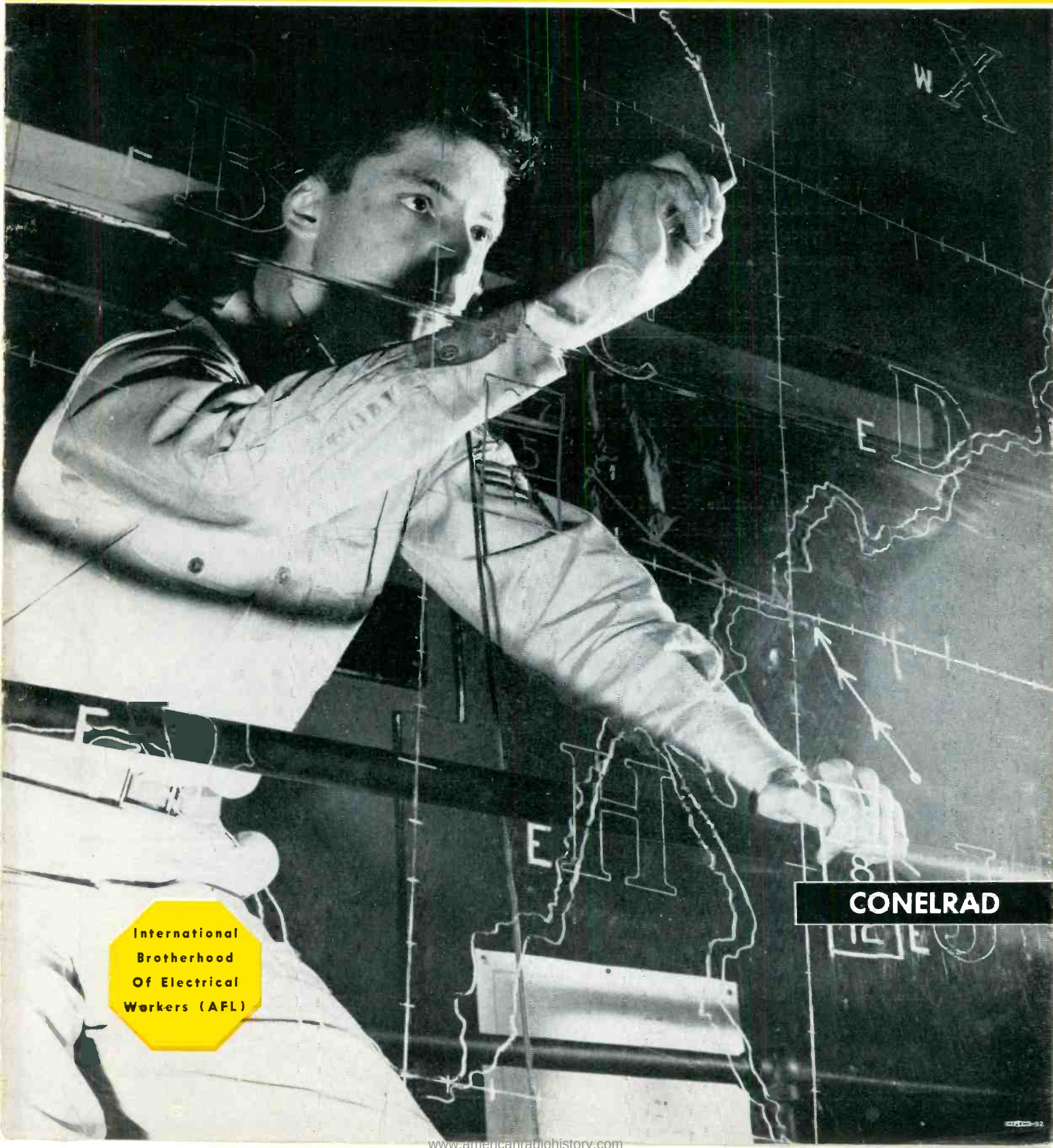
RADIO, TV and RECORDING

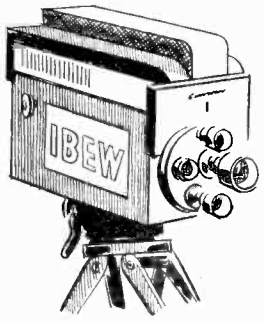
# TECHNICIAN-ENGINEER

JANUARY, 1953




International Brotherhood Of Electrical Workers (AFL)

Old Man '52 hands over some troublesome burdens and a few predictions




# *1953 Should Bring Changes To the Broadcasting Industry*

THE ides of January is a good time to sit down and weigh the scales of time, as it applies to the broadcasting and recording engineer. We should counterbalance working hours against wage scales, job opportunity against industry profits, political pressures against union bargaining.

The picture for 1953 is not yet in clear focus, but here are a few shows which should be programmed in the new year:

● Continued determination within Labor's ranks, President-elect Eisenhower's promise to be fair in dealings with organized Labor, and a growing agitation for a new labor law, should result in, at least, the face lifting—of the onerous Taft-Hartley law.

● Indications are that the AFL and CIO, through their new top leaders, will make a serious attempt to work together. Such harmony at the top might result in a working arrangement with our CIO counterpart—NABET (The National Association of Broadcast Engineers and Technicians). NABET's growing invasion of other broadcasting jurisdictions would offer many a sour note to labor harmony, however.

● The FCC has, as yet, taken no action on the proposed changes of operator rules. The International Brotherhood will put up strong opposition to any plan to eliminate engineers at the transmitters or reduce operator qualifications. This matter may come up in '53.

● It is difficult to forecast how many new TV stations will go on the air in 1953, but by the end of the year there may be as many as 200 stations operating . . . or almost double the 108 operating during the TV "freeze" which ended last spring.

● "Wide-scale improvement of employment conditions in the nation's major metropolitan labor markets" was noted by the Department of Labor in December. Job opportunity in the broadcasting industry does not fluctuate directly with other and more general occupations. But it is influenced by controls, the cost of living, and other economic factors. Management expects great things from the Eisenhower Administration. Labor will be constantly checking the pulse and offering sedatives when the temperature of fast profits sets in.

● Be certain that your IBEW will continue to press for better wages, working conditions, and fringe benefits in 1953.

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TECHNICIAN-ENGINEER
VOLUME 2 NUMBER 1

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D. W. TRACY, *President* ● J. SCOTT MILNE, *Secretary*
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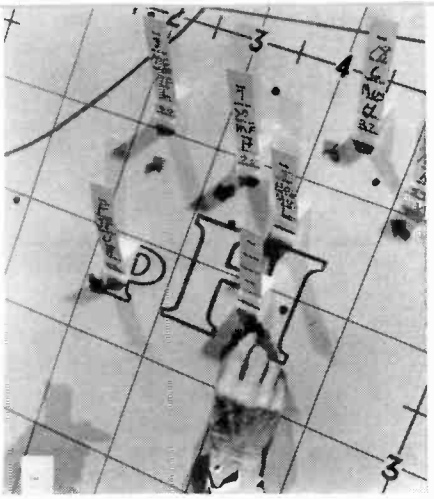


# CONELRAD

*. . . how the broadcasting engineer fits into the nation's air defense system.*

RADIO broadcasting stations, operating on assigned frequencies and at normal power would provide enemy bombers with a "radio highway" to their targets. The flight leader could tune his direction-finding equipment to an AM broadcasting station in the target town. A compass needle would show him in which direction to fly to reach the objective. When the bombers are over the target area, their radar scanners would take over.

