Communication and Broadcast Engineering

VOL. 2 NO. 10

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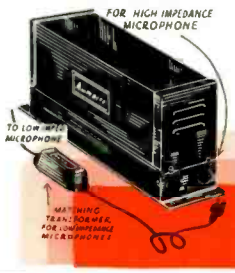

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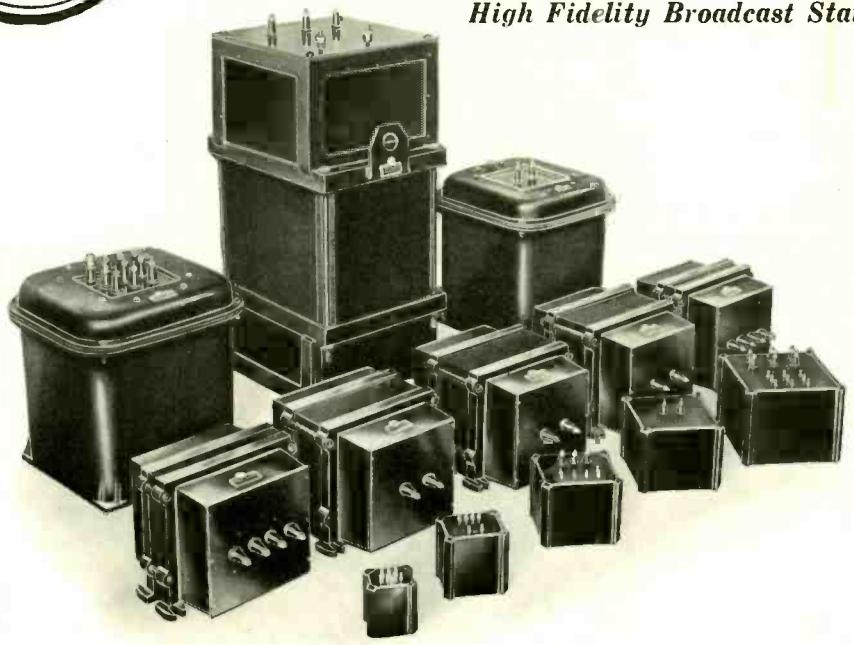

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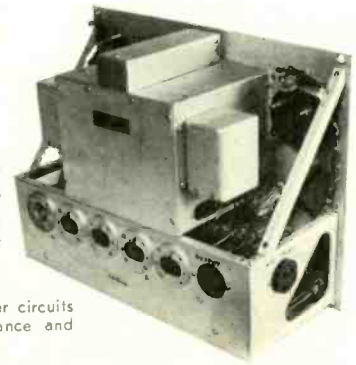

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EDITORIAL

RADIO NEWS BAN?

DURING THE ANNUAL convention of the Inland Daily Press Association, held the week of October 14th, a resolution was adopted urging the Federal Communications Commission to ban news flashes broadcast under the sponsorship of radio advertisers.

A reading of the resolution provides reasons for this suggested muzzling of radio commentators, such as, to "preserve the true news value"; for the protection of the radio audience; as a precaution against the coloring of news by advertisers.

It was pointed out that the U. S. postal laws prohibit newspapers from printing "any editorial or reading matter for which money or other valuable consideration is paid unless it is plainly marked 'advertising.'"

The suggestion was made that all news broadcast should be only in the form of an unsponsored editorial from the broadcasting station itself.

In the resolution the hope was expressed that all newspapers and news-gathering organizations would cooperate in developing a satisfactory plan for the broadcasting of news bulletins as "a public service in the name of the participating groups."

This resolution has all the earmarks of a rather clever counterplay. If sponsored news flashes are banned, the Fourth Estate will be on the road to a complete control of news distribution—at the expense of the Broadcasting Industry.

The inference that sponsored news is "colored" or "edited" by the advertiser is unwarranted. The inference that the listening public requires protection from errors or exaggerations is also unwarranted. The suggestion that the broadcasting of news should conform to the U. S. Postal Rules and Regulations is not only unreasonable, but decidedly incongruous. The controlling body is the Federal Communications Commission, and any interference on the part of another government agency would only weaken the supervising power of the F. C. C. and tend to reduce its efficiency.

The resolution referred to was no doubt prompted by an increasing feeling of uneasiness on the part of newspaper publishers, who see in the human and dramatic appeal of the radio news commentator a menace to printed news. His growing popularity with the radio audience is indicative of the value and interest the public places in radio news flashes.

