BROADCAST NEWS

IN THIS ISSUE

RCA Victor Company, Inc., Camden, N.J.

RCA Victor Company, Inc.

A Radio Corporation of America Subsidiary

Camden, N. J.

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BROADCAST TRANSMITTERS **POWER RADIOTRONS**

POLICE TRANSMITTERS **POLICE RECEIVERS**

SPECIAL COMMUNICATION EQUIPMENT

BROADCAST NEWS

Edited by
E. JAY QUINBY

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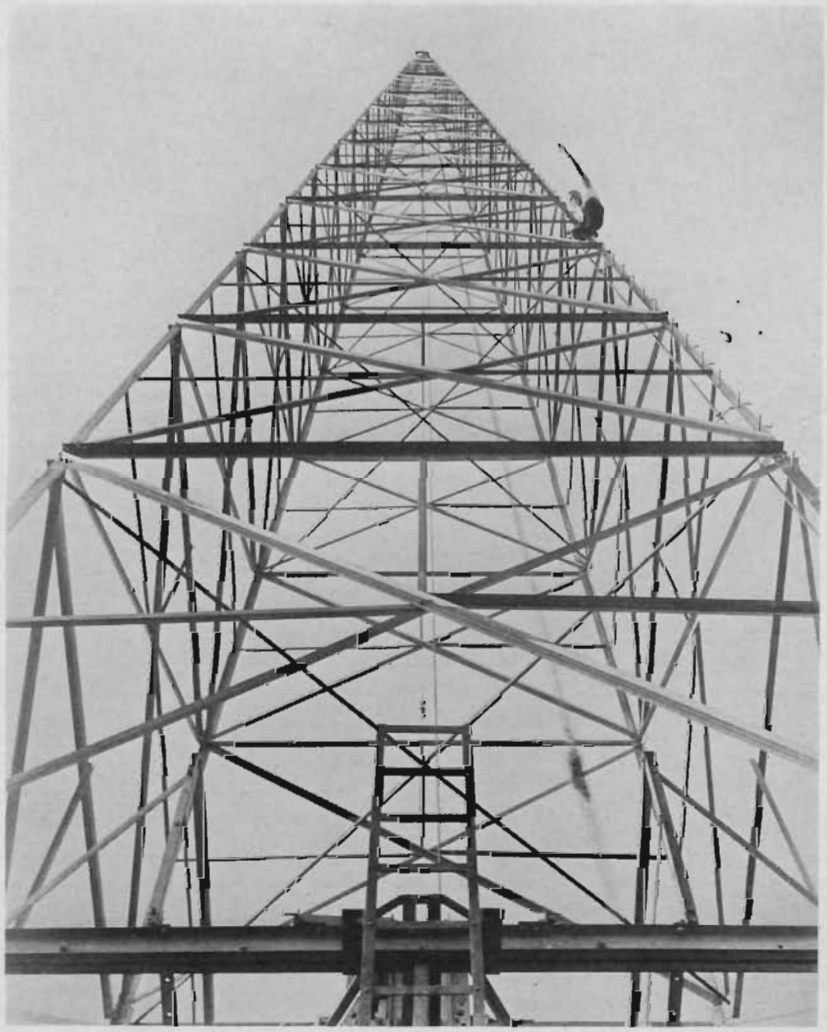

A WORM'S EYE VIEW

ONE OF THE 200 FOOT TOWERS AT STATION WEEU, AS IT APPEARS FROM THE GROUND, CLOSE TO THE BASE. (SEE "A NEW STATION FOR READING, PA." IN THIS ISSUE).

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CAMDEN, N. J., U. S. A.

Maintenance Means Money

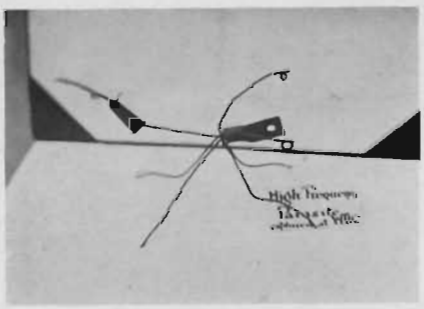
By J. C. RANDALL

Plant Manager WTIC, Hartford, Conn.

THE manner in which maintenance is applied determines in what direction the money in your organization is flowing. Proper maintenance not only keeps the cost of repairs to major elements and replacement of expendable parts to a minimum, but assures more consistent operation resulting in your program department, eliminating refunds to program sponsors for "off-the-air" periods due to transmitter breakdowns.

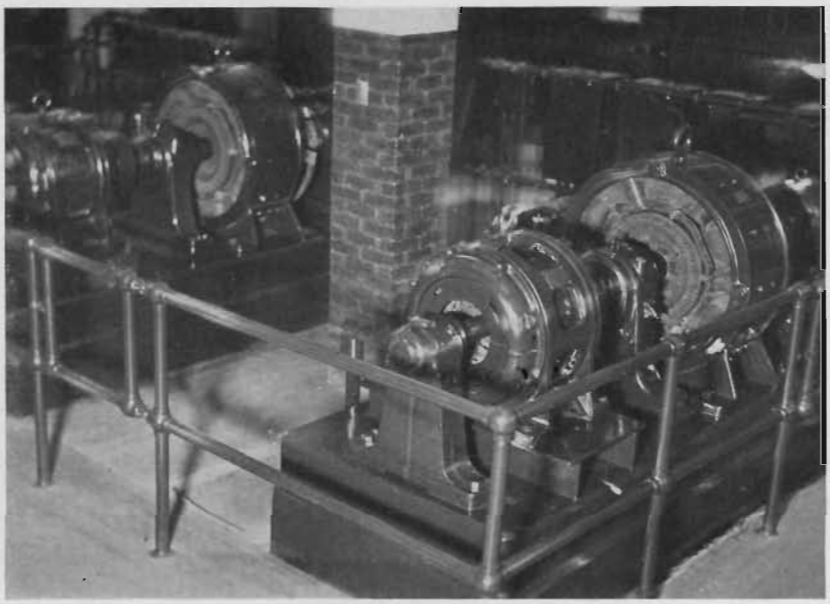
The first step in the establishment of good maintenance is the selection of the crew. They should be men well acquainted with the transmitter, possess an abundance of common sense coupled with the ability to use it. They should be firmly impressed with their responsibility and should never be referred to as the "Black Gang". Your transmitting personnel can only operate the equipment to a point determined by the effectiveness of your maintenance.

In the arrangement of maintenance programs it is necessary to allocate the units to certain schedules such as daily, weekly, semi-monthly and monthly in accordance with the characteristics of various pieces of apparatus. The daily schedule includes the record pertaining to the equipment under loaded conditions such as temperatures and levels of oil in all transformers and reactors, oil levels



HIGH FREQUENCY PARASITE
CAPTURED AT STATION WTIC

of rotating machinery, temperature of bearings, shaft couplings, pump packings, commutators and brush conditions. This record is kept by the regular operating staff in a space provided for it on the reverse side of the daily log sheet. In the daily observance of the operation of the transmitter verbal instructions referring to possible troubles or suspicions are avoided by printed forms of "Maintenance Attention" containing sufficient information to enable the maintenance crew to understand the difficulties encountered.



FILAMENT MOTOR GENERATORS, WTIC

It has been found most practical in the performance of the daily maintenance schedule to divide the transmitter and power sections into groups in order that one section may be completely covered each day for loose connections and various possibilities of trouble. The unit is thoroughly cleaned at this time by means of a vacuum cleaning device and soft cotton cloth; in the partially concealed portions the dirt may be removed with soft bristled brushes. It is very necessary that the building be kept exceptionally free of dust and dirt on the floor and walls for it will be impossible to keep the transmitter equipment clean if the building itself is neglected.

The weekly schedule of maintenance should cover in exacting detail every piece of motor equipment, including shaft alignment and drift. It is especially important to check the drift on motor generators newly installed on account of the base settlement. Batteries are inspected for specific gravity, voltage and water level. Each relay and contactor is carefully checked, as well as the water and door interlocks, thermometers, resistors, water hose and clamps. Samples of distilled water in the cooling system should be removed each week in order to determine the degree of contamination.

The semi-monthly schedule should include a complete examination of every tube in the spare stock for emission, an inventory check on such tubes to determine if the record cards are in agreement; also a check of the spare fuses of various types.

The monthly schedule includes the changing of oil in the automatic starters and oil switches, also the removal of vial samples of transil-oil from various transformers and reactors. The samples are then submitted for breakdown tests. The water system must be inspected and if necessary, the distilled water

reservoir drained. Then the system is flushed and refilled. A complete inspection of all elements contained in the antenna system and transmission line is made. For examination and tests on water, oil and vacuum tubes this company has provided laboratory equipment. For the water system the contamination degree and contents involved can be determined. For oil test the sample is subjected to breakdown test in equipment possible of delivering 70,000 volts to the electrodes in the oil test container. As for vacuum tubes of the water-cooled type, when they show irregularities in their test or operation they are removed and the internal structure examined by means of an X-ray machine. While this testing equipment represents a considerable expenditure it has proved the ability to pay for itself in predictions of approaching trouble which in all probability would result in a lengthy transmitter shut down.

The subject of maintenance is difficult to cover in this short item when installations of various powers differ in their construction; the high spots, however, are adaptable to practically all RCA transmitters and power equipment which will deliver exceptional and consistent performance under proper maintenance. In two years and five months of transmission at WTIC the operating staff bends down with humble thanks to the maintenance shift which has faithfully performed its duties and made possible our standing in the field of broadcasting stations. If Flo Ziegfeld were a radio man he would say "Glorify the maintenance man." Do that little thing, assist them in their problems by systematizing their work on scheduled routine and your company will profit, your own organization will enjoy confidence and above all, you will know that you are doing a good job.

STATION WTIC, HARTFORD, CONN.

J. C. RANDALL, PLANT ENGINEER, CONDUCTING MEMBERS OF THE CONNECTICUT SECTION A.I.E.E. THROUGH THE STATION ON TALCOTT MOUNTAIN. WTIC HAS BEEN HEARD IN AUSTRALIA

CHIEF OPERATOR MILTON W. MIX

IN THE TRANSMISSION CONTROL ROOM OF WTIC

An Unusual Broadcast

Radio's ability to conquer not only time and space, but also adverse weather conditions, was manifested in a unique broadcast by NBC Wednesday night, December 30, when radio listeners heard Lloyd E. Yoder, in San Francisco, interview Howard Jones of U. S. C., and Bernie Bierman of Tulane, in Los Angeles.

Yoder, the manager of the Press Relations department of NBC's Pacific Division, and former All-America star, was scheduled to interview the coaches before the NBC microphone in Station KFI. He was obliged to be in San Francisco Tuesday night to direct the Shrine football rally in the Tivoli theater that night, and expected to fly to Los Angeles to meet Bierman and Jones there the next night.

Storms which swept the entire Pacific Coast Tuesday and Wednesday made it impossible to obtain airplane transportation. It was too late to go by train, but the NBC Press Relations chief kept his interview date just the same. From NBC station KGO in San Francisco, he talked to the two coaches in KFI, and questions and answers were tossed back and forth through the ether with an ease which made it hard for the audience listening, to realize the interviewer was in one city and the two coaches in another.

The unusual microphone conversation was presented during the Team Mates program.

