of Section 14 must be deleted from any new agreement and admits that its purpose for this demand is to cut the staff of building engineers and to operate its major equipment by automatic control. The agreement negotiations for the building engineers have been going forward for some nine months and the immediately preceding agreement was terminated on its anniversary date—March 31, 1954.

Negotiations for a new agreement for the stage employees have been in progress for several months. The major item of dispute is that the Company contends that all employees in the certified bargaining unit must be completely interchangeable. The IBEW seeks some reasonable definition of classification of work and opposes integration of all the skills involved in the unit. A very broad and somewhat vague definition was submitted by the Company and accepted by the Union. Upon its ac-

ceptance the Company withdrew its own proposal and stated that their own language was not clear to the Company and that, therefore, no reference should be made to classification in the agreement.

The basic position of the Local Union is that, for example, if 40 hours of lighting work are to be performed, an employee should be assigned to lighting. If only 30 hours of work in such classification are available, a lighting man should be assigned to the 30 hours and the additional 10 hours of work of a different nature could be assigned to such employee. The Company contends that all employees should be completely interchangeable and that work should be assigned on an hour-to-hour basis.

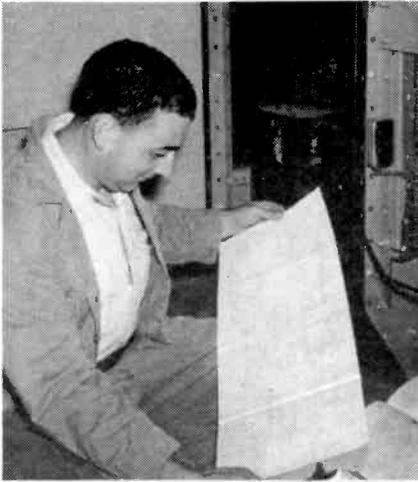
The matter of the term of the proposed agreement is also in dispute; the Company contends a two-year agreement is proper and the Local Union desires only a one-year term.

The technicians and engineers have been negotiating with the Company since approximately September 1 and the previous agreement reached its terminal date on September 30, 1954. The Company freely admits that it has traditionally "been behind" the other stations in the Los Angeles area in the matter of wages, by approximately two years. No denial of ability to pay has been forthcoming—indeed, the Company has stated that a plea of poverty cannot be made. Its only contention with respect to the pay issue for the technicians and engineers is "... it would be bad business policy to grant an increase at this time."

There has likewise been no agreement on the subject of leaves of absence, nor will the Company agree to mutual consideration of the extension of sick leaves beyond two weeks per calendar year.

The only concession the Company has offered to the technicians and engineers consists of its willingness to grant an additional week of vacation to employees having more than five years' service. Its position on the money question is completely adamant; an offer by the Local Union to arbitrate the wage question has been summarily rejected.

FLASH! Just at press time, the good news reached The Technician-Engineer that a settlement was accomplished at KHJ, KHJ-TV. Our congratulations to the Local Union and its militant members. No details are yet available.



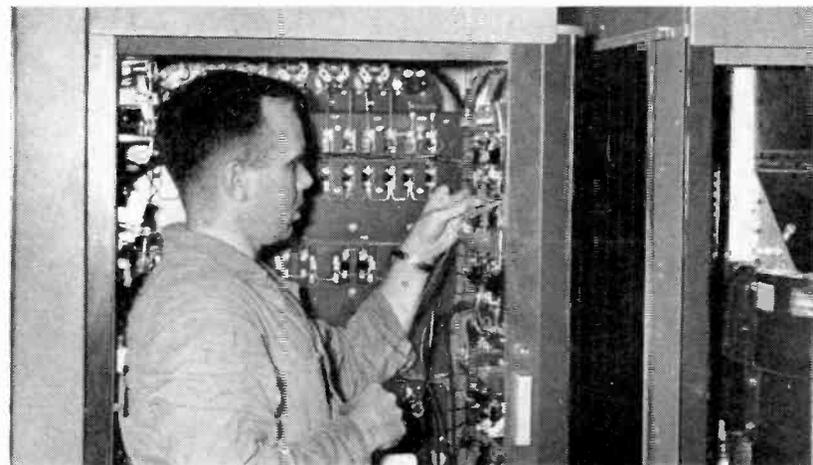
ABOVE: Leonard Euzent looks for the circuit that isn't there.

TOP RIGHT: A general view of the TOP installation, looking across the front of the incomplete transmitter.