Should broadcasters lose their right to transmit news flashes, they will have lost the strongest link between their stations and the listening public. Radio news reporting has not been developed to its full technique, but in time its importance may well overshadow program transmission. It is vital, therefore, that the broadcaster retain his rights in the matter.

Broadcast stations are the logical mediums for the distribution of spot news; first, because of the rapidity with which the news can reach the public ear; second, because of the huge number of people reached; and third, because of the human interest and drama that can be packed into each flash. All three points have vast sociological significance, and we doubt if a public keenly interested in maintaining a close and human contact with the activities in this world, would for a moment approve of a ban *were they given the opportunity of expressing their views.*

The question is: what are the broadcasters going to do about it? It is high time that a complete and unconditional agreement be made between broadcasters and newspapers in regard to what each agency shall do in the future. It is natural that the newspapers should wish to protect their interests as they see them, and it is equally as natural that the broadcasters should wish to expand upon the types and forms of services they are in a position to provide. But it is not reasonable that newspaper publishers and the news-gathering agencies should attempt to retard the growth of broadcasting by depriving the public of a desired service.

COMMUNICATION & BROADCAST ENGINEERING

FOR OCTOBER, 1935

A NEW METHOD OF MEASURING STUDIO REVERBERATION

By ALFRED W. BARBER
CONSULTING ENGINEER

DECAYING SOUND WAVES in a room present an interesting problem in measurement. The particular combination of apparatus necessary for such measurements is unique in requirements and function. The following description deals with a novel system employing some of the most modern tools of the art and yet yielding a simple, direct result. A cathode-ray tube forms the basis around which the system is built.

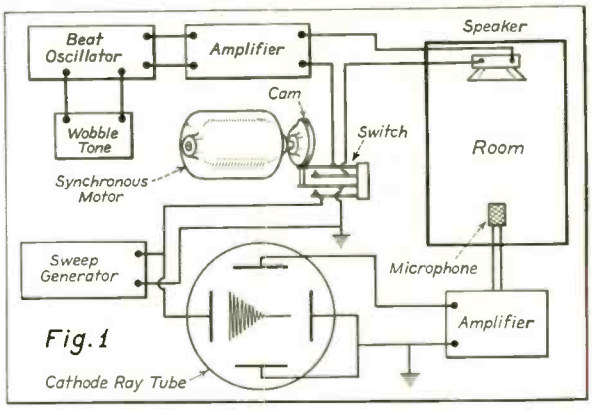
SOUND IN CONFINED SPACE

Whenever a sound wave is produced in a confined space there is formed a complex pattern of direct and reflected waves the vector sum of which at any point creates an instantaneously unique value of sound pressure. While the sound source is vibrating, the reflected waves add to the direct wave producing an increase or decrease in pressure depending on the relative phases but always increasing the average sound pressure in the space. When the sound source ceases to vibrate, the sound waves existing at that instant gradually dissipate themselves upon the confining areas. The rate at which this dissipation takes place is a characteristic of any particular space and since it is in general a function of frequency, its measurement must be performed at a sufficient number of frequencies as to completely determine this function.

Resume of Data Obtained in Studios of W2XR, and the Equipment Used

MEASURING SET-UP

Fig. 1 shows a block drawing of the present system for measuring the rate of sound decay at various frequencies. A beat oscillator is used to generate an audio tone of any desired frequency. The audio-frequency voltage is amplified and fed to a loudspeaker located within the space where measurements are to be made such as a broadcasting studio, living room or auditorium. The loudspeaker sets up the desired sound wave and is turned off and on by a pair of motor-driven contactors. The sound pressure in the space is converted into



BLOCK DRAWING OF THE SYSTEM USED FOR MEASURING THE RATE OF SOUND DECAY AT VARIOUS FREQUENCIES.

electrical oscillations by a high-grade microphone. The electrical energy is then amplified and indicated on a cathode-ray tube. If the amplifier output is applied, as shown, to the vertical deflecting plates, the beam excursion in the vertical direction will indicate the sound pressure amplitudes existing at the microphone. A condenser charged at a constant rate is connected across the horizontal deflecting plates of the cathode-ray tube, thus creating a time axis for the sound pressure. A second set of contactors on the motor is actuated by the same cam which operates the speaker and removes the short from the deflecting condenser, thereby starting the beam across the screen.