Broadcasting in Europe

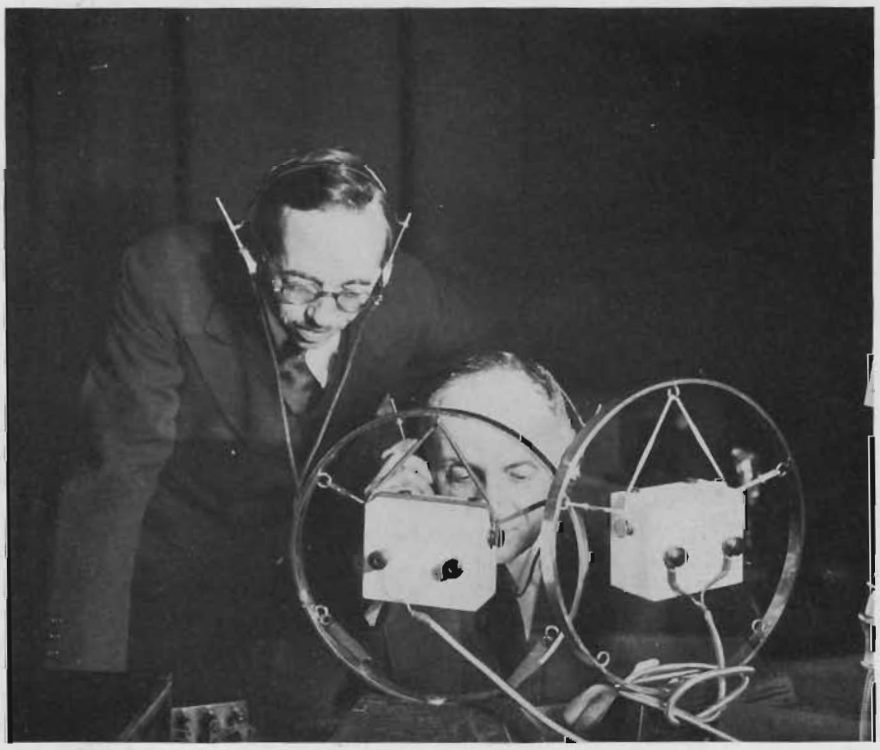
Impressions of Mr. O. B. Hanson, Manager of Plant, Operation, and Engineering Department, National Broadcasting Company, as revealed in an interview by C. L. Beach.

Mr. Hanson has just returned from Europe where he made a study of broadcasting conditions in general, with special attention to studio construction, sound proofing, methods of pickup, etc.

Receiving Conditions in England

With regard to broadcast reception in the British Isles, no direct comparison can be made to conditions existing in United States and Canada. In the first place, broadcast transmission is on the basis of the transmitters having a 9 KC separation. Due to the proximity of stations in France, Germany, Holland, Belgium, carrier heterodyne is as bad or worse than the conditions existing in the United States. Considerable side band scrambling is also encountered.

There is a tendency on the part of the manufacturers of broadcast receivers to provide the public with receivers having high fidelity characteristics. Most receivers have only two or three tubes and at the most, one stage of radio frequency amplification. It is interesting to note that the consensus of opinion in England is that the American built receivers are too selective and cut side bands and therefore do not provide high quality reception. This opinion, no doubt, arises from the fact that the American listeners must depend on long distance reception for their programs, whereas in England, receivers are required only for local reception. The use of high sensitivity receivers in England would result in excessive interference from broadcasting stations located on the Continent.



S. F. ROTHAFEL ("Roxy"), seated, and **O. B. HANSON,** standing, before a pair of German Microphones, on a short wave test from Europe.

Transmitters and Programs

Throughout Europe there are Broadcasting Stations known as "National Stations" of high power, operating on a band in the region of 1500 meters. Some trouble is experienced from heterodyne in this band but it is not nearly as bad as in the regular broadcast band of 1500 to 545 KC. The English transmitter management really provides a dual service. Local programs are available from stations operating in the usual high frequency broadcast band, as well as from the high powered National Stations which give a greater coverage on the low frequency channel. The system is flexible in that local stations can be tied to a common program having a nation-wide interest, thus providing a complete national network.

With regard to programs, it is rather difficult to compare the type of programs used in England with those in the United States, due to the differences in viewpoint and tastes of the broadcast listeners in the British Isles. English programs are mentioned here rather than another country, due to the fact that the programs are rendered in English. As a rule, program material of national interest, such as large symphony concerts and national events, are transmitted on the low frequency channels. Short wave international program hook-ups with National Broadcasting Company in the United States are usually on these national outlets. In England, the quality of program material is high-grade and to the American viewpoint, the outstanding feature is that no sponsored programs are acceptable as the English Stations are operated by a Company under close government control. The operating expenses of the stations are offset by a tax on each receiver.

In Germany, a very limited amount of sponsored programs is used from time to time. The majority of the German programs, however, are not sponsored but are supported in a manner similar to the English tax system.

In Russia, practically all the pro-

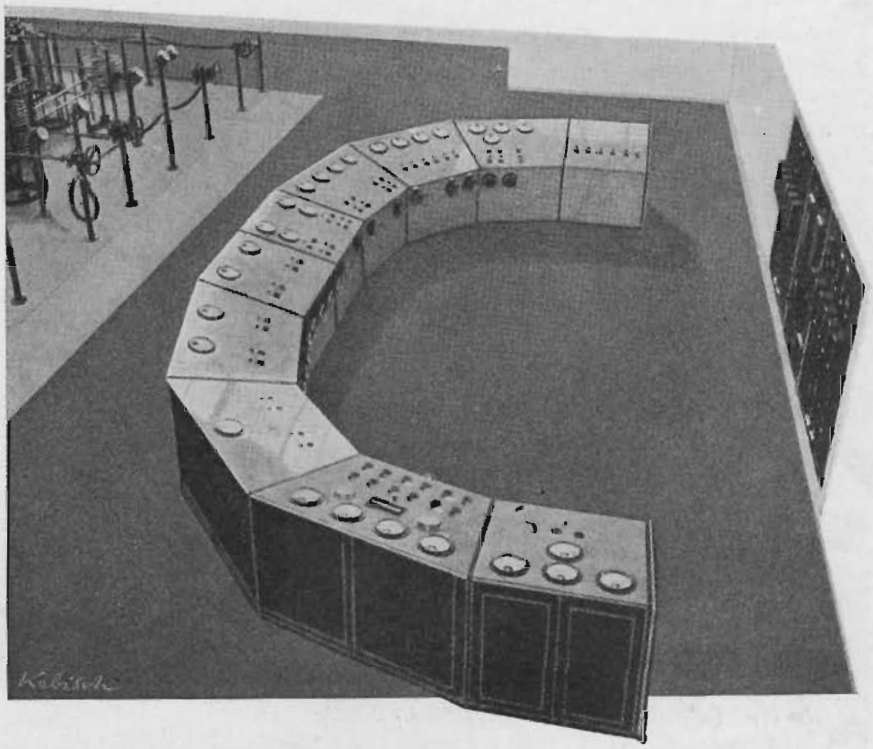
gram material is of an educational nature; even the musical programs in Russia have this general trend. The reason for this can be readily appreciated when we stop and consider that the bulk of the Russian population cannot read or write, and as all of the Russian Stations are owned and operated by the Soviet Government, they provide the type of program, the structure and character of which is based on the idea of education. In this respect, radio is playing an important part in the building up of the Soviet States.

Several high powered broadcasting stations are in use in the various countries of Europe. England has several stations operating on 50 KW; in Germany, the main high powered station at Muhlacker is rated at 75 KW; in Russia, one station in Warsaw can operate at 160 KW—another at Moscow at 75 KW and one in Leningrad at 100 KW.

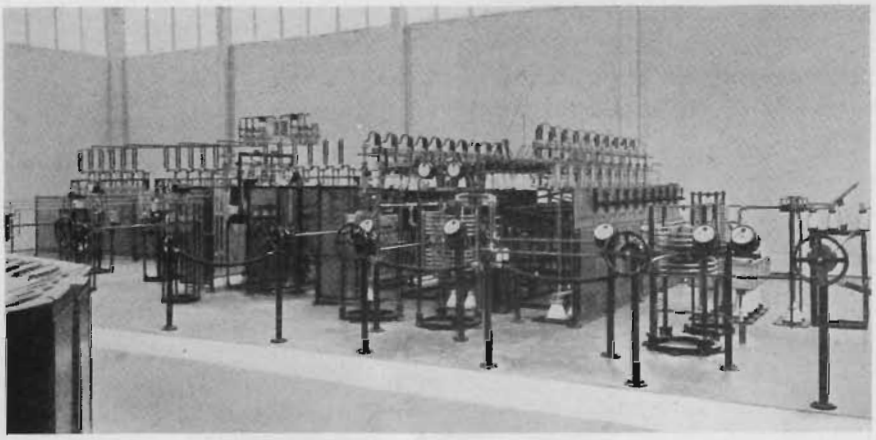
In Germany and Russia, most of the transmitting stations use Dr. Shaeffer's method of grid modulation. This method of modulation, of course, limits somewhat the modulation percentage at which transmitters can be operated.

are practically all of the well-known RCA Victor 4-A type.

In England, the British Broadcasting Company are just completing a large new studio building and we were much interested in the methods



CONTROL DESK of the German Broadcast Station. It is arranged much like the console of a modern theatre organ.



GERMAN BROADCAST TRANSMITTER EQUIPMENT

Studios

It was noticed that very few condenser microphones are in use in Europe as the origin of most programs come through the medium of the Reis carbon type of microphone. However, in Russia, condenser microphones are very common and it is interesting to note that the condenser microphones used in Russia

of construction used to obtain sound proofing. Unlike the National Broadcasting Company in the United States, the British Broadcasting Company does not use a floating wall type of construction which has been found so necessary in American steel framework buildings.

As the building which houses the British Broadcasting Company

studios is a low structure, they have avoided the use of steel where the studios are concerned and have built a brick structure within the steel structure, some of the walls being six feet in thickness. The office part of the building is of the familiar steel construction. As it is known that the steel work of buildings readily transmits sound, they prefer to leave the steel out of the studio section to eliminate this source of trouble rather than use the floating type of studio. The British method of using brick is not applicable to such projects as Radio City, as the walls would be much too heavy due to the height of the structure. Experience has proven to the National Broadcasting Company that the floating type of wall is satisfactory and this method will be used.

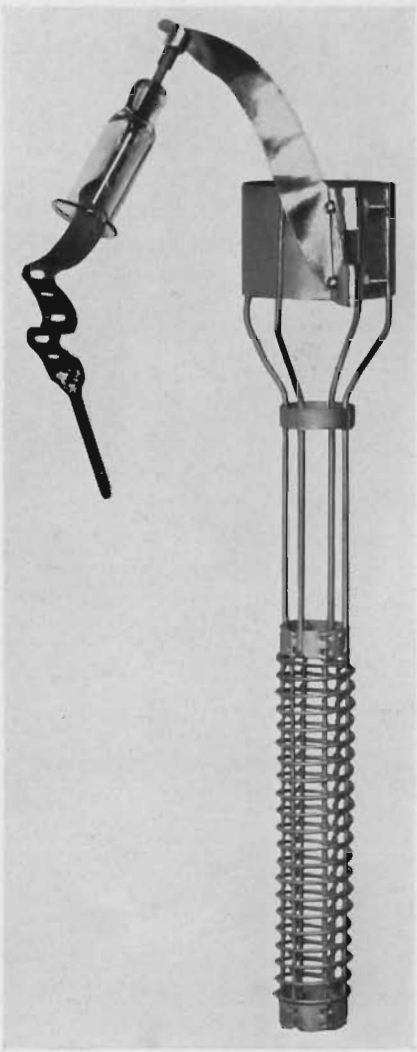
Materials available in Europe for acoustic treatments of studios are limited. Many of the familiar products available in the United States are entirely unknown in Europe. It appears that acoustic treatments in America, especially in connection with broadcast studios, have been developed beyond those to be found in Europe at present.