CENTER RIGHT: A pause for reflection. J. P. Mercer, left, and Howard Stephen take a look at a blueprint.

BOTTOM RIGHT: C. M. McKinley wiring terminal blocks in the rear of the transmitter.

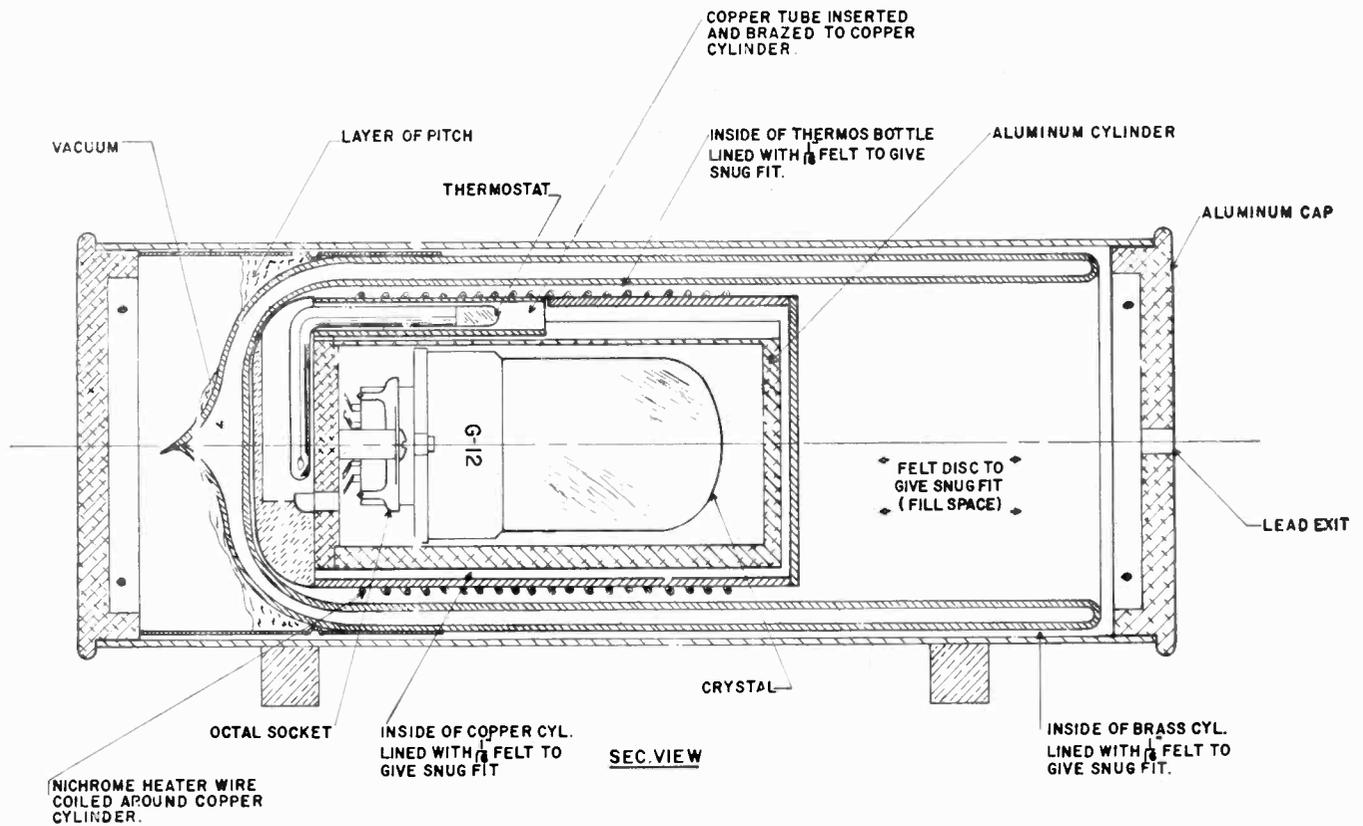
WTOP-TV, Washington Ups Power to 316 kw Limit



WTOP-TV, Washington, D. C., manned by IBEW Local 1215 engineers, recently increased its effective radiated power from 54.9 kw to 316 kw, the maximum permitted for its Channel 9. The changeover, which cost an estimated \$250,000 and will add \$50,000 to the station's yearly maintenance costs, makes the station's signal available in an area of 14,900 square miles in Virginia, West Virginia, Maryland, and Pennsylvania. The station estimates that 646,900 sets are now able to pick up the signal. Pictures on this page show the installation of new equipment and some of the work performed by IBEW members.