To confuse such an enemy air approach plan and make its direction-finding equipment useless, the Federal Communications Commission, the Defense Department, and Civil Defense have come up with a plan, which they call CONELRAD—a plan for CONtrol of ELectromagnetic RADiation.

To make the plan a working component of the nation's air defense system, more than 1,000 privately-owned AM broadcasting stations have volunteered to participate in CONELRAD. They are spending approximately $1,500,000 of their own funds to make equipment changes necessary to put the plan into action. These are the only stations which will stay on the air during an air raid alert. FCC hopes to enlist at least three-fourths of the nation's 2,500 AM stations eventually.

### *Wraps Taken Off Plan*

Last month the White House took the wraps off the plan and gave the public an inkling of what to expect from their radio receivers in case of an air raid alert. In doing so, it also gave little comfort to any potential aggressor.

The CONELRAD plan envisages a radio net whereby broadcasts can continue without providing homing beams for invading aircraft. The system will be rigged so that President Eisenhower, for instance, could talk to the entire population at a moment's notice.

Similarly, state governors or local authorities could cut in with emergency reports and instructions.

No engineering method has yet been found to enable FM and TV stations to remain on the air. They'll go off the air at the first alert from the Air Forces' Air Defense Command. All CONELRAD stations, meanwhile, will switch to one of two pre-designated frequencies (640 kc or 1240 kc) and broadcast to the public a continuous flow of accurate, official information, news and civil defense instructions.

Who'll want to listen to a radio with enemy bombers overhead? Civil Defense authorities are advocating that battery-powered radio receivers be installed in all public air raid shelters set up by local CD leaders. For those scrambling souls who head for the basement or the nearest hole. Civil Defense authorities suggest that they take along any portable battery-powered radio handy. Col. William M. Talbot, Civil Defense director of warning and communications, is trying to interest the radio manufacturing industry in developing a cheap portable radio that's within the means of every family. Ideally, this radio would operate either on house current or on batteries and would cost only $7 or $8. It would need power only to bring in the signal of the nearest stations in the CONELRAD net.

CD is also planning a campaign to have people keep their small radios in repair. It hopes to interest radio repair shops in offering special low prices for this service.

CONELRAD also covers the operations of industrial, fire, and police radio systems. These units will get special rules for staying on the air after the air raid siren has sounded. Under the CONELRAD Executive Order, the President has the authority to silence any X-ray, diathermy, or industrial machine that emits signals between 10 kc and 100,000 kc, if the signal carries five miles or more and is capable of being used for aerial navigation.

CONELRAD is expected to be placed in operation in about two months. Under present temporary arrangements, a detected air attack would silence all broadcasting and telecasting until the all-clear sounds.

*Continued on page 6*

# AIR DEFENSE'S 'BIG

First warning of enemy air attack will probably come from one of the many radar units guarding our coastline and our major cities. Revolving CPS-6 radar antennas, such as the one shown above, are usually situated near critical target areas on a 24-hour alert.

SEEN in the melodious serenity of a console pilot's seat in any IBEW-contract station across the nation, the pictures of these two pages seem like so many shades of F-for-Freddie, Mrs. Miniver, and One of Our Aircraft is Missing. But seen through the eyes of the men of the Air Defense Command, USA, they are examples of early, far-from-adequate efforts to prepare ourselves against enemy attack . . . Far from adequate, because the United States, to defend itself against aerial onslaught, must safeguard a land a dozen times larger than the gallant British Isles of F-for-Freddie days. The Air Defense Command must patrol an air border stretching 10,500 miles, across the Canadian boundary and along our East and West Coast. It must cover more than 3,000,000 square miles of land, and that means from Altimeter Zero to a dozen miles up in the stratosphere.

Add to these statistics the raw realities of intercontinental rockets,

From a ground observer post atop the City Trust Company Bank in Bridgeport, Conn., two "spotters" go through a recent practice alert. Observers manning such posts report sightings through a telephone net to filter centers, such as the one at right. They also work with local Civil Defense.

Phone operators working the filter board of the Civil Air Defense Unit in Los Angeles during a test operation. With earphones and chest voice receivers, they keep constant contact with observation posts. Each card holder on the table represents a flight of aircraft. Each holder shows the number of aircraft, type and identity. A "track," or course, is shown by small arrows pushed to a position beside the cards. Grids on the plotting table keep positions geographically correct and offer coding symbols for messages.

Two observers in East Winsor, Conn., spot a group of military planes during recent Operation Lookout. They relay such information to their post supervisor, who, in turn, phones it into the local defense unit's filter board for evaluation. Both friendly and enemy planes are reported. Spotters are trained in aircraft identification. They plug many defense gaps.

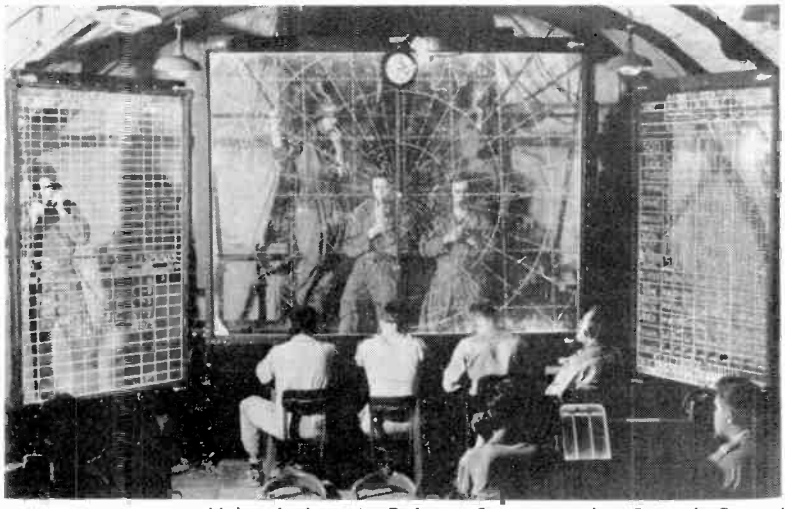
CONELRAD fits into the overall picture with Air Defense Command's first alert. Key broadcasting stations are notified; these station quickly notify relaying stations; the word is passed on until all stations are informed. TV and FM go off the air. CONELRAD's AM stations switch frequencies, broadcast Civilian Defense information at reduced power.

# PICTURE'

submarine-launched buzz-bombs, supersonic bombers which can pass over a dozen ground spotter positions before you can say yonder-she-goes, and you see the pressing need for air defense of the United States. And you see, too, why this CONELRAD matter is not just rover boy stuff.