Transmitting Radiotrons

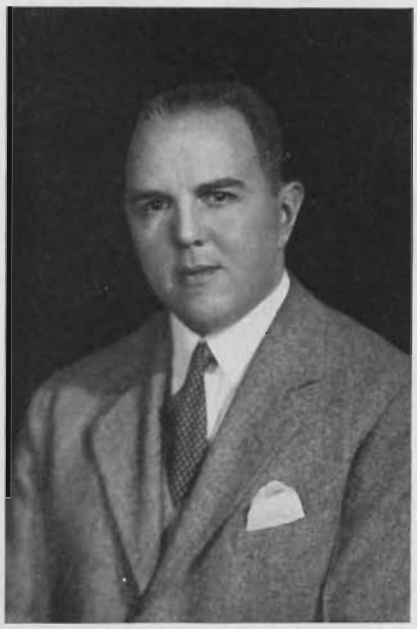
By A. H. CASTOR

Transmitting Radiotron Sales, RCA Victor Co., Inc.

IT is axiomatic that good tubes are essential to the successful performance of a Broadcast Transmitter. Freedom from interruptions in service, and economy of operation depend to a large measure on the use of tubes of uniformly high quality. A brief account of the materials entering into the construction of Transmitting Radiotrons and the methods of safeguarding quality by shelf-aging and pre-shipment tests is presented here. A few generally known (but unfortunately not always observed) suggestions regarding operating technique are included, together with notes on our Service Policy.



GRID OF RADIOTRON UV-207



1. Materials Used

(a) *Metals*

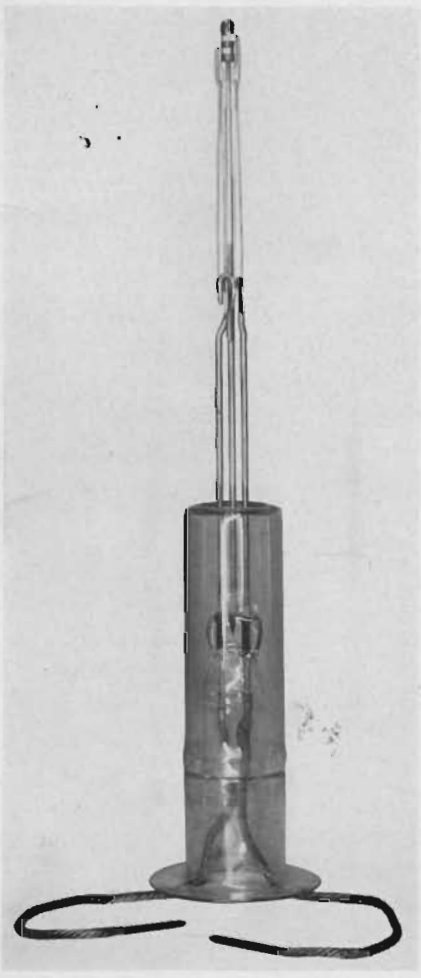
Since many parts in transmitting tubes must of necessity operate at elevated temperatures, it is necessary to choose metals for these parts which have high melting points, retain their mechanical rigidity at high temperatures and which do not anneal readily.

Tungsten, molybdenum and tantalum are three metals which possess these properties to a high degree. Tungsten is universally used for filaments; molybdenum is used for anodes, grids and supports; while tantalum finds limited application for making grids. Tungsten is frequently used for grids in the case of water-cooled tubes.

Parts which do not operate at high temperatures are made of nickel or a suitable alloy. Pure electrolytic copper is used exclusively in the anodes of water-cooled tubes and aluminum is used in the base shells of some of the smaller air-cooled tubes.

(b) *Insulators*

Insulators to be suitable for use in Transmitting Radiotrons must have high dielectric strength, low RF loss and be free from occluded gases. Special heat resisting glass is used for the envelopes. The materials are so blended that the glass will have the same coefficient of expansion as tungsten which makes possible a perfectly air tight leadin seal. Insulators within the tubes are frequently made of lava or fused quartz, while bases of the smaller transmitting tubes are made of Micalex which is the best high frequency insulator known for the purpose.



CATHODE OF 20-KW RADIOTRON

All of the materials used in Transmitting Radiotrons are held to very close specifications to insure uniformity in the finished product.

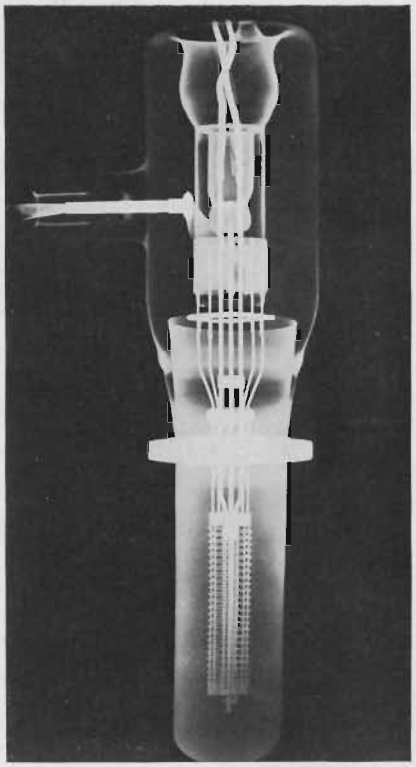
2. Processes

After forming, the metal parts for tubes are carefully cleaned, not only to remove dirt and oil but also to liberate any foreign volatile substances. Many of the parts are cleaned by means of carborundum blasting which, through roughening of the surface, facilitates heat radiation. After fabrication, the parts are heated to very high temperatures in a hydrogen atmosphere or in a vacuum to distill out volatile materials and occluded gases.

The glass parts are formed and annealed then inspected under polarized light to make certain that the annealing process has removed all glass strain.

Before the assembly of the electrodes, all parts are carefully checked for mechanical strength and conformance to dimensions. In assembly, the electrodes are lined up and spaced very carefully and where visual inspection is difficult, as in the case of water-cooled tubes, an X-ray photograph is taken.

After the electrodes and supports have been assembled and sealed into the bulb, the exhaust procedure is begun. The air is withdrawn by means of a high vacuum pump and during this process all electrodes are heated to a high temperature by means of high frequency induction and electron bombardment. This is continued until there is no further evolution of gas from the electrodes or from the glass envelope. Particular care is taken in the degassing of the grids and also of grid and plate leads which are brought up to a red heat by means of high frequency currents. When an exhaust of less than one ten-millionth of an atmosphere is obtained with the electrodes at white heat, the "getter" is flashed which further reduces the residual pressure to the order of one billionth of an atmosphere. The discovery of "getters" has probably done more than any other factor in producing the present quality and reliability of Transmitting Radiotrons. "Getters" commonly consist of some volatile active metal such as magnesium, barium or calcium.



X-RAY PICTURE OF WATER-COOLED RADIOTRON

3. Electrical Tests

After the completion of the exhaust and sealing off processes the tubes are based and given a very thorough series of tests. The tubes are oscillated under service conditions for five two-hour periods with cooling intervals of two hours between the runs. This repeated heating and cooling shows up any weak tubes. A complete electrical test is then made and the filament current, plate current, grid current, emission, oscillating output, insulation, dimensions, etc. must all be within their limits. Tubes which pass this test successfully are aged two weeks or more on the shelf to make certain that no air leaks develop. All tubes are tested immediately before shipment to make certain that they come within the rigid specifications.

In the case of small and medium-sized power tubes which are carried in warehouse stock, another test is made before shipment to the customer.

4. Operating Technique

Economical operation of a transmitting station requires not only tubes of high quality but also proper operating conditions. A frequent check-up of conditions will pay good dividends in operating economy. Probably the most frequently occurring cause of sub-normal life in power tubes is the application of more than rated voltage to the filaments. Panel instruments are sometimes inaccurate and it is recommended that a portable instrument of known accuracy be used periodically to check filament voltages. In this connection, care must be observed of course in measuring the voltage of filaments which are at high potential above ground, as is usually the case in rectifiers.

There are certain applications such as audio amplifiers where it is feasible to operate a tungsten filament at from ten to twenty percent less than rated voltage with a considerable increase (usually much more than ten or twenty percent) in useful operating life. This is possible because the emission current even at reduced temperature is many times the required peak plate current in the case of an audio amplifier. In class A operation the peak plate current required is only twice the static plate current. In the case of transmitters which are supplied with power of poor regulation, care must be exercised to make certain that the filament voltage is sufficiently high to provide adequate emission during the periods when the line voltage is low.

Oxide coated filaments used in mercury vapor rectifier tubes should never be operating below rated voltage. Since there is a wealth of emittive material in the filament, long life is assured at rated voltage. In the

(Continued on page 19)

LET'S GET ACQUAINTED

E. A. NICHOLAS, General Sales Manager of the RCA Victor Company, Inc.

HE STARTED HIS COLORFUL CAREER AS A RADIO OPERATOR AT SEA. HIS EXPERIENCE AND CONSISTENT PROGRESS TO HIS PRESENT POSITION SHOULD PROVIDE INSPIRATION TO EVERY BEGINNER AND WAYFARER IN THE RADIO INDUSTRY.

JAMES M. SAWYER, Assistant Manager Engineering Products Division, RCA Victor Company, Inc.

MR. SAWYER'S ACTIVITIES IN THE RADIO COMMUNICATION FIELD DATE BACK TO THE PIONEER DAYS OF THE UNITED WIRELESS CO., AND HE IS A FAMILIAR FIGURE TO ALL THE VETERANS IN THIS MODERN SCIENCE. TODAY HIS RESPONSIBILITIES COVER THE ENTIRE UNITED STATES.

Broadcasting Personalities

Mr. W. C. Etheridge has left WSPA and is now chief engineer of WIS.

Mr. Donald P. Sanders is now station manager of WIS, at Columbia, S. C. Mr. Sanders has arranged for NBC programs, and WIS has now joined this network.

Mr. G. O. Shepherd, manager of WWNC in Asheville, N. C. made a recent trip to New York City. He and Mr. Sanders who visited New York at the same time joined each other on top of the Empire State Building in a good old fashioned southern toast—coca cola!

Mr. H. E. Gihring of the Camden office is working with Mr. C. Brown of WEVD to select a new location for the transmitter.

Engineers of CBS and NBC have been cooperating to put on the Sunday night series of unemployment programs. Due to the large number of remote pickups in a short time, extremely close cooperation is required. The personnel of both networks are to be congratulated on their excellent work.