WTOP-TV is the CBS outlet in Washington. It is operated by *The Washington Post* from new studios and facilities in Broadcast House located in the northwest section of the nation's capital.

COVER PICTURE: Norton C. Richardson, president of IBEW Local 1215, kneeling, shows singer Jeanne Dowling the new equipment. Tom Fanning, staff technician, is an interested bystander.



NOTE:

CRYSTAL OCTAL SOCKET AND THERMOSTAT NOT SHOWN AS SECTION VIEW.

Scale



▲ The NBS one-megacycle frequency standard showing the crystal oven (left) and the accompanying electronic equipment (right)

HIGH-STABILITY, ONE-MEGACYCLE FREQUENCY STANDARD

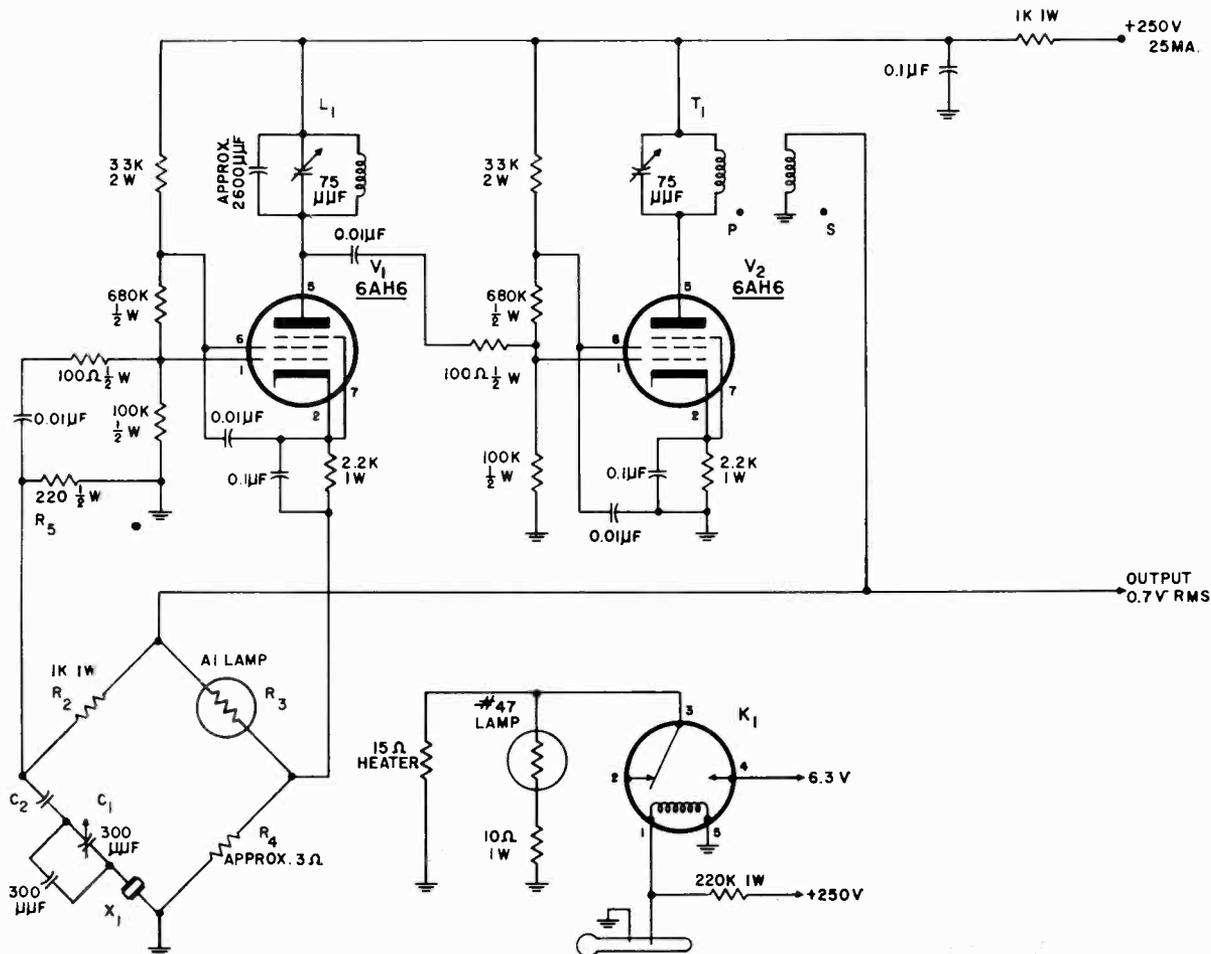
New device said to have wide application in checking radio transmitters

A PORTABLE one-megacycle frequency standard, stable to a few parts in 100 million per day, has been developed by P. G. Sulzer of the National Bureau of Standards. The compact and relatively simple assembly, employing inexpensive commercially available components, makes use of a crystal unit to control the frequency of an oscillator. The device is sufficiently rugged for general laboratory and field use as a working standard. It is expected to have wide application in checking radio transmitters and measurements, and in various other industrial and research fields.