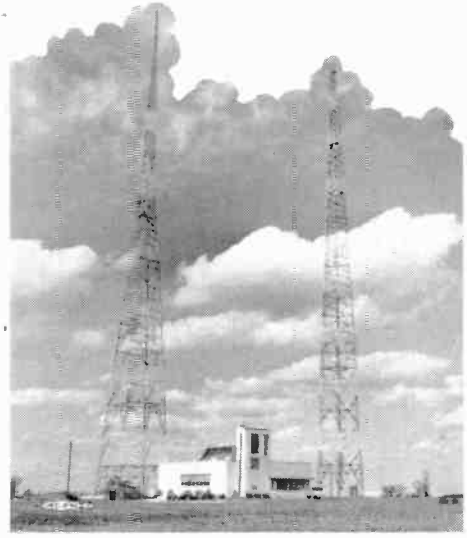
Preparedness is not war hysteria. Nor is it tilting windmills. It is a calm and methodical approach to future uncertainties. CONELRAD, to be effective, must be of a similar mold.

Jet jockies on the run. Seconds after the shriek of an alert siren, pilots of an interceptor squadron dash for their planes. Interceptor units of the AAF's Air Defense Command have planes ready for action at all times. Alerts for such units are relayed by ground control intercept stations.



Hub of the Air Defense System is the Ground Control Intercept Station. Such units, located in each defense region and, in the event of air attack, directed by military personnel, receive radar information direct, plus reports from filter boards (see picture, left) Plotters behind gridded plexi-glass screen give Air Force commanders running picture of air defense. From such stations, information and instructions go to anti-aircraft units, interceptor squadrons, Civil Defense units and CONELRAD broadcasting stations.

In case of enemy air attack, Civil Defense units must work in close harmony with military action. Civil Defense units will warn the civilian population, work with police, fire and medical units. Two-way radio will be a vital link for many such units. Above, a test alert in Hattiesburg, Miss.



Warned of approaching enemy aircraft, anti-aircraft units scan the skies for first signs of an enemy plane. An Air Defense control center alerts such units as to direction, number, type, and altitude of aircraft.

# Conelrad

*Continued from page 3*

Planning and preparations are well underway. The type of programming in emergencies has to be firmed up. Line interconnection between participating stations, which will cost nearly a half-million dollars, has to be completed. (The Air Force budget will bear this expense.) Cost of program lines from CDA headquarters to control points of the "clusters" of stations is being borne by CDA at a cost of about $80,000.

The report is that the broadcasting industry has already sunk more than $1½-million into CONELRAD experiments. They have to buy new-crystals for broadcasting on CONELRAD frequencies and be able to cut their power to a 5,000-watt limit.

### *Hub of the System*

The pictures on the preceding pages show what will happen if unidentified or aggressor planes are detected. The Air Defense Command of the AAF is the hub of the whole air defense system. Its headquarters is at Colorado Springs, Colo., in a yellow-brick building surrounded by an eight-foot steel mesh fence topped with barbed wire. Outside the 48 states, ADC is flanked by the Alaskan Command, the Northeast Air Command (Labrador, Newfoundland, and Greenland) and by the Canadian air defense organization. The only warnings from our wide-open sea frontiers will come from Coast Guard weather ships and other vessels, or from radar picket vessels. The Navy lists some radar picket vessels activated, but whether or not they have been assigned to U. S. coastal patrol has not been disclosed.

Under Air Defense Command are defense force combat operating centers, then air division control centers, and, finally, air defense direction centers. The continental U. S. is divided into three separate areas known as Eastern, Central and Western Defense Forces, and each such Force is subdivided into a number of separate smaller areas known as Air Divisions. Each Air Division has, as its operational staff section, an Air Defense Control Center as ADCC.

CONELRAD is built around the ADCC's.

Broadcast stations are generally grouped in geographic relation to particular ADCC's, forming station "clusters." There are about 200 such regional clusters.

Certain stations are designated as "basic key stations" and "relay key stations." The remaining stations are not given special designations. To confuse espionage agents stations designations may change from time to time.

All alert warnings and all clears will reach the involved stations through the nearby ADCC. They'll go first to the basic key stations, then to the relay stations, then to the remaining stations in each cluster. Notification will be by telephone or, in certain instances, by radio broadcasts. Such telephone warnings will receive top priority at telephone exchanges under the CD set-up.

At about this point the broadcasting engineer starts hopping. Notifications of alerts go direct to the transmitters. CONELRAD communications lines are not going to the front office, so to speak, but to the men who have to handle the engineering problems. Likewise, all radio receiving and alarm equipment must be located at the transmitters.

### *As the FCC Sees It*

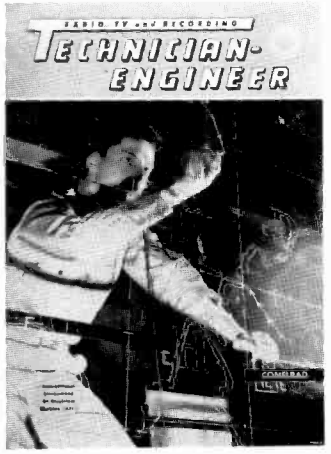
As the FCC visualizes CONELRAD, "all broadcasting stations subject to this plan, including those with special designations, must install the necessary equipment to receive notifications of alerts and all clears by means of reception of radio broadcast messages, and must maintain this equipment in a state of readiness for reception *including arrangements for human listening watches* or automatic alarm devices or both."

Predetermined messages, warning signals, and authenticators will prevent enemy agents from fouling up the works with false passwords, etc. Broadcast notification messages will normally be prepared and on hand in advance in the form of approved disc or tape recordings.

The whole CONELRAD scramble goes into effect with the announcement of Warning YELLOW or Warning RED. In no case will the plan be put into effect without either of these two warnings.

The FCC determines the specific manner in which each station fits into the plan, including whether key stations should receive or give notifications via telephone and whether, in borderline cases, stations of any category should be grouped in relation to one or the other of several possible ADCC's. Once CONELRAD is a working unit, FCC will send out appropriate rules and regulations to make the plan legally effective.

From time to time, FCC will maintain field surveillance to check the readiness of stations. As far as is practi-




THE COVER

An Air Force enlisted man marks the courses of intercepting aircraft on a vertical plastic plotting board, as the Air Defense Command goes through a practice "alert." CONELRAD key stations receive first warning from control centers where such boards are vital units.

cable, tests and practice operations will be conducted to take any flaws out of the plan.

Stations under a binding agreement with the FCC to participate in CONELRAD may withdraw from participation upon 30 days' advance notice to the Commission.

As previously mentioned, any station not participating in CONELRAD must go off the air at the first alert. Unless the FCC gives it other instructions, such a station must comply with the following paragraph of gobbly-gook issued by the Commission:

Before leaving the air it may broadcast "such 'sign-off' and other civil defense messages as civil defense authorities (Federal, State or local) may request subject, however, to complying with such requirements as the FCC, by rule or regulation, may provide for the purpose of securing the CONELRAD objective of minimizing navigational aid to a potential enemy."

### 'Sign Off' Broadcast

Before a CONELRAD station changes frequencies and begins power changes, it may also broadcast "such 'sign off'," etc. as is listed above.