Mr. A. B. Chamberlain, Chief Engineer of CBS, presented a paper before the Rochester meeting of the Institute of Radio Engineers early in November. His topic was "Visual Broadcasting".

WORC, in Worcester, Mass. has just completed the installation of a new RCA 100 watt transmitter. Messrs. Kleindienst and Hill, owner and manager respectively of WORC have arranged for the work, and Mr. D. W. Reynolds of the General Electric Company put the transmitter on the air. Mr. Kleindienst reported the carrier frequency originally at 8 cycles off their assignment, and after two weeks, the inspectors check showed 9 cycles "off".

Harry Stone has been holding the reins at WSM since George Hay was suddenly taken ill some time ago. Keep up the good work Harry, your famous Saturday night "Grand Opry" is still as popular as it was when the "old judge" handled it.

Lambdin Kay, manager of WSB recently took great delight when he changed his usual announcement of "and now we join the network of the National Broadcasting Company," to "and now, ladies and gentlemen, the network of the National Broadcasting Company joins *us*." This was occasioned at the introduction of Bobby Jones during one of his NBC broadcasts from Atlanta.

Jack Montgomery, engineer-in-charge WSM Nashville, has just recently returned from an inspection

trip to Camden and New York. His line of conversation since his return to Nashville makes us wonder exactly what he did inspect on that trip.

J. C. Randall, Plant Manager of WTIC returned from his annual vacation with a nine point deer weighing 185 pounds, draped gracefully along the right mudguard of the Auburn speedster mentioned in our last issue. "J. C.", as he is known outside of office hours, shot the buck in the Adirondack Mountains.

And, speaking of cars, new ones seem to be in vogue at the Traveler's. H. D. Taylor stops at the bottom of Avon Mountain with his DeVaux '80', waiting to pass some poor Ford on the hill.

Walter Gilbert of the Maintenance Crew at WTIC has joined J. C. R. in the Auburn Fraternity. He too, has an '80' Sedan. Also John H. Dillingham, has blossomed forth with a new Plymouth. Who said anything about depression?

After this, Ye Editor prepares to sell the horse and buckboard and go to WTIC.

WODA—O'DEA

RICHARD E. O'DEA
OWNER OF STATION WODA, PATERSON, N. J.

The story of how station WODA came into being is an interesting one. Richard E. O'Dea, a young veteran of the A. E. F. engaged with his brother in the phonograph business with the Victor franchises in Paterson and Passaic, N. J., was returning home from New York City one night, and noticing a chap by the roadside who evidently was awaiting some form of transportation, O'Dea invited him into his car for a "lift". Both O'Dea and the passenger were headed for Paterson, and during the conversation on the ride it developed that the passenger was on the control staff of one of the leading broadcast stations in New York City. His enthusiasm for his work interested O'Dea to the extent that O'Dea inquired concerning the approximate cost of building a modest station.

The passenger advised that an outlay of about $500 would be required, and to his amazement O'Dea handed him $100 on the spot and told him to start work on the Paterson station the next day. Soon WODA, the "VOICE OF THE SILK CITY" was heard on the air by listeners within range of its modest little 10 watt output, and before long, thanks to the effort of its ambitious proprietor, WODA blossomed out with 1000 watts. Today WODA is one of the very popular stations in the New York suburban vicinity, and enjoys an ever increasing roster of listeners.

STATION WJTL MOVES

The "UNIVERSITY OF THE AIR" is moving their transmitter from the location at Oglethorpe University eight miles north of Atlanta to the Fox Theatre building, right in the heart of Atlanta. The studios, however, will remain in Lupton Hall, on the University Campus.

Dr. Thornwell Jacobs, President of Oglethorpe University, Ga., is shown above at the microphone of WJTL. In addition to the RCA Transmitter and Studio equipment, the University has installed a complete RCA Victor Centralized Radio system connecting class rooms, dormitories, dining hall and the stadium.

Police Alarm Broadcast News

POLICE RADIO STATION WPEB

Grand Rapids, Mich.

We are in receipt of a communication from A. A. Kirchner, Chief Engineer of WPEB, the Police Radio Station at Grand Rapids, Mich., which to us appears to point out a very fine moral lesson. Mr. Kirchner advises us that previous to the

A. A. KIRCHNER, CHIEF ENGINEER POLICE RADIO STATION WPEB

installation of their Radio System, the city averaged about 6 or 7 holdups a month, but since the station has been on the air they have only had one small holdup. We suspect that there is a bit of disappointment in Mr. Kirchner's admission that things have been a bit slow out there recently, but he promises to keep us posted if "business" picks up.

Congratulations to Mr. Kirchner and the whole Grand Rapids Police force. It doesn't take the Yeggs long to find out that Police Radio territory is unhealthy for them. They have probably moved on into more primitive country which still remains unequipped, . . . Q.E.D.

Station WPEB is equipped with an RCA 100 Watt Transmitter, type ET-3670, which covers a radius of 300 miles, with reports from even greater distances and we are advised that all the officials are more than pleased with the performance.

POLICE RADIO STATION WPDU

Pittsburgh, Pa.

The Pittsburgh Police Department owns and operates a Radio System which is producing very gratifying results. The system was placed in operation on May 11th, 1931, and already the daily average of 90 stolen automobiles has been reduced so that it seldom runs over 15 per day. Moreover, three men are now serving 15 years who, thanks to the radio system, were caught carrying a safe from a chain Drug Store in Pittsburgh. Two bank holdups have also been flouted by the speedy action of the Police, which was made possible through the services of the new department Radio service, and generally speaking, the system is demonstrating in Pittsburgh just what it has demonstrated in every city that has given Police Radio an opportunity to prove its own value.

WILLIAM M. GAMBLE, OPERATOR
POLICE ALARM RADIO STATION WPDU, PITTSBURGH, PA.

The operating personnel of the Pittsburgh Police Radio Station is as follows:

Frank S. Verner, Chief Operator
John T. Joyce, Assistant
William M. Gamble, Operator
Charles B. Crusan, Assistant
Charles B. Sproull, Operator
Austin Hoffman, Assistant

The station is located on the highest of several peaks which surround the city, known as Mt. Washington, and is in service 24 hours a day, seven days a week. The day is divided up into three 8 hour watches, with two men on duty during each watch,—one operator and one assistant. WPDU operates on a frequency of 1712 K.C. or 175.23 meters wavelength, with an output of 400 watts. The transmitter is a W. E., crystal controlled.

Pirates Capture XEW

In real melo-dramatic fashion, an armed band of Communists forced their way into Mexican station XEW on Sunday Nov. 8th, and taking command of the works, they proceeded to tell the amazed listeners just what they thought of the Government in particular and everything else in general. What they had to say was anything but complimentary, and they were just getting well warmed up to the unscheduled program when the local police arrived on the scene and politely but firmly interrupted their discourse, apologizing to the audience.

Station XEW sports a real RCA 5KW Transmitter, installed by RCA engineers, and the impromptu "Red Lacquer and Vodka" team enjoyed considerable coverage while they lasted.

Criticisms, suggestions and fan mail may be addressed to the boys in care of the Warden, Mexico City Jail.

Police Radio from an Administration Standpoint

By E. K. JETT, Assistant Chief Engineer, Federal Radio Commission

POLICE radio is new and the Federal Radio Commission is attempting to work out an allocation of frequencies that will fit in with many other services and at the same time give an efficient service to the police. We desire a combination of efficiency in police radio and in the use of frequencies. Frequencies are scarce and new ones cannot be created until new developments have been made in the art. Therefore, radio assignments should not be expected to replace wire communications and signal systems; at best it can only supplement them for emergency communication when speed is necessary to points where landwires cannot be made available, such as to police cars cruising on streets.

First some of you may not be familiar with the way police radio is working in some of our cities. One or more transmitters are located in strategic places in a city, and all police cars are equipped with radio receivers and loud speakers. One frequency is assigned to several cities all in the same geographical area.

The information transmitted over most police radio stations is obtained from two general sources:

(1) From citizens by means of the telephone or call boxes.

(2) From the precinct stations and the several divisions of the Police Department.

The radio-equipped patrol cars are in general arranged throughout the city by precincts and each regular police precinct is divided into what are termed "patrol districts". A radio car is assigned to each district, and is constantly on watch while patrolling the district. When an emergency arises in the district, and police assistance is necessary, the car is immediately dispatched to the scene of trouble by means of a radio message.

The patrol districts are chosen with the following points in mind:

(1) Density of population

(2) Crime record of the territory considered

(3) The traffic problem:
   a. Density of traffic
   b. Congested points
   c. Possible obstructions, such as railroads, etc.

(4) Other police protection.

MR. E. K. JETT, Assistant Chief Engineer, Federal Radio Commission

The radio cars are usually of two types, termed "scout cars" and "cruisers". The "scout cars" are light automobiles and are usually manned by two policemen. It is these cars that are assigned to the patrol districts. The "cruisers" are heavy, high-powered cars, and usually carry about four men. The "cruisers" are usually equipped with riot guns, tear gas bombs, etc., and are designed to handle the more serious crimes. A "cruiser" patrols through an entire precinct and covers territory which may also be covered by "scout cars" so that during serious trouble the two policemen in a "scout" car are augmented by the crew in the "cruiser".

The following method of handling a call is used by many police departments: A citizen calls the police department by telephone. This call comes direct to the telephone operator in the main dispatching room who turns the information over to the police dispatcher. The dispatcher then determines the orders to be given and connects a microphone through to the radio station. He then gives his orders by talking into the microphone, and those orders are received by all automobiles in the streets, thus informing all cars of movements of any others. His orders are also heard by loud speakers in various parts of his station and by means of receiving sets in other police stations of the city and adjacent communities. The call is sometimes repeated either by the dispatcher or the radio operator to insure that it is received.

The car, upon receiving its orders, immediately proceeds to the scene of the trouble. As soon as the patrol crew has completed its work, one member of the crew telephones back to the radio station and the patrol car is then considered ready for new service.

The following report was taken from the log of a large city and represents one month's record of emergency broadcast messages:

Total messages broadcast	6639
Total number of runs	4079
Total minutes on runs	8774
Total arrests	418
Average time on runs, in minutes	1.99

From the above it is noted that if the average time consumed in making one announcement is thirty seconds, an emergency message was transmitted on the average of once in every thirteen minutes. It is of further interest to note that an average of one arrest was made during each successive period of one hour and forty-five minutes.

(Continued on Page 16)

A New Station for Reading, Pa.

By T. A. SMITH

Sales Engineer, Eastern District, RCA Victor Company, Inc.

THE keynote of WEEU, in Reading, Pennsylvania, is newness. Not only has the station been granted a new license, but it employs a brand new transmitter, in a new location, and had planned to put its first program on the air on January 4th, 1932. This station, which operates with 1 kw power on 830 kc, is owned by the Berks Broadcasting Company, whose personnel have had considerable experience in broadcast station operation.

The transmitter which has been installed is the latest model RCA 1 kw equipment. At the time that the decision was made to erect the station, engineers of the RCA Victor Company cooperated with the station personnel to select a site. A number of locations were considered and the most favorable was one approximately two miles northwest of Reading. Consequently when other factors were found to favor this location, a portable transmitter was set up and a field intensity survey was made. From the data thus obtained it was found that quite uniform radiation would be obtained in most directions.