As custodian of the national standards of physical measurement, the Bureau develops and maintains basic

standards for electrical quantities at all radio frequencies. From these basic standards are obtained the secondary standards used by research laboratories and the radio industry. As science and technology advance, research must constantly be conducted to meet increasing demands for more precise and reliable secondary standards. In its search for more accurate secondary standards of frequency, the Bureau has made a continuous effort to improve the performance of crystal-controlled oscillators, which appear to offer the best solution in the present state of the art.

The NBS one-megacycle standard, like other crystal-controlled oscillators of this type, consists of three ele-



▲ Schematic circuit diagram of the NBS one-megacycle frequency standard. The Meacham-bridge circuit is at lower left

ments: the crystal unit proper, an amplifier or negative-resistance device to supply the losses in the crystal unit and to deliver power to a load, and an amplitude control. However, the NBS oscillator was specially designed to minimize frequency changes caused by tube or component instability. As a result, the over-all stability of the unit is nearly that of the crystal itself.

Any phase of shift in the amplifier must be offset by a corresponding but opposite phase shift in the crystal unit, which will produce a frequency change. Such a phase shift can be caused by an actual reactance change or by a variation in the reactive component of the input impedance of the tube. Phase shifts can also be produced by the electronic component of the input capacitance of a tube, by transit time, and by the effects of nonlinearity.

In the NBS oscillator, the effects of these amplifier variations are decreased by the use of inverse feedback. The familiar Meacham bridge oscillator is utilized be-

cause it gives excellent results with comparatively simple circuitry.

The Meacham bridge consists basically of a crystal resistance R_1 , a pair of resistors R_2 and R_4 , and a lamp resistance R_3 . These components are so arranged that negative feedback occurs through R_1 and R_2 while positive feedback occurs through the lamp R_3 and resistor R_4 . If the amplifier has sufficient gain, oscillation will start at the frequency of minimum degeneration, which is nearly the series-resonant frequency of the crystal, and the lamp resistance will increase with the amplitude of oscillation until the bridge is nearly balanced. When an equilibrium is reached, the bridge attenuation must equal the amplifier gain.

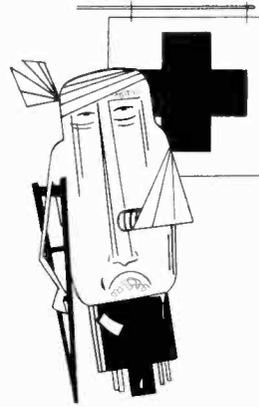
Good phase stability of the amplifier requires a large voltage gain (A) and a maximum transmission (B) through the negative-feedback path. However, certain practical considerations limit the increase of transmission. With a given amplifier, the product of A and B

cannot be increased without increasing the crystal current or decreasing the lamp voltage, both of which are undesirable. The 20-ohm glass-enclosed, contoured AT-cut crystal chosen for the present oscillator has a Q of 5×10^5 and a maximum current limitation of one milliamper. The A-1 switchboard lamp R_3 used in the bridge requires at least 0.7 volt for proper operation, so that with a crystal current of 0.7 ma, R_2 is approximately 1,000 ohms, and the transmission is approximately 1/50. If the gain equals 1,000, then the product A times B is approximately 20, and a 20-fold reduction in effective phase shift is obtained.

Sufficient voltage gain for good amplitude stability requires two amplifier stages. The crystal current must be kept constant because the resonant frequency is a function of current. With two similar stages the voltage gain is squared, while the shift is at most doubled, permitting sufficient gain without greatly increased phase shift.

A two-stage amplifier with a voltage gain of 1,000 exhibits a maximum phase shift of ± 10 degrees over a two-to-one supply-voltage range. Thus, when the Meacham bridge is used, the maximum expected phase change with feedback becomes ± 0.5 degrees. The crystal must experience the same phase shift, and its frequency will be pulled accordingly. A simple calculation shows that with Q approximately 5×10^5 , the corresponding fractional frequency change is $\pm 1 \times 10^{-8}$. Thus, with reasonably constant supply voltages, the short-term frequency stability can be expected to be somewhat better than this. The long-term stability will depend on these and other factors, however, including the drift of the crystal resonator itself.