What it boils down to is that, before taking appropriate defense action, any U. S. station must holler "run for the hills" as calmly as possible to the listening audience . . . and tell it how . . . then either leave the air or jump to CONELRAD. Before changing over, each station will tell its listeners where to find the civil defense frequency.

FCC says switching to the CONELRAD system frequencies must not take more than five minutes.

Standard Operating Procedures are as follows:

- After alert notification and until the all clear, no on-air identification will be permitted.
- All CONELRAD stations will be either on 640 kc or 1240 kc, as determined by the FCC.
- The effective radiated power of no participating station will exceed 10 kw. Usually it will not be permitted to exceed five kw.
- The plan provides for four different types of system operation—sequential operation, on-off operation, pulsating operation, and synchronous operation. It also provides for pulsating operation of entire groups or clusters, with individual stations of which are engaged in sequential operation.
- The FCC is permitted to change the mode of operation from time to time.

SEQUENTIAL MODE—In the sequential mode of operation, stations are arranged into groups or clusters of two or more stations. All stations of a particular cluster use the same system frequency, and all have power which is properly adjusted throughout the cluster. Each station of the cluster, one at a time, in a non-cyclical sequence, goes on the air for a "random" period varying from five to 40 seconds. As one station goes off the air and another station goes on, there is no appreciable "lost-air" time or carrier overlap. All stations of a given cluster carry the same program. Listeners in the shelters, tuned to a single previously announced spot on the dial, will hear an uninterrupted program of defense information and morale material. The enemy navigator, meanwhile, finds his direction finding equipment completely snafued.

All-weather flying is a must in any air defense plan. To get interceptor planes off the ground and back again safely, "ground approach control" equipment is available at all defense bases. Here, two Air Force sergeants use the vital instruments to "talk a flyer in" at a New England base.

Program lines and sequential control lines (In some cases, a single line may serve both purposes.) are provided for each cluster station. The specific means for controlling sequential switching—manual, mechanical, electronic, or otherwise—may vary among clusters. The manner of switching for a particular cluster is mutually agreed to by stations of the cluster. Each cluster will, likewise, agree to coordination procedures.

ON-OFF MODE—The on-off mode of operation may be applied to individual stations operating all by themselves or to full clusters operating in the sequential mode. Each station operating individually is assigned one or both of the system frequencies and its power is properly adjusted by the FCC. The on-air time of each such individual station is of the order of 10 seconds, and the intervening time is of the order of 30 minutes. When applied to clusters, this mode will permit the cluster on-air time to be of the order of one to 20 minutes, and the off-air time to be of the order of one to 30 minutes.

PULSATING MODE—The pulsating mode may also be applied to either individual or cluster stations. In either case, the power of the station transmitter is varied over a range of the order of 10 db, at a non-cyclical rate generally of about 10 seconds to 45 seconds. In a given area, such as a single city, if there are several stations operating individually rather than in a cluster, all of these stations should normally carry the same program. In such cases, all of these stations will be provided with program lines from a common source . . . perhaps Civil Defense headquarters.

*Continued on page 15*


An IBEW group inspects KALW cameras at the John A. O'Connell Trade & Technical Institute, San Francisco, Calif. In the group are Russ Pray, president, IBEW, Local 202, KFRC; Jack Dunn, business agent, Local 202; Henry Celli, president, San Francisco Broadcast Unit, Local 202, KLX; Herb Lewis, past president, Local 202, KCBS; Ken Neilsen, instructor, radio-TV operation, member of IBEW.

# Northern California Engineers BONE UP on Television

***IBEW Local 202 gives a helping hand to journeymen broadcast operators enrolled in the first class in 'Television Station Operation.'***

**BY K. L. DRAGOO AND K. M. NIELSEN, Co-instructors, Radio-TV Station Operations**

EIGHTY-FIVE journeymen radio broadcast operators from Northern California form the first class in "*Television Station Operation,*" now being offered by the San Francisco Unified School District's new J. A. O'Connell Trade and Technical Institute. Many of them are members of IBEW Local 202, which is assisting the school.

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*In September, the* TECHNICIAN-ENGINEER *told of how IBEW Local 1259 of Kansas City had worked with a local vocational school to establish a television training course, enabling working radio engineers to prepare themselves for the up and coming new medium.*

*In San Francisco, Local 202 has helped to establish a similar course in TV operations. Two of its instructors tell us of its successful launching.*

In 1951 a careful study was made of the possible technical personnel requirements of the television industry. An Advisory Committee indicated that an acute need for operators would occur in 1952-53 and possibly over a five year period, to man the hundreds of new proposed TV stations. To meet this need, plans were formed, budget set and in the fall of 1952 complete RCA field pickup equipment, as used in all local TV stations, was delivered.

Initial training in studio and field pickup phases of operations was offered to employed radio broadcast operators during October, 1952. Eighty-five men, representing almost every large and small broadcast station in the area have enrolled for a two-hour lecture period per week, plus a three-hour "crew" training session.

At the end of six weeks of classes, interest is on the

increase in the groups, and classes have been wait-listed. This group of government licensed, experienced radio men are expected to form a nucleus of trained TV operators which will be available for employment in the late spring of 1953, when openings should be available for vacation relief men and in new TV construction.

Training programs are set-up as group projects to provide weekly discussions of RCA technical manuals and periodical literature. These classes are repeated in morning and evening sessions to accommodate men who work shift. Men sign up for a three-hour on-the-equipment "crew" training session, and become members of typical eight-man TV field pickup crews. Here each man rotates through audio, boom, camera, floor man, camera control, switcher, lighting and director positions to gain first hand experience in operation on the same equipment he would use if employed by a TV station.

### *Special Advanced Class*

While preliminary emphasis is now placed on this much needed journeyman training, another small group of selected advanced students, all adult, from the Radio Operations Group are given an opportunity to work with TV on a longer and more complete time basis.

For fifteen years San Francisco has been training radio operators for broadcasting and other stations, and has placed more than 400 graduates in this field. The success of the training program is based on the following factors:

- The employment of instructors from the industry.
- The use of KALW, educational station of the San Francisco Board of Education, for training with professional types of equipment. (KALW was the first FM educational station built in the country and is equipped throughout by RCA. See *Broadcast News*, Issue 37, Page 10, "Interesting New School Installation.")
- The interest and encouragement offered the program by school officials.
- The formation and efficient functioning of a special Trade Advisory Committee of labor, employer, employe and educational members.
- The acceptance of trained persons by the industry.

• GATHERED AROUND FOR CLASS DISCUSSION AT THE SAN FRANCISCO VOCATIONAL SCHOOL

Standing: Dale Walfron, principal of O'Connell; Ken Nielsen, instructor of Radio-TV operation; Russ Pray, president of Local 202; Joe Clisham, vocational supervisor; Harry Jacobs, engineer in charge, KGO-TV. Seated: Jack Dunn, business agent, Local 202; Paul Williams, chief supervisor, KPIX-TV; Ken Dragoo, instructor


• RADIO-TELEVISION OPERATIONS ADVISORY COMMITTEE, 1953, JOHN A. O'CONNELL TRADE AND TECHNICAL INSTITUTE, SAN FRANCISCO, CALIF.