Construction of the building was started about the end of September and the transmitter was installed and the towers erected by December 15th. The installation work has been done by the Berks Engineering Corporation in conjunction with Messrs. Landis and Gaul of the WEEU management. The tuning and adjustment of the transmitter was done by Mr. Ed. La porte of the Westinghouse Electric and Manufacturing Company.

INTERIOR OF THE CONTROL ROOM
Station WEEU, Reading, Pa.

The station is housed in an attractive structure finished in Spanish style. The building contains, besides room for the equipment, a two car garage and living quarters for the operating personnel. A transmission line one hundred feet long, leads to the antenna tuning equipment which is contained in a small building of similar construction to the main house.

The antenna system is of the T type suspended from two hundred foot Blaw Knox unit type insulated towers. The ground system employed is that recommended by the RCA Engineering group and consists of three radial systems, one under each tower and one under the antenna down lead.

The land about the station has been carefully graded and it is planned in the Spring to landscape it with flowers, trees and shrubs.

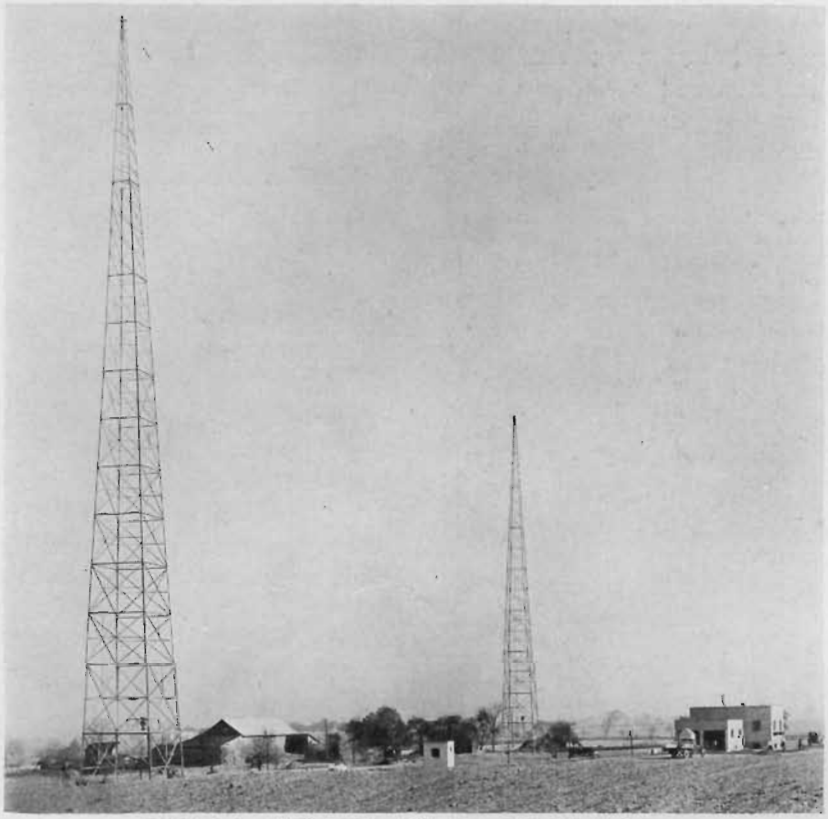
It has been planned to locate the studios in Reading, Pa., and the latest design RCA Control room equipment will be employed. Two studios will be used with condenser microphones throughout.

The transmitter, RCA type 1-C, is of the one hundred percent modulation type. It employs two 50 cycle crystal control units and is thoroughly modern in every respect. The transmitter uses a UX-210 tube as crystal oscillator with three stages of screen grid buffer amplification following. The final output tube is the RCA 1652, a new 5 kw Radiotron developed for this transmitter. From the output tube circuits, a transmission line is run to the antenna tuning equipment adjacent to the down lead. The equipment is automatically started by means of time delay relays and is completely protected against overloads.

Since the frequency characteristics of the transmitter and studio equipment are flat from thirty to ten

thousand cycles, WEEU will produce as fine quality as any station in the country.

The speech input equipment at the transmitter consists of one type 40-RA panel which combines the function of an audio amplifier, volume indicator with volume control in a single panel. This equipment is AC operated.



BROADCAST STATION WEEU, AT READING, PA.
THE TRANSMITTER BUILDING MAY BE SEEN AT THE EXTREME RIGHT, AND THE TRANSMISSION LINE COUPLING HOUSE IS BETWEEN THE TWO BLAW-KNOX 200 FOOT UNIT TYPE TOWERS.

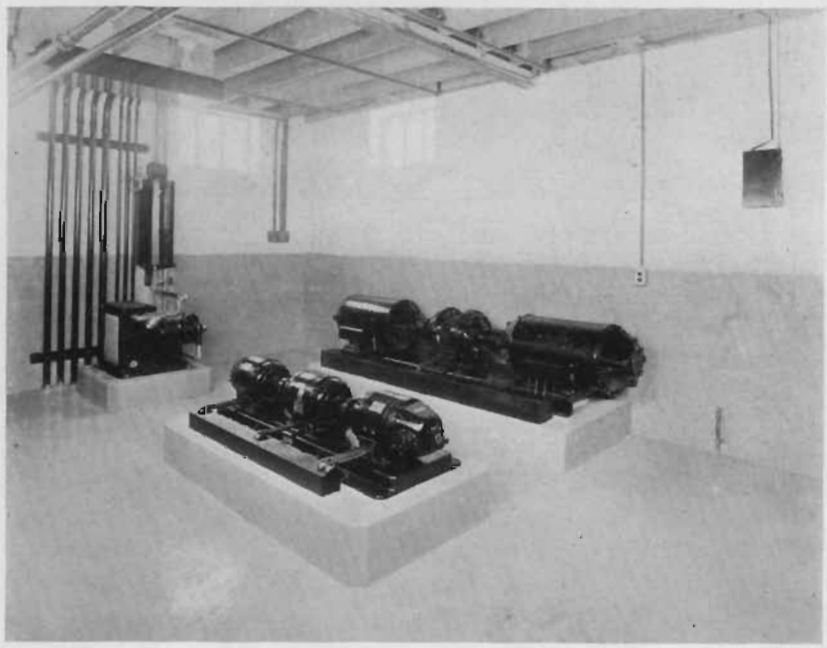
The transmitter is located on the first floor, on the right hand side of the building facing the front. The power equipment and water cooling apparatus has been placed in the basement directly under the transmitter room. A great deal of thought has been used by the staff of WEEU to make the installation complete and finished in every particular. Leads from the transmitter have been terminated in boxes from which conduits run to the various pieces of equipment. This permits an unusually neat and attractive installation.

WEEU operates daytime only but is expected to render valuable service which has been lacking in Reading and the vicinity. The owners of the station are to be congratulated on their thoroughly modern and excellent installation.

YOUR NEWS

Broadcast News is being produced for you,—to interest you,—to promote closer relations between you and your contemporaries in the field of Radio Broadcasting. We hope you enjoy reading about each other, and we hope you will help us to gather the news of the day in this field. At present we have no "reporters" in the strict sense of the word,—we depend upon our field representatives to gather what news items they can, of the sort that will interest you. If you have any news items of interest to your fellow readers, we,—and they,—will appreciate your thoughtfulness in sending such material in direct to us or handing it to one of our men.

Photographs are of special value to our readers. They have a subtle way of attracting the eye to the associated text. We are trying to sprinkle Broadcast News with a generous helping of photos and drawings each issue, and if you have any pictures to accompany your news items, be sure to include them. We will of course be glad to return such illustrations.



FILAMENT MOTOR GENERATORS, WEEU

KFGQ Runs Six Hour DX Test

Miss Lois Crawford, Operator at the Broadcasting Station of the Biblical College and Associated Institutions advises us that on Christmas Morning, from Midnight until 6 a.m., KFGQ ran a long distance test on 228.9 meters, (1310 kc) and confirmation reports will be appreciated. The station is located at Boone, Iowa.

How About Your "Modulation"?

By J. P. TAYLOR

HOW about your modulation, Mr. Broadcaster? Yes, we know your transmitter is designed for 100% modulation—but how fully do you utilize that capability? Do your peaks of modulation fall short at 80 or 85% or do they reach 100% as they should—or do they perhaps spill over to 125% or more? Are you sure—what kind of a modulation indicator do you rely on? We hope, Mr. Broadcaster, you don't depend entirely on that sluggish little meter on your transmitter panel. Surely you find it difficult to read accurately that swinging little needle—and how do you manage to see it from your seat at the control desk? We've tried it—and frankly we don't see how you do it.

There is a better monitoring system, Mr. Broadcaster—it makes *use of an oscillograph as a modulation indicator*. Yes, we know you have heard of this use before. But we imagine you have been inclined to regard the oscillograph as an instrument limited by complexity of construction and operation to laboratory applications. Certainly instruments of past design with their arc lamps and complicated driving and timing mechanisms did much to justify this accusation. However, what you perhaps do not know, Mr. Broadcaster, is that the growth of this broadcasting business has accelerated the development of an oscillograph having none of these disadvantages. An oscillograph in which ruggedness and portability are featured. Using this oscillograph, radio engineers have developed the technic of observing and photographing the modulated output of a transmitter to the point where they can recommend that you make it a routine operation at your transmitter.

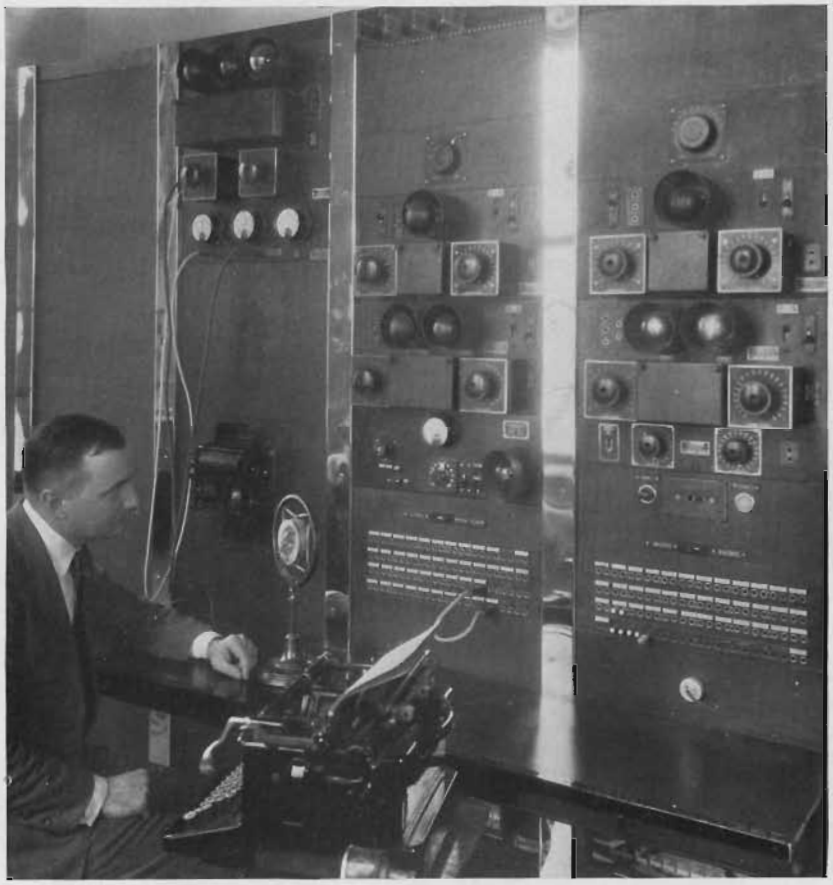


Fig. 6 OSCILLOGRAPH MOUNTED ON SPEECH INPUT RACK IN THE CONTROL ROOM OF STATION WEAF

As you know, the oscillograph is essentially an instrument for visualizing audio frequency currents. Briefly, an input audio frequency flowing through vibrator elements

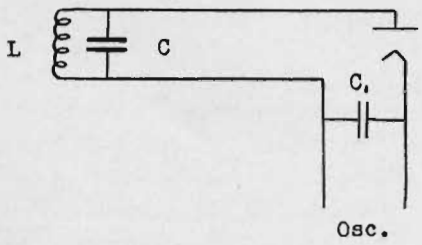


FIG. 1 OSCILLOGRAPH RECTIFIER CIRCUIT

located in the field of a permanent magnet causes these elements to oscillate in a rotational direction. A tiny mirror mounted on these elements vibrates with them. A fine beam of light reflected by this mirror traces, when the mirror is caused to vibrate, a path which is an accurate picture of the wave form of the current exciting the elements.