To obtain the best frequency stability, the AT-cut crystal used is kept in an oven at a specified, constant temperature. The oven is of a single-stage type, with temperature control provided by a 50-degree mercury thermostat. A Dewar flask is used to isolate the controlled oven chamber from outside temperature changes. Consequently, the average power requirement is only 0.4 watt at a temperature difference of 25°C. Frequency changes in the crystal due to oven cycling are less than 10^{-9} cps, and normal laboratory temperature changes are apparently not reflected in the temperature of the crystal.



Fractured VIDEO

The broadcasting industry is steadily adding to its vocabulary new words gleaned from the maelstrom of television. Some are serious; others are not. Below are some of the latter, authored by Bruce Anderson, radio program manager of a station in Cedar Rapids, Iowa:

FILM CLIP: Practice of bilking television stations with inferior movies.

FLIP BOARD: Informal society of sales personnel; name derives from expression: "Let's flip for the coffee."

I. D.: Abbreviation for intestinal disorder; *i.e.*, ulcer.

I. D. CARD: Employee who jokes about ulcers.

LAP DISSOLVE: Instruction to seated actor; as "Get up."

MIKE SHADOW: Affectionate name for TV detective.

TELEPROMPTER: Viewer who notifies advertiser when somebody goofs.

TIGHT CLOSEUP: Refers to performer who appears crooked at close range.

PANNING: Objective appraisal of TV program by radio personnel.

FEATURE FILM: Three Mexicans shaking gourds in unison.

FLASH BACK: Reaction of sales person who has been notified at lunch of a prospective advertiser waiting at the office.

REAR SCREEN PROJECTION: Sprung look acquired by overworked prop men.

Illinois Senator Discusses Paradox of Big Business

"It is curious to see how business groups which demand subsidies for airlines, shipbuilders, shipping companies, magazine publishers and advertisers, wool-growers, silver mining companies, sugar refineries, tariffs of all kinds, guaranteed investments in real estate, tax favors for the mineral industries, oil giveaways, etc., etc., hold up their hands in holy horror when the Gov-

ernment tries to protect the farmer from sharp price decreases, or tries to clear a slum so that poor kids may have a more decent chance to grow up free from crime and disease! How hypocritical or unseeing can people get!"—Sen. Paul Douglas (D., Ill.) speech, Harvard, Ill.—Thanks to the "202" Radio-Television News.

Reading Time

The Arbitration of Wages, by Irving Bernstein, University of California Press, Berkeley 4, Calif., 1954. 125 pp. \$3.50.

What are the chief factors in wage determination?

What are the merits of arbitration?

These and other questions of paramount interest to labor are answered in a new book published by the University of California Press. The book is based upon an analysis of wage arbitration cases published in the Bureau of National Affairs' *Labor Arbitration Reports* from 1945 through the first part of 1950. The author, Irving Bernstein, discusses the relative advantages of wage arbitration as compared to negotiation. He analyzes the bases which arbitrators rely on in reaching their decisions.

For instance, Bernstein finds that arbitrators are much more likely to lend a sympathetic ear to arguments based on facts than to theoretical discussions.

Wage-rate comparisons between the company in question and others in the industry or area seems to be the most widely accepted determining factor, according to the author. In 60 per cent of the cases studied, in which the arbitrators gave their reasons for their decisions, wage comparisons were the deciding factor in the award. Even where other arguments are introduced, Bernstein says, wage comparisons almost always outweigh them. For example, when a wage-rate comparison indicates that a wage boost is in order but the company's financial condition doesn't, the company's financial condition is given secondary consideration.

The cost of living is the second most important factor, according to the study. Prime weight was given to changes in living costs in 34 per cent of the awards. Bernstein points out, however, that this figure is probably higher than it would normally be because of the sharp increases in the cost of living during the 1945-50 period. When prices are stable, this factor is of little or no significance, and it usually isn't of much importance when prices are declining, the author finds.

A third important factor in wage determination is that involving the financial problems of the company involved in the dispute. About a third of the companies in the study brought up this factor. However, only 3½ per cent of the awards were based primarily on this consideration. Almost all of those were in situations where the company was so badly off that it would have been forced to go out of business unless wages remained the same or were cut.