Standing: Ken Nielsen, instructor, Radio-TV operation; Paul Williams, chief supervisor, KPIX-TV; Jack Dunn, business agent, Local 202; Harry Jacobs, engineer in charge, KGO-TV; Henry Celli, chairman, San Francisco Broadcast Unit, Local 202, KLX; Dale Walfron, principal—O'Connell; Ken Dragoo, instructor, Radio-TV operation; Herb Lewis, past president, Local 202, KCBS. Kneeling: Russ Pray, president, Local 202, KFRC, and Joe Clisham, vocational supervisor for the West Coast school.

RCA field equipment used in the training program consists of two new RCA TK-31A field cameras with tripods, camera controls, field switcher, sync generator and master monitor. For floor monitors two 21" RCA 21T159 receivers are used. In addition to the 50, 90 and 135 MM lens supplied with TK-31A cameras, two RCA 8½" lens and two 15" Wallensak telephoto lens are available.

An RCA 77-D mike is used for boom operation in conjunction with an RCA BN-2A remote amplifier for field pickup.

### *Projection Equipment*

A film pickup is made, using a TK-31A camera and a long persistence rear projection screen. A 35 MM sound projector, 16 MM sound projector, 35 MM slide projector and a balop unit are multiplexed to frame on the single screen by means of front silvered mirrors.

Lighting equipment includes six 8" fresnel spots and six 18" scoops using 1000 watt lamps. All lighting is mounted on roller stands for field pickup use. The KALW mobile recording truck unit is being rebuilt to accommodate the TV gear for field pickup use.

TV operations are quartered in temporary studio facilities adjoining the KALW FM plant on the fourth floor of the Samuel Gompers Trade School Building. In 1953 it is expected that all radio-TV operations

training will be centered in new quarters, adequate for the program.

Dr. Herbert C. Clish, Superintendent of Schools in San Francisco and Dr. O. D. Adams, Assistant Superintendent, should receive much acclaim for their interest and recommendations in the furtherance of this training program. J. C. Clisham, Vocational Supervisor (and veteran IBEW Local 6 electrician) has been of the greatest assistance.

The two labor bodies under whose jurisdiction men in radio-TV operations in this area work, NABET, C. F. Rothery, President, and the IBEW Local 202, Jack Dunn, Business Agent, have been enthusiastic and active in class organization and acceptance of trained men.

Chief engineers and station supervisors, many of which are former students, have assisted greatly in organization, advice and in hiring trainees.

Howard McGill, of Zack Radio Company (RCA Jobber) and President of the San Francisco TV Academy of Arts and Sciences has been of great help and encouragement as have equipment manufactures representatives such as Dick Newman, San Francisco RCA representative, jobbers and station managements.

## *WGN-IBEW Two-Year Contract*

A two-year contract was signed in November by IBEW Local 1220 and WGN, Inc., in Chicago. The agreement was retroactive to October 1, and it covered salary and fringe benefits for 117 technicians at WGN's AM and TV installations.

Top wage is now $147.50, increased from $137.50, with the minimum starting wage remaining at $80. Terms provide $1 to $2.50 per week more after one year. Workers also are to receive a day off for each holiday, totaling five days or another week which can be added to the regular vacation.

All Technicians are entitled to one day's vacation with pay for each sixteen days worked, or major fraction thereof, during the twelve-month period prior to April 1 of any year, provided that (a) any Technician who works a minimum of 225 straight-time shifts in such period will be entitled to three weeks' vacation; (b) in no case shall any Technician be entitled to more than three weeks' vacation with pay, except that one day may be added to the vacation period for each of five stated holidays; (c) vacation credits shall not be allowed for holidays, vacation days or for work on off-days for which premium rates have been paid.

Probationary Technicians are now entitled to one weeks' notice, five days' written notice is necessary to change days off, overtime will be computed on the basis of half-hour units, the automobile mileage rate is increased to 15 cents per mile for the first 50 miles and is set at 10 cents per mile thereafter. Two men are required on duty at transmitters at all times and transmitter men receive 15 cents per mile for transportation to the Roselle (AM) transmitter.

The company has agreed to furnish all "special clothing" as well as tools and equipment for the operation, installation, repair and maintenance of equipment. An improvement of note in the new agreement is in the jurisdictional provision—various items are clearly set forth—flying spot scanners, kinescope recorders, tape editing operations, etc. Certain fringe items are matters of concern to the WSB; however, the wages are automatically approvable and self-administrable.

Negotiators were Carl J. Meyers. WGN, Inc., chief engineer; Andrew Hamilton, Kirkland, Fleming, Green, Martin & Ellis, *Chicago Tribune* law firm, and Thomas Antrim of the *Tribune*. IBEW was represented by Walter Thompson, president of Local 1220.

## *WMBR-AM-TV to Washington Post*

Late in December, the sale of WMBR-AM-FM-TV, Jacksonville, Fla., to the *Washington Post*, which is already majority owner of WTOP, Inc., in the nation's capital, was big news in the broadcasting industry.

The sale price was $2,470,000. An all-cash transaction, it was the second big sale to be concluded in a fortnight involving more than a million dollars. The other was the acquisition by Crosley Broadcasting Corp. of WLTV (TV) Atlanta, Ga., for $1,500,000.

All of the capital stock of the Florida station was purchased by the *Washington Post*. The transaction had been in negotiation for several weeks. It is entirely divorced from WTOP, Inc. in which CBS holds a 45 per cent interest. TOP engineers are IBEW.

It is presumed that the Jacksonville operations later will become a division of the Washington Post Company.

## *1953 Working Cards*

Unavoidable delays at our printery have held up delivery of our standard working cards; however, as we go to press, we are informed that the cards will be ready for mailing to local unions on January 5. Any local union which has not already done so may order the necessary quantity from the office of the International Secretary. The usual order forms list the cards at $1.50 per hundred.

## *Anniversary Issue*

Just a year ago, the first issue of the TECHNICIAN-ENGINEER was published. As we put Number 1 of Volume 2 to bed, we express our thanks to our many contributors and to our many friends for their cooperation, comments and encouragement. The many hard and long hours of work that go into each issue are made worthwhile by the very kind reception our magazine has enjoyed. And A HAPPY NEW YEAR TO ALL!

# Phonograph needle

# DRAG DISTORTION

**Longitudinal motion, caused by uneven groove widths and friction changes, can play havoc with the fidelity of a recording. How can it be eliminated?**

A RECENT study by Jacob Rabinow and Ernest Codier of the National Bureau of Standards in Washington demonstrates the existence of a type of distortion sometimes arising in phonograph reproducers—ordinary record players—that has apparently not been treated in available literature.

The study, reported in detail in a recent issue of the *Journal of the Acoustics Society of America*, demonstrates that, if a phonograph needle can move longitudinally (tangentially) with respect to the groove of an ordinary laterally recorded disk, the needle will not follow perfectly the lateral excursions of the groove, and "drag distortion" will result. In the playing back of recorded music, this distortion may apparently result in spurious tones of greater amplitude than the tones originally present.