It is not possible with this oscillograph to observe the actual radio frequency waves produced by the transmitter. However, in studying modulation, it is the envelope of these waves that we are interested in and this is readily depicted by the oscillograph. As the vibrator elements will not follow radio frequencies, you will need in addition a small linear rectifier. Quite probably you have such a rectifier already

Fig. 7 CONTROL ROOM OF STATION IRO,—AN RCA VICTOR 50-B TRANSMITTER AT ROME, ITALY

—driving your present m.i. or a monitoring speaker. If you have, you can use it—if you haven't, one can be easily made.

The circuit of the pickup coil and rectifier tube making up a representative linear rectifier for this purpose is indicated in Fig. 1. Pickup coil L—broadly tuned to the carrier frequency by a small fixed or variable condenser C—is mounted in proximity to the power amplifier tank circuit. A small amount of radio frequency energy induced in this tuned circuit is rectified by the tube and furnished to the oscillograph as an audio frequency current which is equivalent to the envelope of the modulated carrier. Capacitor C, by-passes the r.f. current around the oscillograph. A variable resistance

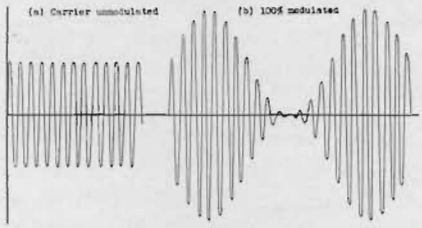


FIG. 2 RADIO FREQUENCY CURRENT IN PICKUP COIL

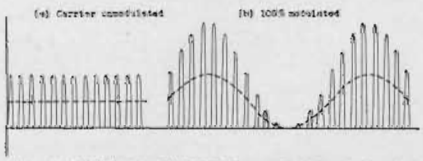


FIG. 3 RECTIFIED CURRENT IN OSCILLOGRAPH ELEMENT (DOTTED)

R allows adjustment of the oscillograph current. In some instances, r.f. chokes in the oscillograph leads may be desirable. While a UX-281 Radiotron will furnish sufficient current to excite the oscillograph, it is recommended that a UV-217-C

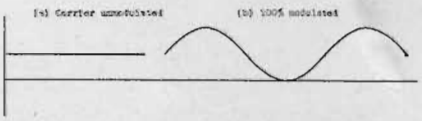
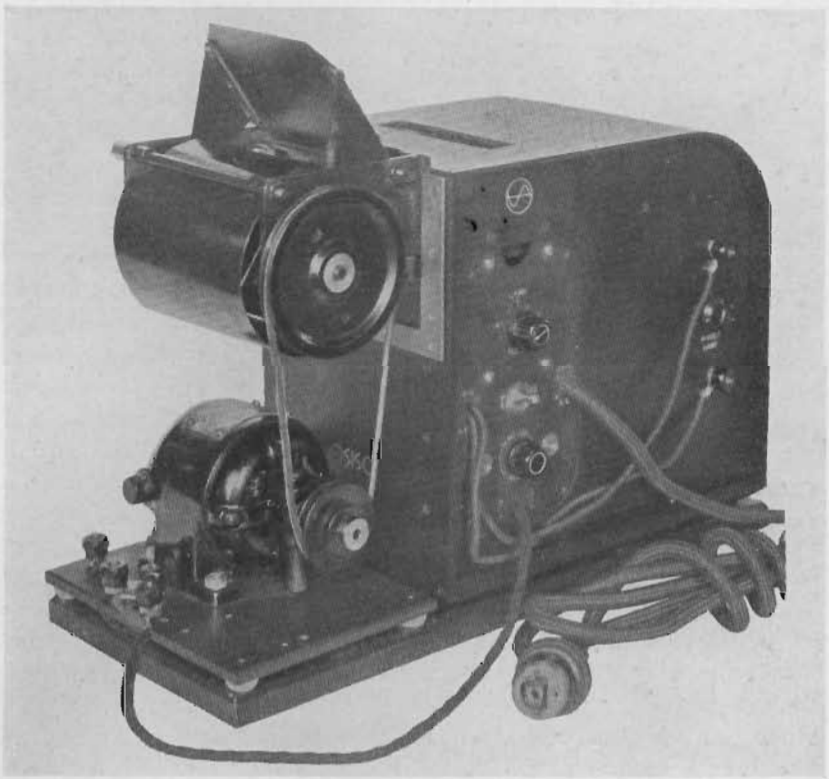


FIG. 4 PATH OF BEAM REFLECTED BY VIBRATOR MIRROR

Radiotron be used. If this is done, a loudspeaker, a relay, or both may be operated in addition to the oscillograph. It should be noted that mercury vapor rectifier tubes are not suitable for use in this rectifier.

Interpretation of the results obtained when an oscillograph is used as a modulation indicator requires just a brief consideration of the phenomena of modulation. Referring to Figure 2, when the transmitted carrier is unmodulated, the radio frequency current which is induced in the pickup coil is a sine wave whose peaks are of constant amplitude as indicated in Figure 2 (a). When this carrier is modulated with a constant tone, say 200 cycles, the current in the pickup circuit will be a radio frequency current, the amplitude of whose peaks varies from zero to twice the unmodulated value 200 times a second, as, Figure 2 (b).



TYPE MA-1 OSCILLOGRAPH

The radio frequency current in the tuned circuit is rectified by the UV-217-C rectifier tube. The circuit (Figure 1) is that of a half-wave rectifier. The output of the rectifier tube is a current such as that of Figure 3 (a) when the carrier is unmodulated and Figure 3 (b) when the carrier is 100% modulated. This current differs from that of Figure 2 in that the negative loops have been suppressed. It is made up of three components—a direct current, an audio frequency (200 cycles), and the carrier radio frequency. Since the radio frequency is by-passed, only the d.c. and audio frequency components are supplied to the oscillograph. The actual current in the vibrator elements is, therefore, the dotted curve of Figure 3 and it is this curve which is portrayed on the viewing mirrors as shown in Figure 4. Comparison of this curve with Figure 2 indicates that its frequency is the frequency of the envelope of the modulated radio frequency while its amplitude is proportional to the amplitude of this envelope. Hence the viewing mirrors accurately depict the envelope in which we are interested.

There remains Mr. Broadcaster, only to adapt the above action for your particular needs. This is perhaps best done by setting up a Standard procedure for using the oscillograph as a modulation indicator.

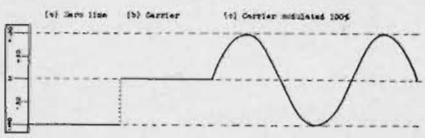


FIG. 5 ILLUSTRATION OF USE AS A PERCENTAGE MODULATION INDICATOR

First, the scale of the oscillograph is marked —100 to +100, as in Figure 5. Second, with the transmitter off, the zero position of the light beam

(Continued on Page 20)

POLICE RADIO FROM AN ADMINISTRATION STANDPOINT (Continued from Page 11)

Another large city reported only 3,001 messages broadcasted during the same month. These are classified as follows:

No. of	Nature of Transmission
955	Call your station, meet detectives
411	Automobiles stolen
342	Automobiles recovered
318	Minor complaints
101	Accidents
91	Robberies
77	Descriptions of persons wanted
71	Pick-up automobiles—persons wanted
62	Fights
28	Burglaries
20	Assaults
4	Murders
1	Rape

NOTE: Other announcements related to bank alarms, prowlers, drownings, mad dogs, false fire alarms, suspicious persons, shootings.

To get back to the main subject, emergency police radio service is defined by the Commission as the broadcasting of emergency communications from central police headquarters to squad cars or other mobile units. It follows, therefore, that the service is a mobile service and the frequencies which may be used by police stations must be allocated from the international mobile bands.

Frequencies Limited

The number of frequencies suitable for municipal or state police radio service is limited to a relatively small portion of the radio spectrum. Frequencies, beginning at 3000 kilocycles are useful for long-distance communication and the higher frequencies above 5000 kilocycles possess skip distance characteristics which render them useless for short-range communication. The lower-frequency bands below 1500 kilocycles are used to full capacity by Government stations, ship and aircraft stations, and broadcast stations. In the case of any frequency, the area of interference is vast and both domestic and international considerations must be given proper weight.

In North America, the band of frequencies between 1500 and 6000 kilocycles is allocated to services as between nations by a special treaty commonly known as the North American Agreement of 1929. The frequencies suitable for municipal and state police radio service fall within the band between 1500 to 3000 kilocycles, which under this treaty is allocated for use by maritime and aviation stations, amateurs, experimental visual broadcasting stations, and finally a general allocation for any stations in the mobile service. The mobile service bands, from which the police allocations are made, are further subdivided for use also by maritime, aviation, and geophysical stations.

The specific frequencies available for exclusive use by police radio stations are set out in the Commission's General Orders Nos. 85 and 119. The latter order was adopted on September 3 last, and provides only for slight changes to permit greater frequency separation between stations.

Reallocation of Frequencies

General Order No. 119 will require a reallocation of frequencies for use by police departments. Many cities have already been notified that their frequency will be changed effective February 1, 1932. This order not only involves police departments, but affects the allocation of frequencies throughout the radio spectrum for all radio services except broadcasting. It is a recognition on the part of the Commission that different classes of stations require different communication band widths depending upon the types of emission which are employed. Radiotelegraph, for example, required a much narrower band width than is needed for radiotelephony; and television, because of the great amount of detail which must be rapidly transmitted, requires vastly greater frequency space than radiotelephony.

Most of the police frequencies now in use are separated from each other by only 6 kilocycles. This is considered as ample width for voice telephony but does not allow for deviation of the carrier frequency. Under the new plan, police frequency assignments will be separated by eight kilocycles. It is expected, therefore, that improvement will result due to the elimination of cross talk and severe heterodyne interference. It is hoped that all cities will take advantage of the time between now and February 1 to make the necessary arrangements to shift their frequencies to the new assignments on that date. If the changes are not made simultaneously, it is expected that interference in some sections will result.