Bernstein lists other factors which he says are based on concepts or theories which can't readily be translated into cents per hour. These are almost never used by arbitrators as the bases of their awards, he states. These factors include (1) "existing wages are below those necessary for a decent standard of living," (2) "pro-

ductivity—within the firm, the industry, or the nation—has risen and wages should be raised accordingly, and (3) "a wage increase would have a good effect on the economy by increasing purchasing power."

Turning to the whole picture of wage arbitration, Bernstein estimates that wage disputes which are finally settled by arbitration probably account for less than 2 per cent of general wage changes throughout the country.

Bernstein, who is on the staff of the Institute of Industrial Relations at the University of California at Los Angeles, points out that the factors which influence wage determination are significant because they reflect the arguments which determine wage settlements generally. An umpire's award in one dispute becomes the basis for a settlement in another dispute.

In the long run, Bernstein says, there appears to be little difference between the results of wage arbitration and negotiations. Wages usually won't go up any more quickly under arbitration than they would through negotiations, mostly because arbitrators are influenced by the same arguments that usually determine the outcome of bargaining negotiations. The umpire's award turns out to be about what the parties would have agreed to in his absence.

Arbitration has advantages, he reminds:

- if the union isn't in a position to strike in support of its demands.
- if the union leadership is convinced that a "no-increase" or "decrease" wage settlement is unavoidable but knows that it would have a hard time getting the rank and file to agree, and
- in situations where the parties have actually reached an agreement and then bring in an umpire as a formality to gain public acceptance of the settlement.

Formulas for Computing Capacitance and Inductance, by Chester Snow, National Bureau of Standards Circular 544, 37 figures, 69 pages, 40 cents. (Order from the Government Printing Office, Washington 25, D. C.)

This collection of formulas contains some that are commonly used in electrical work and some that have been specially developed for precision work at the National Bureau of Standards. Explicit formulas are given for the computation of (1) the capacitance between conductors having a great variety of geometrical configurations, (2) the inductance, both self and mutual, of circuits of various shapes, and (3) the electrodynamic forces acting between coils when carrying current. Formulas for skin effect and proximity effect in concentric cables and parallel wires are included. The formulas for the simpler configurations are given in terms of the elementary functions, whereas more complex shapes involve the use of Legendre polynomials, Legendre functions, and elliptic functions. One section is devoted to a discussion of the relation between the Legendre and the elliptic functions.



Technical NOTES

Growth of Color TV

At least two million people have already seen color TV shows, according to NBC's Executive Vice President Robert W. Sarnoff, who estimated the figure was "banker-conservative," in a talk before the Advertising Club of Buffalo recently.

The estimate, Sarnoff said, was based on the "hundreds of people" who have at least caught a glimpse of color on the 10,000 color sets now in national circulation.

To bolster his estimate, Mr. Sarnoff traced reports he has received from various population centers.

Similar words were echoed by Dr. Allen B. DuMont, President of Allen B. DuMont Labs, when he stated recently that "wide public acceptance of color—still several years away—will come about once the price of color receivers drops below the \$500 level."

The current cost of the color cathode ray tube, which is about \$175, must come down in price to the \$50-\$100 level of the black-and-white tube before color can capture about 70 percent of the set market, Dr. DuMont said.

He also noted the importance of programming color. According to Dr. DuMont, only those network shows which are produced with color in mind are worthy of the addition of color—specifically he noted the "spectacular" type of variety program.

Looking to the future, Dr. DuMont added his predictions to those of RCA and GE leaders, that the set with the "new look" will consist of a large screen, a few inches deep, hung on the wall and controlled by a small-sized cabinet. Experimental work aimed at such a set is already under way by manufacturers, he said.

As if to bear out the statements and predictions of industry leaders, Raytheon Manufacturing Company has set a production goal of 2,000 color TV receivers for the rest of this year and 25,000 during 1955.

Sets tabbed for output the next few months will incorporate a 19-inch three-gun color tube and will sell for \$1,095. Next year's schedule calls for use of a 21-inch color tube, with a retail price of under \$1,000.

Another significant advance in the road toward mass color television was made recently when patent number

2,692,532, covering basic concepts of the Lawrence Chromatron color television tube, was presented personally to Dr. Ernest O. Lawrence, inventor of the device, by Comdr. Robert C. Watson of the Patent Office.

Inventor Lawrence says color TV sets using the Chromatron can be produced at a substantially lower price than sets using other types of color tubes.