The essential mechanism of drag distortion is not difficult to understand. The usual type of disk phonograph record is recorded laterally—the audio-frequency motion of the recording needle is at right angles to the record groove. For ideal distortion-free reproduction of recorded music or information, the motion of the tip of the playback needle or stylus should exactly duplicate the original lateral motion of the recording stylus. Provided the electrical output of the reproducing pick-up is proportional to the lateral displacement of the reproducing stylus, the electrical output of the pick-up will then be undistorted. But if forces acting on the stylus cause longitudinal motion, its lateral motion will no longer exactly duplicate the motion of the recording stylus, which means that distortion will be introduced.

### *Many Causes Suggested*

Many possible causes for such longitudinal motion can be suggested. One is the well-known "pinch" effect due to the uneven width of the record groove. Another is the varying force which the sides of the record groove exert against the stylus. A third is the change in friction with changes in the pressure and velocity of the stylus in the groove.

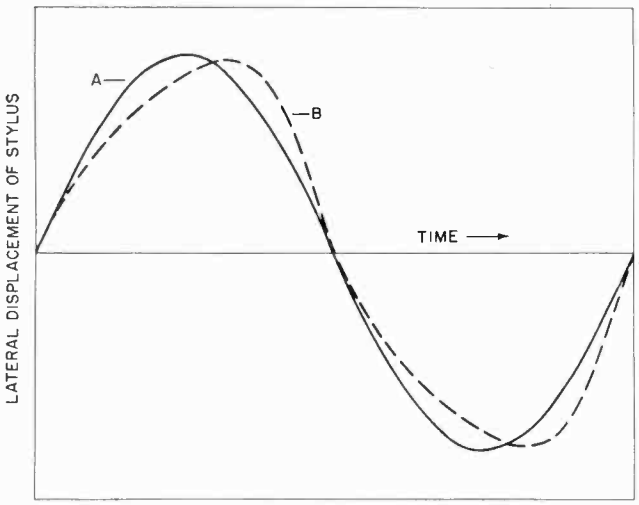
The NBS study included both mathematical analysis and laboratory experimentation. The mathematical treatment indicates that if the recording consists of a pure tone of constant amplitude, drag distortion will introduce only even harmonics, with the second harmonic predominating. A sudden transition from one amplitude to another will produce a large change in the longitudinal force on the stylus, and this may be expected to give rise to transient distortion if the needle is not properly restrained longitudinally.

### *Regular Pick-up Used*

In the experimental work. a conventional crystal pick-up with a replaceable steel needle was used. For some of the tests a thin steel wire was spot-welded to the needle near the tip; by tying back the needle tip with this wire, longitudinal motion could be minimized. A dual-beam oscilloscope was used to indicate simultaneously both the output of the pick-up and the longitudinal displacement of the needle tip.

Two methods of measuring the longitudinal motion

● Pickup, tone arm, and turntable used for experimental study of phonograph-needle drag distortion. Longitudinal motion of the needle was measured by means of a frequency-modulated oscillator mounted on the tone arm; longitudinal motion of the needle modulated the oscillator, but lateral motion did not.




A - IDEAL STYLUS, FREE TO MOVE LATERALLY ONLY
B - STYLUS FREE TO MOVE LONGITUDINALLY AS WELL AS LATERALLY

• Graphical representation of the phonograph-needle "drag distortion." Solid line: lateral displacement of an ideal stylus, free to move laterally but not longitudinally, as it follows a lateral sine-wave recording. Dotted line: same recording, but stylus free to move longitudinally as well as laterally; because of this longitudinal freedom the lateral displacement (and hence the output of the pickup) is distorted, instead of duplicating the original sine wave.

of the needle were tried. The first consisted of a photoelectric arrangement in which longitudinal motion of the needle modulated a beam of light. In the second and more satisfactory method, longitudinal motion of the needle frequency-modulated a 50-megacycle oscillator. Two small metal plates were mounted near the steel needle in such a way that the capacity between the plates varied with longitudinal motion of the needle but not with lateral motion. The plates were connected across the tank coil of the oscillator, and the resulting FM signal was picked up on a standard FM receiver a few feet away. With proper tuning, the instantaneous output of the receiver varied with the instantaneous longitudinal position of the needle tip.

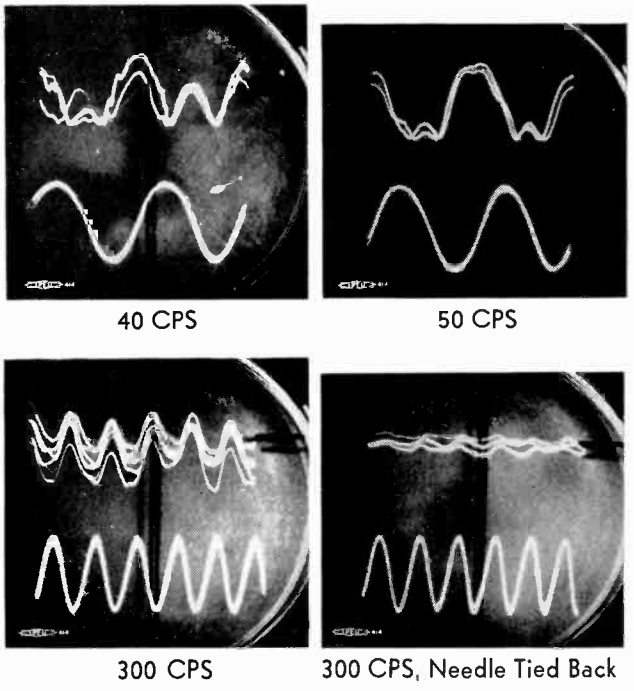
### *Magnitude Determined*

Various test records were reproduced with this experimental equipment. Tests were made with recordings of pure tones ranging from 20 to 10,000 cycles per second, of two different tones recorded simultaneously, and of music. The unrestrained needle significant longitudinal motion, substantially verifying the original hypothesis. With the equipment available, it was not possible to measure electrically the amount of distortion caused by this motion, because of the simultaneous presence of other forms of distortion. It was possible, however, to determine the magnitude of the longitudinal motion, and by computation to arrive at the character and amount of distortion attributable to this longitudinal motion.

Although the effects of drag distortion can apparently be serious with some pick-ups, the NBS investigators point out that the styluses of the better modern pick-ups have high longitudinal stiffness; with such pick-ups, drag distortion is probably negligible.

The scope of both the mathematical analysis and the laboratory work was necessarily limited; however, the NBS work may serve as the basis for more rigorous investigation elsewhere. Although no tests were made on hill-and-dale (vertical) records and pick-ups, the same general considerations should apply as with lateral recordings and reproducers. It appears probable also that a form of drag distortion may arise in the recording operation if the recording stylus is not sufficiently rigid.

The NBS investigation of phonograph-needle drag distortion was a by-product of the Bureau's military research program. Telemetered information from experimental weapons is frequently recorded on disks in the NBS ordnance development laboratories, and the distortions introduced in the recording and reproducing processes are sufficiently serious at times to cast doubt on the significance of indicated measurements. Analysis of possible sources of error in these recorded measurements led to the study of distortion introduced by phonograph-needle drag.