The Commission is confronted with the necessity of providing for the greatest possible use of the eight frequencies allocated for police service. After considerable study, it was decided that the entire country should be divided into zones and frequency assignments made on the basis of all cities within a zone sharing the use of the same frequency. In this way it is possible to duplicate frequencies in other distant zones and at the same time provide for the operation of an efficient system within each zone. For example, Detroit, Highland Park and Grosse Point all share the same frequency.

Interlocking

In each control room, there is installed a monitor receiver, together with a loud speaker tuned to the joint police frequency. If the frequency is in use by any one of the municipalities, the operator is aware of such fact and will not attempt to put his call through until the other city has signed off. If, however, he has an emergency message which cannot be delayed, it is possible to gain the immediate use of the frequency by the exchange of signals over a private leased wire. It will thus be seen that there is cooperation between these cities and that the common frequency plan keeps all patrol units within the zone informed of the crime conditions in neighboring cities as well as in their own city.

There is general belief on the part of some licensees that a separate frequency should be assigned to each municipality. In this connection, I wish to point out that with only eight frequencies available such a system could not possibly be as efficient as the present zone system of allocation. For example, in the Boston metropolitan area there are 19 cities located in 80 districts and

nearly all of these districts are within 20 miles of the center of Boston proper. Obviously, therefore, if different frequencies were assigned to each municipality, the adjacent police departments would not be notified of crimes committed in neighboring cities and there would be delay in the apprehension of criminals who succeeded in making their escape to adjacent municipalities. Furthermore, it is believed that serious interference would result if several cities within the same area attempted to operate simultaneously and independently on frequencies separated by only eight kilocycles.

Cooperation

Cities in areas such as that around Boston are encouraged to organize a metropolitan district type of radio service. To do this it is necessary for some one city in the area to take the lead and impress on the other police departments the necessity of all cities cooperating in the establishment of one system. Without cooperation the system cannot be efficient as there would be no way to trace the criminal from one city to another. A metropolitan type of service may be organized by all cities within an area entering into contracts providing for mutual use and support of one radio station, or the various cities involved could enter into a partnership and designate one licensee who would be responsible for the operation of as many radio stations as may be required to properly serve the entire area. It is important when this plan is desired that the applicant forward with the application certified copies of contracts entered into between the cities subscribing to the joint system. The contract should show that the applicant is required to furnish police radio service to all subscribing municipalities without discrimination and that these municipalities agree to accept the service and not request the Commission to grant them independent transmitting facilities.

In the interest of reduction of inter-zone interference, an allocation of power based on population was selected in preference to an allocation based on the area to be served. Under this system, cities or state subdivisions having populations under 100,000 are permitted to use a maximum power of 50 watts; 100,000 to 200,000 population, 100 watts; 200,000 to 300,000, 150 watts; 300,000 to 400,000, 200 watts; 400,000 to 500,000, 250 watts; 500,000 to 600,000, 300 watts; 600,000 to 700,000, 400 watts; and cities with over 700,000 population, 500 watts.

It is pointed out in connection with the allocation of power based on population that municipalities having large populations need more power than those of less populous areas because there is greater attenuation of the radiated energy due to building construction. Furthermore, it was determined, after careful study, that many of the small municipalities occupy greater geographical dimensions than some of the larger cities and they are not handicapped with the transmission difficulties usually present in the more populous districts.

Additional Transmitters

In the event that the amount of power allocated is insufficient to afford reliable coverage over the desired service area, the Commission will, upon proper showing being made, authorize the use of additional transmitters of the same or less power. The City of Chicago, for example, now operates three 500-watt transmitters, and the City of Detroit one 500-watt and one 50-watt transmitter. In each case it is possible to provide efficient communication and at the same time limit the power on the particular frequency so that it can be duplicated for use in other zones. Where more than one transmitter is installed a plan should be evolved whereby only one transmitter is to be used for local alarms, and two or more transmitters when the alarm is general in nature.

Where two or more cities desire to cooperate in the operation of one system, the amount of power which may be authorized is computed on the basis of population of the entire area to be served. It is possible that a city may desire to install a police transmitter capable of serving a metropolitan area and to make the installation at once with the view of ultimately furnishing service to mobile units in contiguous municipalities. The construction of such a station may be authorized pending the conclusion of arrangements between the applicant and police officials in surrounding municipalities. However, the use of increased power, above that which may be authorized on the basis of population of the applicant's city, will not be allowed until satisfactory arrangements have been concluded and the Commission has been furnished with copies of contracts entered into by all cities subscribing to the system.

Temporary Permits

The Commission has from time to time authorized the temporary experimental use of increased power to cities for the purpose of demonstrating to surrounding municipalities the quality of service which might be rendered under a metropolitan area plan. These authorizations, it should be understood, constitute authority to use higher power only for the duration of the tests.

It is known that some applicants desire a metropolitan area system of communication but they cannot obtain agreements from a sufficient number of cities within their area to warrant the assignment of more power than would be available if only one city requested the service. I have in mind a case where nearly half of a county desired radio service and the population did not exceed one hundred thousand. In another case, two cities separated by ten miles desired a joint system but could not reach agreement with the county police officials to make it a contiguous system. The Commission of course regrets that it cannot offer any immediate solution of these problems. It must of necessity adopt certain rules and adhere to them when passing on each application. The plan must also provide for the granting of facilities to every police department regardless of whether they may desire radio service at this time or not. This latter aspect of the Commission's police plan is often overlooked by applicants when applying for facilities. The fact that no other city in the vicinity of the applicant's city desires radio service cannot be accepted as proof that a

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POLICE RADIO FROM AN ADMINISTRATION STANDPOINT (Continued from previous Page)

neighboring city will not apply for radio service and for this reason requests for additional power and exclusive frequency rights cannot be authorized.

Police radio service is not an entertainment service and the same high quality service should not be expected of it as of broadcasting. The Commission has been lenient with respect to the duplication of police frequency assignments, knowing that in some seasons and during certain times of the day, particularly at night, the police announcements from municipalities in one zone will be heard at a location where the frequency is used in another zone. However, in all such cases, the signal strength of the distant signal can be completely blanketed by the local signal without the probability of inter-zone confusion.

Emergency Messages

The question sometimes arises as to whether a city licensed for police radio service may transmit messages to fixed points or to police units not under the control of the licensee. An illustration of this is a case in which the City of Washington may desire to transmit messages to fixed points or to mobile police units outside of the District of Columbia. The answer is that such messages may be transmitted to the fixed points provided the information which is transmitted is of an emergency nature of equal importance to mobile police units. When in doubt a good test to apply is, can wire lines be used and if so, is there any advantage to be gained by using radio. Transmissions to mobile units not under the control of the licensee may be made, provided the amount of power which is used does not exceed that which is stipulated in the station's license.

The Commission has been asked from time to time to grant licenses for the operation of automatic alarm transmitters. These, it was explained, are to be controlled by the opening of a door or window. In one system, the presence of the intruder is made known by a loud speaker announcement from a phonograph record. In another the operation of a fire alarm box automatically operates the police transmitter. Aside from the fact that there are insufficient frequencies available for such systems, there is the objection that automatic devices lack the ability to discriminate between the urgency of calls. Furthermore, all of these devices could be made to work into a landwire signal system and the alarm could be given by radio from headquarters.

Requests have also been made for experimental development of a two-way communication system between police headquarters and police cars. While there may be some merit in these proposals, the Commission nevertheless does not have an ample supply of frequencies to permit the granting of applications to all who might make a satisfactory showing and it would be inconsistent to grant facilities to one applicant unless the same privileges could be granted to others. The officer's duty is to go where he is sent and when through to phone back to headquarters. If he is in trouble, a transmitter in his car would probably not be any more useful than the telephone at the corner store. Moreover, it is pointed out that the usual practice in the handling of messages between police headquarters and patrol cars is to transmit test messages at regular intervals. The officers in the patrol cars then know that a test message should be received at these regular times and should they not hear the message, they are instructed to report immediately to the operator in charge of the station in order that a service car may be sent to investigate the difficulty. As a result of this procedure, a reliable system of communication has been worked out. In the event that someone at police headquarters should desire to talk personally to an officer on duty, an announcement could be made directing him to telephone to headquarters. This is now done in most cities and has proven to be a fast service.

In all considerations of radio, look on it as an emergency service and an added weapon against crime. The addition of radio to the signal system should not replace wires any more than machine guns replace revolvers. Like the machine gun and the automobile it makes the police more effective. It is fast and only important messages should be sent. Everyone should respect the need of other cities and make it possible for everyone to have the additional weapon and use it effectively. The frequency facilities are limited. The Federal Radio Commission asks that you help in making the most effective use of these limited facilities.

At the Federal Radio Commission we stand ready to help you in your radio problems—write to us, or, better still, send the man or men responsible for installing or operating radio to see us and give us a chance to explain our plans in detail. We are glad to do this and perhaps an exchange of ideas will help us all.

WBT, CHARLOTTE, N. C.
ON THE COLUMBIA BROADCASTING SYSTEM (RCA 5 KW)

TRANSMITTING RADIOTRONS (Continued from Page 7)

case of mercury vapor tubes, a reduction of filament voltage causes an increased tube drop or potential gradient within the tube that supplies a force which causes the ions to accelerate and bombard the filament at high velocities. Short life and unsatisfactory performance will always result from the operation of mercury vapor tubes at sub-normal filament voltages. It is important, therefore, to keep a check on the regulation of the line supply voltage to make certain that the filaments of mercury vapor tubes are never operated below the required voltage. (An article on the operation of mercury vapor rectifier tubes will appear in a later issue of Broadcast News).

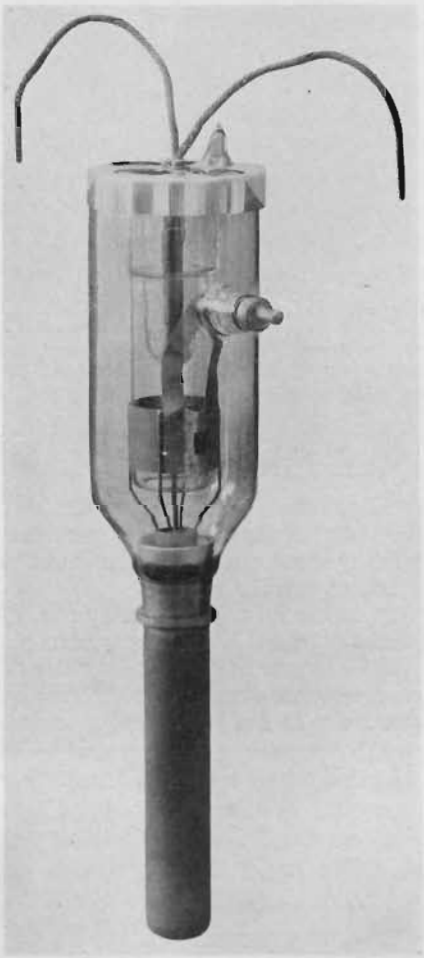
A large percentage of the failures of water-cooled tubes is traceable to inadequate cooling. Frequent tests and examination of protective devices which are controlled by water pressure or flow should be made. Water of the proper quality should of course be used and frequent tests made to insure that the rate of flow is normal. If the water contains a small percentage of mineral salts, it will be necessary to precipitate them out with suitable water conditioners. Examination should be made frequently to make certain that no scale has formed on the anodes, water jackets or hose nipples. In replacing water cooling hoses care must be exercised to be certain that the direction of flow is correct; that is, the water should enter the bottom of the jacket and leave at the top. An accidental reversal of the hose connections will always result in over-heating and tube failure.