Other developments on the color TV scene include a decrease in the suggested user price from \$1,900 to \$1,700 of the RCA camera pickup tube for color TV broadcast service. The announcement was made by the Tube Division of RCA.

The revision in price is designed to provide broadcasters with color cameras employing a simultaneous pickup system, with an overall saving of \$600 per unit, since three RCA pickup tubes are required in each camera.

Phonevision Down Under

Subscription television utilizing Zenith Radio Corporation systems of Phonevision will be introduced to Australia and New Zealand under terms of a contract signed between Zenith and the Rola Company of Melbourne, Australia, that country's foremost manufacturer of loudspeakers, magnetic winding wire and other radio and television components. In a joint statement issued by Commander Eugene F. McDonald, Jr., President of Zenith, and A. Leonard C. Webb, Managing Director of Rola, it was announced that introduction of the Phonevision systems to Australia and New Zealand will be sought immediately.

Under the terms of the contract, Rola is to organize a new corporation which will be licensed under Zenith's Phonevision patents. This company will immediately seek governmental and industry support for Phonevision. The contract grants the right to manufacture and use all transmitting and receiving apparatus necessary to the operation of the various Phonevision systems.

According to Zenith officials, the contract terms allow the broadest possible use of Zenith's many subscription television patents already filed in Australia and New Zealand. This, they believe, will permit the new company maximum freedom to stay in the forefront of the developing TV picture in Australia. Although the Zenith

patents cover different systems of Phonevision, officials anticipated that the Air Code System will be preferred over the system using telephone lines. The Australian sub-continent and New Zealand do not have television at the present time, but standards have been adopted and transmission is expected to begin in the not distant future.

Engineering representatives of Rola are expected in Chicago shortly to undergo intensive training by Zenith Phonevision experts, and a Zenith crew will probably visit Australia at a later date to help set up Phonevision there.

'Workhorse' Tube Changes

A miniaturized and "versatilized" version of one of the most widely used "workhorse" receiving tubes for home television receivers was announced this month by the Tube Division, Radio Corporation of America. The new tube (RCA-6CG7) is a 9-pin miniature equivalent of the popular 6SN7-GT.

A general-purpose medium-mu twin triode, the new RCA miniature tube is designed for use in television circuits employing either parallel or "series-string" operation of the tube heaters, and, because of its compactness, can be employed also in printed-circuit sockets, according to Lee F. Holleran, general marketing manager. It measures less than one inch in diameter and only $2\frac{5}{8}$ inches in length, compared with a diameter of $1\frac{9}{32}$ inches and a length of $3\frac{5}{16}$ inches for the 6SN7-GT tube.

The new miniature twin triode is intended for primary use as a vertical deflection oscillator and a horizontal deflection oscillator in home television sets, he said. It has applications also as a phase inverter, multivibrator, sync-separator and amplifier in electronic equipment.

Design features include: a 600-milliamperere heater with controlled warm-up time to insure dependable performance in television sets employing a single series-connected heater circuit; an internal shield which prevents electrical coupling between the triode units, and an internal structure which holds grid operation to a cool level and minimizes grid emission.

Replacement Cartridge

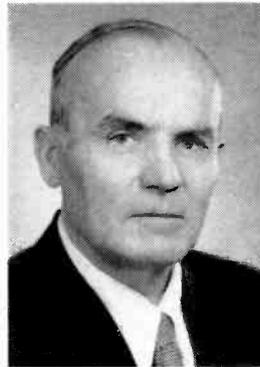
The Turner Company, Cedar Rapids, Iowa, has introduced universal phonograph pickup replacement cartridge in Models AU and A, which can be used to replace 95 per cent of 78 rpm pickups in use, according to company. AU employs externally mounted condenser for 2.0 volts or lower output replacement; A is same cartridge without condenser. Company also has available new general catalog covering microphones, phonograph pickup cartridges, microphone interiors and microphone accessories, obtainable from the Turner Company at 936 17th St., N. E., Cedar Rapids.

Ampex Marks 10th Year

To commemorate the firm's tenth anniversary, executives of the Ampex corporation presented a 10-year service pin to its founder and president, Alexander M. Poniatoff, at a dinner in his honor Tuesday, November 2.

In making the award, George I. Long, executive vice president, cited Poniatoff "for his leadership and guidance to professional acceptance and establishment of Ampex as the finest in magnetic recording equipment."