• Cathode-ray oscillograms, made with a dual-beam oscilloscope, showing longitudinal motion of needle (top trace in each of the two pictures) and pickup output voltage (bottom traces). Upper picture: 300-cps sine-wave recording, reproducing needle unrestrained. Lower picture: same recording, reproducing needle restrained longitudinally. Note great reduction of longitudinal motion. Because of the presence of other simultaneous distortion, it was not possible with available equipment to measure electrically the amount of distortion resulting from longitudinal motion. It was possible, however, to compute the amount of this distortion from the measured longitudinal motion of the tip.

# TECHNICAL NOTES

## A Practical Idea for a Switchless Intercomm

BY DAVE RUSSELL

*Reprinted from IBEW Local 349, Unit 3's "Radio Broadcast Television Sound News."*

INTERCOMMS seem the most useful product of the audio industry despite the fact that almost every engineer or technician who has ever worked with them has felt, at one time or another, that their usefulness was slighted because of the usual system of press to talk, release to listen. This is without a doubt a great handicap to many busy users.

A number of ideas have come out of the minds of workers in this field for elimination of the switch. Most of these ideas were impractical for reasons of expense or delicate adjustment. A most practical idea from W. A. Plice has recently been patented. It involves the addition of an amplifier stage and a second output transformer to each master station.

Mr. Plice's idea may be applied to any kind of system involving master to master or master to remote or both and looks extremely inviting for the future. This writer will attempt to give the reader a mental picture of the added stage and its function.

### *Procedure Explained*

Suppose Station One pushed up Station Two and made the initial call. Station One's voice would follow its usual course to the amplifier of Station Two and through it to the output transformer. Here we find the speaker removed from the secondary and the low side tied to B plus. The high side of the old output secondary goes to two places. First it travels through a large size blocking condenser to the signal grid of a 6F6 or similar tube. The screen of this tube is tied to a second output transformer which gets the voice from Station One to Station Two's speaker. The second route of the high side of our old output transformer goes to a variable resistor which in turn is tied to the plate of our new output. This plate will be tied into the input of the amplifier of Station One when Station Two goes to answer it through a blocking condenser. Aha! Why no feedback path? Well, with the above mentioned variable resistor in the plate circuit, the grid to plate amplification of the 6F6 is adjusted so that the apparent voltage back to Station One's amplifier is close to Zero.

Now when Station Two answers Station One the screen grid of the 6F6 becomes the input grid of the tube and varies plate current with modulation from the speaker. This forms the output circuit of the system and we have a switchless intercomm.

Should anyone be trying this idea, the inventor states the required resistance for the variable resistor is found by the tube's plate resistance divided by the tube's grid to plate tranconductance. One word of caution: the old output's secondary must be able to handle the plate current of the 6F6 or equivalent.

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### *RCA's First UHF Transmitters*

Four ultra-high-frequency television transmitters—the first to come from commercial production assembly at the RCA Victor plant at Camden, N. J.,—were shipped in December to holders of high-priority orders. Additional UHF transmitter equipment is in production, the company stated, and units will be shipped against existing orders as soon as production and testing can be completed.

The transmitters, new 1-kilowatt models capable of providing up to 27-kw effective radiated power in the 470-890 megacycle frequencies, are the first commercial equipments to be delivered for telecasting in the new channels 14 to 83. They went to . . .

Station WSBA-TV (channel 43) York, Pa., owned by the Susquehanna Broadcasting Company;

Station WBRE-TV (channel 28), Wilkes-Barre, Pa., owned by Louis G. Baltimore;

Station WFPG-TV (channel 46), Atlantic City, N. J., owned by the Neptune Broadcasting Corporation;

Station WSBT-TV (channel 34), South Bend, Ind., owned by the *South Bend Tribune.*

The new equipment, which is expected to inaugurate UHF service in the East, is the result of extensive development by the Radio Corporation of America. Development work on the new 1-kw transmitters was begun in 1949, shortly after the shipment of a laboratory model UHF transmitter to the company's experimental station near Bridgeport, Conn.

Commercial production of transmitting equipment for the new UHF channels presented a major challenge to equipment manufacturers, according to T. A. Smith, assistant manager of the RCA Engineering Products Department.

"Equipment designed for VHF television cannot be used for the UHF channels," he said. "This meant not only complete design, development, and production of commercial UHF transmitters; it also meant starting from scratch on production of new types of antennas, transmission lines, filter and diplexing equipment, and other requirements for the new ultra-high-frequency service."

The commercial transmitter, Type TTU-1B, differs in several important respects from the laboratory design, used at Bridgeport. It has a completely new tube complement and uses only one output tube, developed especially for this model by the RCA Tube Department at Lancaster. This is the new Type 6181 air-cooled tetrode. The new transmitter also employs a newly developed crystal oscillator unit which has a stability more than five times greater than that of the one used in the laboratory model. A new-type stacked Class B video modulator with negative feed-back is also incorporated in the present model. This unit uses a small, newly developed RCA 6146 beam tube.

The entire equipment is housed in three aluminum cabinets which have been designed for maximum accessibility of circuits and components. The equipment makes use of the same type of UHF pylon antenna as that designed for the Bridgeport experimental station. The antenna is of the slot-type and provides high gain, with powers ranging from 21 to 27 in the various channels. Especially designed new feed systems and transmission line are incorporated in the new transmitters.

Another important feature of the TTU-1B transmitter is its use of a newly developed filterplexer. This unit is a combination of the side-band filter and the notch diplexer used on the experimental transmitter to combine the outputs of both the picture and sound portions of the transmitter and feed them into a single transmission line.

I just got off a rotating TV antenna.

### *Tubes "Could Not Be Made"*

Electron power tubes that some engineers said could not be made are today helping telecasters, radio broadcasters, and industrial users of a wide range of electronic equipment to sharply reduce operating costs and make more efficient use of such equipment.

The "tubes that couldn't be made" are high-power vacuum types which use filaments of thoriated tungsten instead of conventional pure tungsten, explained L. S. Thees, general sales manager of the Tube Department of RCA Victor.

These high-power thoriated-tungsten tubes, which have been commercially available only since 1947, are establishing new life records and pointing the way to further simplification of equipment and associated accessories.

Mr. Thees cited as examples of longevity an RCA-5671 type high-power broadcasting tube which is still in service after more than 30,000 hours.

In addition, these thoriated-tungsten tubes require 60 to 70 per cent less filament power than conventional types, have a 10-to-15-times greater electron-emission efficiency, and operate at a temperature lower by 500 to 600 degrees C.

Because these advantages sharply reduce the heat stress on glass and metal parts, thoriated-tungsten-filament tubes can use simplified transformers and associated power equipment, require less-complicated tube-cooling equipment, and make possible a general simplification of over-all mechanical problems, he said.

### *Gadget to Check Show Ratings*

Neilsen may soon be able to find out what radio station your set is tuned to without calling you on the telephone. It has bought the patent rights to a gadget which picks oscillator signals and translates them into dial settings.