5. Service Policy

In order to take care of the small percentage of tubes which fail prematurely by reason of manufacturing defects, a service routine has been established.

We request that immediately upon such failure the station engineer execute in duplicate a standard Service Report form (which is included with the tube) and mail one copy to our Service Division, Camden, N. J. for the information of our engineers. This will act as basis for the issuance of a tag which will be mailed promptly authorizing the return of the tube and giving detailed shipping instructions.

The tube should be shipped as directed and enclosed with it should be a copy of the Service Report and a copy of the return apparatus tag. A test and examination will be made promptly and when warranted a merchandise credit will be issued.



RADIOTRON UV-207

6. Technical Information

In order that our Transmitting Radiotrons may be used in the approved manner, an instruction booklet giving the operating constants and suggestions is enclosed with each tube. These booklets are available to any of our customers and will be furnished promptly on demand.

We have requested monthly reports covering the performance of Transmitting Radiotrons. Blanks have been prepared which we will be glad to mail to any users of RCA Transmitting Tubes, and if these records are maintained in duplicate they constitute a valuable record for the station operating engineer. Monthly reports on tube operation from our customers will be of material assistance to us in maintaining progress in the improvement of tube quality.

In short, we are doing our utmost to cooperate with the users of RCA Transmitting Radiotrons, and we solicit suggestions which may assist us in this effort.

WANTED—A FREE WHEELING TYPEWRITER

What an age of statistics this is! In order to facilitate the transcription of ideas which flash through our mind betimes, we recently requisitioned a typewriter to be placed at our elbow, so that even when our fair secretaries are all engaged elsewhere, we could dash off a choice bit of MSS here and there in our own two-finger-exercise fashion.

Suddenly one morning we apprehended a serious individual peering into the chassis of our new machine through the port side just abaft the keyboard and being of a curious nature, we also stole a look. So help us Bob, there, hooked up with the transmission, was a Speedometer. At the time it registered 66,324. It has since flipped up to 69,598. Through careful experiment and research, we have determined that the device jumps up one figure everytime we strike ten keys, or even if we write ten blank spaces. Apparently, we are going to be credited just as much when our mind is a total blank as when it is busily engaged in setting down coherant thoughts, so we have cultivated the habit of absent-mindedley manipulating the spacer bar while interviewing insurance salesmen and while waiting for Mr. McFud's secretary to locate him after she has called us on the telephone.

If you are interested, we will keep you posted on the score as it stands just before we go to press each issue. When the meter reads 00000 again, we suspect it will be time to have the oil changed and the battery watered,—or we might possibly have the ribbon redecorated.—Ed.

R. R. SOOY, who has charge of recording, directs a special rehearsal of a vocal solo by **G. P. HOPKINS** accompanied on the Estey Organ in the studios of the RCA Victor Co., at Camden, N. J.

PIPE ORGAN PICK-UP

—Not the simplest task for the Radio Engineers. The modern Organ, with its wide range of frequencies, its tremendous and often sudden changes in volume, its marvelous assortments of tone qualities which combine to form complex sound patterns —presents many interesting but difficult problems for the pick-up man. The addition of a vocal artist does not simplify matters, to say the least.

We have been fortunate in securing an article on this subject by Mr. *Henry Grossman* of the Columbia Broadcasting System. You have probably heard the splendid CBS programs played on the "Mighty Wurlitzer" in the Paramount Organ Studio, where Ann Leaf's dainty fingers produce her dreamy Nocturne Melodies,—where Jesse Crawford recites his popular Organ Poetry,—where Fred Fieble dashes off his invigorating Morning Revelry.

Be sure not to miss this interesting treatise in our forthcoming issue.

HOW ABOUT YOUR "MODULATION"

(Continued from Page 15)

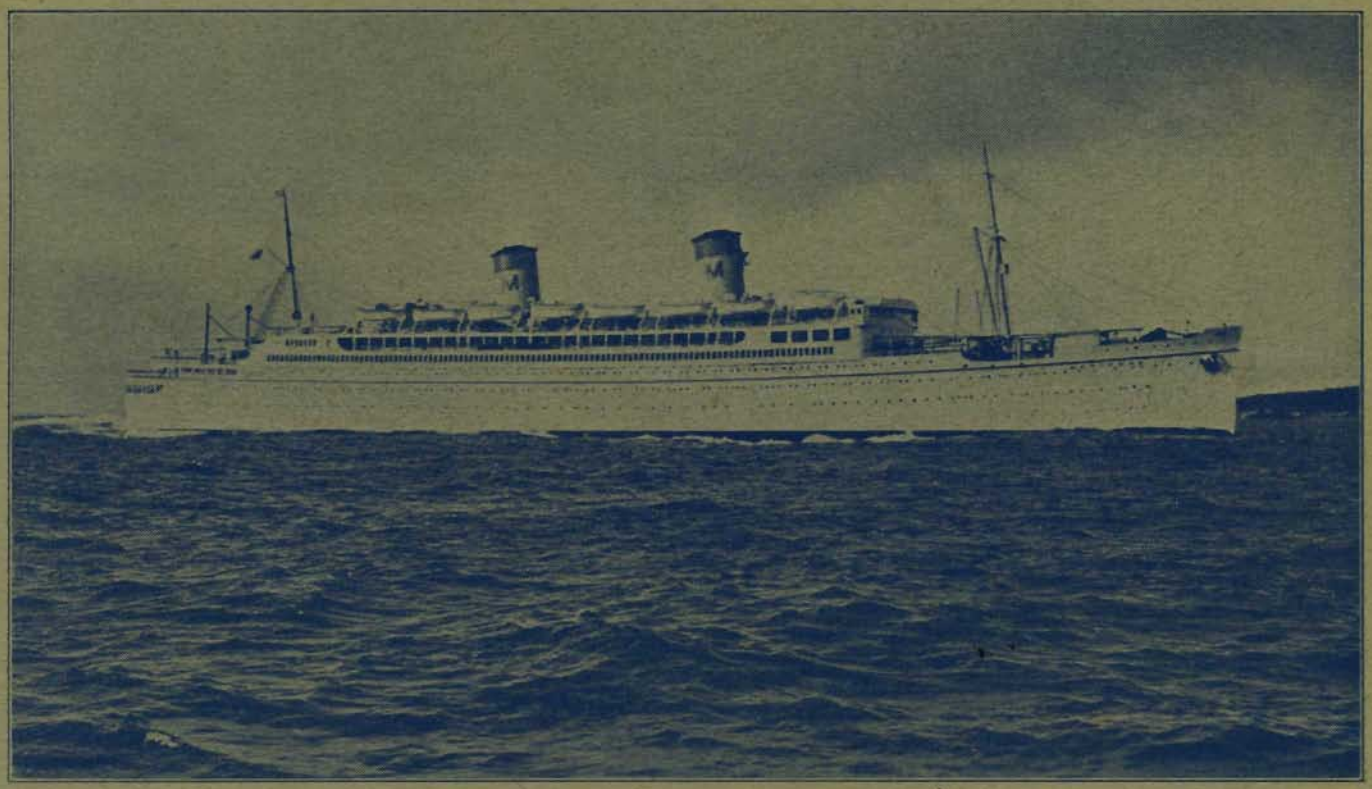
is adjusted to fall on —100, as Figure 5 (a). Third, with the transmitter on but the carrier unmodulated, the resistance in series with the vibrator element is varied until the carrier line falls on the zero of the scale, as Figure 5 (b). Now, when the carrier is modulated a wave such as Figure 5 (c) will be indicated in the viewing mirrors of the oscillograph. When the peaks of this wave fall on —100 and +100 the carrier is being 100% modulated. Similarly, 85% modulation will be indicated by peaks falling on —85 and +85, etc. Find—if you can, Mr. Broadcaster—a better modulation indicator.

In reality, however, this instrument when so used is more than a modulation indicator, for it also affords an excellent check on other adjustments of the transmitter. For instance, in the above analysis, it will be noted that the positive and negative peaks of modulation are of equal amplitude. If the transmitter is incorrectly adjusted, this will often not be true. In such cases, the oscillograph is an invaluable adjunct in facilitating correct adjustment of the transmitter. After a little experience, obvious mal-adjustments in bias and excitation voltages may quite easily be recognized. Other factors causing dissymetrical modulation, however, involve a consideration of tube characteristics, for which space is not at present available here.*

Finally, in addition to all its technical advantages, the oscillograph is more conveniently mounted than any other type of modulation indicator. Not only may it be located anywhere in the control room but also it may be moved as often as desired, without fear of changing its calibration. If desired, it may be permanently installed on the control desk, or it may be mounted on the control racks as in Figure 6—or as in Figure 7. When it is desired to make oscillograms, the viewing attachment consisting of the revolving mirrors is removed and the photographic attachment substituted. The operation requires but a few seconds. General Order No. 97 of the Federal Radio Commission is best fulfilled by making on one film three successive exposures showing the three conditions indicated in Figure 4. When submitted to the Commission, such oscillograms should be accompanied by data on the power output of the transmitter measured simultaneously with the taking of the oscillograms.

*NOTE: If response elicited by this article indicates sufficient interest, the uses of oscillographs in broadcast stations will be discussed at further length in a forthcoming issue.

RCA Victor GOES TO SEA



The new Matson Liner "Mariposa," carries RCA Prestige to Sea.
This picture was snapped by the photographer on a tug-boat, as the newly crowned Queen of the Pacific flashed by at 22.84 knots, over the U. S. Government's measured course at Rockland, Maine, Dec. 10th, 1931. She will soon enter regular service between San Francisco and Australia.

IN addition to the powerful RCA radio telegraph transmitters and receivers for long and short waves, the three new additions to the Matson fleet,—the Mariposa, the Monterey, and the Lurline,—will carry RCA radio equipped lifeboats, RCA direction finders, RCA Photophone equipment in both 1st Class and Cabin Class spaces, and the most extensive RCA Victor Centralized Radio installations which have yet been undertaken afloat. In addition to the dancing pavillions, lounges, smoking rooms and other public spaces, the de luxe staterooms also have centralized radio extensions.

Passengers of the future travelling on these speedy new floating palaces will not only have the advantage of every modern radio device for safeguarding travel at sea, but will be in constant communication with the shore and other ships, and will be entertained by up-to-date sound movies, electrical transcriptions of the finest dance orchestras and other recording artists. Moreover, timely broadcast radio programs from stations at home and abroad will be brought to them,—right to their own staterooms if desired.

Thus the prestige of the familiar RCA seal and the famous Victor trade mark continues to travel afar. One finds these friendly reminders of our own United States not only in foreign lands but out on the seven seas,—tokens of Safety, Service and Entertainment.

RCA Victor Company, Inc.
A Radio Corporation of America Subsidiary
Camden, N. J.
"RADIO HEADQUARTERS"

"BROADCAST NEWS"

is not on sale. If you wish to be placed on our mailing list, please notify the editor, at the RCA Victor Co., Inc., Camden, N. J.

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