Although only 10 years old, Ampex pioneered the field of magnetic tape recording in 1948 when it introduced the first successful professional-quality tape recorder ever built in the United States. Today Ampex recorders are used by all major radio networks and all major record manufacturers. The uses of tape recorders have been extended beyond the field of sound to include such things as recording laboratory data, controlling machines and regulating processes.



Poniatoff

Fate catapulted Ampex to the forefront of the magnetic recording industry in the form of Bing Crosby being faced with the prospect of having to go to "live" broadcasting, because of a low Hooper rating attributed to "canned" characteristics of current recording methods of 1948. In his search for a recording medium that could not be distinguished from direct broadcasting he arranged a series of demonstrations by manufacturers of the then "new" magnetic recording machines including Ampex. On hearing the Ampex, Crosby placed an order for the first 20 Ampexes at \$4,000 each. These machines were later sold to ABC, and Bing Crosby Enterprises has been an Ampex distributor ever since.

From that beginning, Ampex recorders are now used by every major radio network, by all major recording companies, by the Armed Forces Radio Service—by all critical users of recorded sound and data recording.

With this mushrooming use of magnetic tape recorders, Ampex itself has undergone vast growth. When the original machine was built in 1948, the company has eight employes housed in a small building in San Carlos, Calif. Today, the main plant in Redwood City and a subsidiary in North Hollywood includes over 75,000 square feet of space housing 500 workers with additional facilities of 30,000 square feet of space nearing completion.

In accepting the award Mr. Poniatoff expressed his belief in the future with the statement: "the daily discovery of new uses of information recorded on tape presents unlimited horizons to the growth of the industry and to Ampex."

Station Breaks



More Dual Operations

Here's an item from the *Local 1212* (New York, N. Y.) *News*, telling of remote-operation troubles around the big city:

One of the most diabolical plans to wreck our AM-FM station operations came to light as we write this. It is a long range campaign to oust the Unions (including the IBEW) from the scene. To date, two of the radio stations within our jurisdiction have closed their studio-remote operation and moved to the transmitter, abolishing in one instance, nine jobs and the other, five. Two others are in the making. Others will follow. The latest change of record, paid the laid-off men their full salary to the anniversary date of the contract Jan. 2, 1955, in order to get rolling on the new "system."

We need not expect such consideration from all of our contractors. Here is an excerpt from the long range plan of one of our hitherto, peace-loving stations in the area:

"We may expect the greatest amount of resistance and strike trouble from the IBEW, who have contracts covering the Engineers." However, preparations for dual operation from our transmitter site, with combo-engineer-announcer staff, will affect an annual savings of many thousands of dollars. . . . Much language is devoted to non-union manning which means JOBS LOST in our book. Within no more than sixty days from the time you read this, you will have learned further that this is no bogey story. You will know that this is a planned campaign, with no holds barred. And those who may feel smug in a TV spot may do well to oil their own muskets; RCA has an upcoming system in the works which will revolutionize the TV operational methods of the present at the expense of much manpower. Manpower, in case you miss the point, means jobs. It could mean YOUR OWN!

DuMont, ABC Talk Merger

Early this month rumors and published reports had it that DuMont may suspend its network television operations, if an arrangement under discussion with the American Broadcasting Company went through. Later, this month, industry magazines reported that DuMont would be sold to Guild Films.

ABC was said to be holding discussions with Allen B.

DuMont Labs, which could result in a consolidation of the two networks. DuMont, rumor had it, would continue to own and operate at least two of its three stations—WABD(TV), New York; WTTG(TV), Washington; and WDTV(TV), Pittsburgh. However, the report that WDTV(TV) might be sold to Westinghouse, is still circulating.

WNOE Records AFL Leader



Two members of AFL unions employed by Station WNOE, New Orleans, recently recorded a speech by AFL Secretary William Schnitzler, second from left, to the 7th International Convention of the United Cement, Lime and Gypsum Workers. The engineer is Lynn Wooten of IBEW Local 1139; the announcer, Jimmy Steele, AFTRA. William Schoenberg, Cement Workers president, is at right.

Hurricane Hazel

The recent hurricane named Hazel which made a wide sweep up the East Coast kept radio and TV engineers busy at many IBEW-contract stations. Employees on the top floors of WTOP-TV's Broadcast House, atop a hill in Washington, D. C., were evacuated as winds hit 90 mph. The tower above was swaying, but it stood.

At WPIX (TV), New York, engineers made arrangements to borrow two Army anti-aircraft searchlights for use in coverage of the hurricane at night, between City Island and Rockaway Beach, Long Island, using remote equipment.