The A. C. Nielsen Co., Chicago, is one of the concerns which provides ratings of radio and television programs to sponsors and advertising agencies. It has been assigned the patent rights to Patent No. 2,618,743, an invention developed by Serge A. Scherbatskoy of Tulsa, Okla.

The principle of the invention is this:

All superheterodyne receiving sets have local oscillators, which puts out a signal the frequency of which changes as the set is tuned to different stations. This signal must be effectively shielded so that it does not interfere with other radio sets in the area.

The new gadget draws off a very small part of the

## Conelrad

*Continued from page 7*

SYNCHRONOUS MODE—In the synchronous mode, two or more stations in a given area are on the air at the same time. They are all assigned the same system frequency, or frequencies, by the FCC, and their power is adjusted so that so none of the stations will stand out individually from the group. A single station may be operated synchronously with a cluster of stations, in which case it is provided with a program line from the cluster.

During periods of broadcasting, when not beaming civil defense programs or alert messages, CONELRAD stations will be able to use music, news, and such other program material as they desire.

During recent months, there have been test runs of CONELRAD in the after-midnight hours. Air Force bombers have set out to "blast" certain targets, using radio direction equipment. In typical non-commital language, the tests were called "satisfactory." But there seems to be a satisfied note to these reports.

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local oscillator's signal and translates it into a signal which modulates at ultra-high frequencies. This signal is strong enough to be picked up at a central station several miles away.

The device has only one or two tubes and is small enough to fit into the back of a typical radio cabinet. At the central station a receiver and a recording device are provided. Because the signal has been transferred into UHF, the inventor says that it will be possible to receive permission from the FCC for its use.

Then all Nielsen has to combat is the average radio listener's and TV viewer's suspicion of a translating gadget in the rear of his receiver.

### *Sharper Television Pictures*

Dr. Ernest O. Lawrence, Nobel prize winner, has received a patent on an invention which promises to produce sharper television pictures.

In his patent, Dr. Lawrence, who is director of the radiation laboratory at the University of California, says that the present scanning method in TV receivers tends to blur the line between light and dark areas in a picture. Dr. Lawrence would modify the deflection of the scanning beam in the direction in which the lines are scanned in proportion to the rate of change of illumination from point to point along the picture line. The deflection of the scanning beam would increase when the illumination is increasing and decrease when the illumination is decreasing.

With this method, the inventor says that substantially full theoretical resolution of a television receiver may be sensibly obtained, and blurring of the edges of television images is reduced to a negligible minimum.

### One Moment Please

On December 1, A. Rat, of Valley Brook Avenue, Lyndhurst, N. J., was taken into police custody after he created a disturbance in the Station WINS radio transmitter, which is located in the meadows near his home.

Mr. Rat, who apparently hates all-night radio shows, stormed into the studio about 5:30 a. m. and bit the astonished engineer, Paul Canter of Fort Lee, on the right hand. Canter, press secretary for the IBEW Local 1212 News, beat a hasty retreat.

Rat was captured by Patrolman Charles Groenveld and William Jarvis. They said that if any of his relatives start more trouble they'll retaliate with their ace dectective, Thomas Cat.

—From the *Passaic Herald-News*.

### *45 rpm Recording Disc*

Reeves Soundcraft Corporation of New York City announces a "first" in the sound industry—the Soundcraft 45 rpm Recording Disc. The new disc fills a need for such a product created by wide public acceptance of the RCA 45 rpm record player.

No special equipment is needed for the new platter. It fits a conventional spindle. A center circle can be punched easily after recording so that the record will fit a 45 spindle.

Reeves has just begun direct-mail promotion of the records. The new product is expected to have its greatest sales among recording hobbyists and commercial recording houses.

# Station Breaks

### *Agreement Reached at WSB*

WSB-AM-FM-TV, Atlanta, Ga., and IBEW reached agreement effective on December 1, covering the technical employes at the station generally considered to be one of the South's most important broadcasting operations.

The agreement establishes a five-year escalator which offers a starting wage of $75 per week and progresses to $125 at the end of five years of service. Time and one-half on six holidays and other standard provisions are included in this, the first agreement under which the technical employes have ever operated.

A provision, worthy of note, which has been agreed to is that pertaining to safety precautions:

"*Section 19.* SAFETY PRECAUTIONS — TOOLS AND EQUIPMENT. For reasons of safety, no technician will be permitted to do any work on repairs, remodeling or maintenance of a hazardous nature, or to do any work which requires him to be inside an interlocked enclosure, unless, in any such case, another technician or another qualified WSB engineering employe is present.

"The Company shall furnish all tools and equipment necessary for the installation, repair and maintenance of equipment. No technician at any time shall use the Company's tools, equipment, or property for personal purposes."

WSB is owned and operated by the Atlanta Newspapers, Inc., the Atlanta *Journal* and the Atlanta *Constitution*. The Company was represented in the negotiations just concluded by John M. Outler, Jr., General Manager of WSB-AM-FM-TV. We salute the management and the men and extend a warm welcome to the new IBEW members in Atlanta. The employes affected are expected to add considerable prestige and good fellowship to the membership of Local Union 1193.

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### *Items from Local 1212*

At the risk of being accused of plagiarism, we call attention to the following items of interest which appeared in the November-December *1212 News:*

*WNEW Signs for $160*—Negotiations with WNEW have just been concluded and the contract provides for the highest wage in the broadcast industry.

The highlights are a reduced escalator to four years with the top wage at $160 for staff men and $180 for supervisors, also providing up to four years of industrial seniority. Included in this pacemaker are eight holidays which are at double time and one-half, the usual vacations, overtime pay in minimum units of one hour, a second paid meal period when the work day is 10 or more hours plus $2 meal money, auto mileage increased to 15 cents, improved relief periods, and a new grievance procedure that will eliminate many petty annoyances to both management and the men.

Again we take pride in pointing to our drive to either eliminate the escalators (as at WVNJ and WHOM) or to reduce them. Each contract negotiation has been devoted to this problem. We are nearing the goal—no more escalators and equal pay for equal work.

*Night Watch*—Here's a switch! New York's Victoria theatre is presenting as a feature film, CBS-TV's "See It Now" program of June 29 titled "One Plane, One Bomb, One City."

*Peaking Zero*—WPAT, Paterson, N. J. contract was signed last week with an increase of $7.50 across the board from September 21 last and an additional $5 next September 21, for a two year deal. Five additional holidays were added which may be turned into a fourth week of vacation by five-year men. Mileage improvement and other minor fringe changes were added.

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### *WHUM, WHUM-TV, Reading, Pa.*

Following a short and action-packed strike at WHUM and WHUM-TV, Local Union 1173 has secured an agreement with the management and a happy Christmas holiday was enjoyed by all concerned. Wages and working conditions in a standard pattern agreement were negotiated by Representative Russell D. Lighty.

WHUM-TV is not yet on the air and we are promised data for a magazine article of interest as soon as the construction and testing of the UHF set-up is completed. There are many new and intricate problems being worked out, not the least of which is that posed by the wave guide being run up the 1000-foot tower. This is a General Electric installation and the first G.E. UHF project.