OPERATION

In operation, the motor is started and for part of a revolution connects the speaker and returns the cathode-ray tube beam to one side of the screen. The speaker, actuated by the amplified beat-oscillator output, builds up a sound pattern. The speaker is silenced by opening its circuit and at the same instant the cathode-ray beam is started across the tube at a uniform rate of speed. The vertical deflection records the decay of sound against the horizontal time axis. A camera may be conveniently used to record this pattern and the results may be computed from the photographs.

By definition "reverberation time" is the time required for the free sound pressure in any given space to fall 60 db. On a cathode-ray tube it is difficult to measure a 60-db range, but since the decay function is closely logarithmic, the result may be obtained by taking three times the time required for a 20-db decay of sound pressure. The accuracy of the results thus obtained seem to fully warrant the extrapolation.

MEASUREMENTS IN W2XR STUDIO

The above apparatus was used to measure the characteristics of a studio being used by the high-fidelity broadcasting station W2XR in New York. The studio under investigation has a floor 15 feet by 15 feet and is 10 feet high. The walls are covered with half-inch Celotex backed by rock wool for sound insulation purposes. Two walls and the ceiling are covered with Monk's Cloth having a fifty percent gather. The main furniture in the studio consists of two grand pianos with benches, and four small chairs. This studio is used for solo and duo piano work, solo and duet singing, violin and piano, and violin, 'cello and piano combinations.

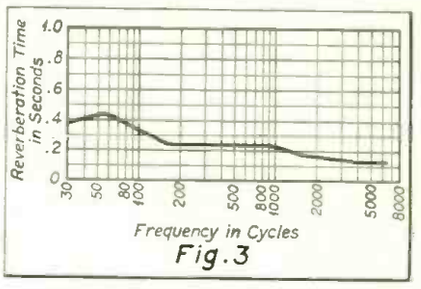


Fig. 3

RESULTS OF MEASUREMENTS MADE IN A STUDIO AT W2XR.

The measurements to be described in this report were made with steady tones of frequencies from 30 to 6500 cycles. Higher frequencies will be used in later tests as the upper limit by the present method is determined only by the speaker used as a sound source.

MEANS OF MEASUREMENT

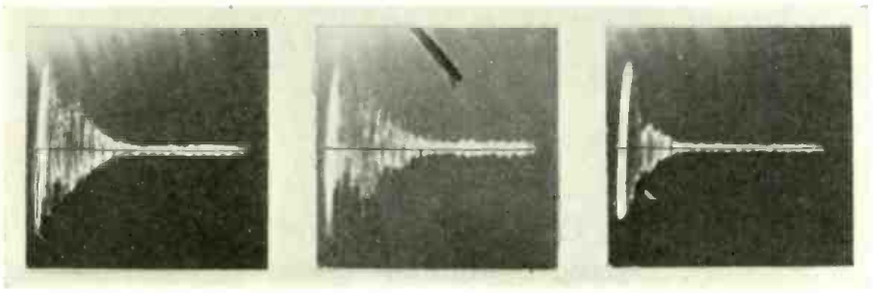
In making these measurements an audio-frequency beat-oscillator output was amplified by the station monitor amplifier and the output fed to a high-fidelity speaker located within the studio. The sound pressure produced was picked up by means of a special crystal microphone. The microphone output was amplified by the regular station pre-amplifier and main amplifier. The main amplifier output was indicated vertically on the screen of a three-inch cathode-ray tube.

The horizontal cathode-ray tube deflection was obtained from the voltage across a condenser charged at a constant rate through a current-limiting tube. The beam speed was determined by photographing it against a 60-cycle voltage. The speed thus determined was 15 cm/sec. The speaker was turned off and the cathode-ray tube beam started by means of a double contactor actuated by a cam driven by worm-gear reduction from a 3600-rpm synchronous motor. A 9 by 12 cm camera having an aperture of f 4.5 and a double extension bellows was used to photograph the cathode-ray tube traces on verichrome film.

RESULTS OBTAINED

Fig. 2 shows the results obtained over the range from 30 to 6500 cycles. It will be noted that the decay curve is not smooth, but goes through a series

(*Continued on page 21*)


FREQUENCY: 30 CYCLES. TIME: 0.38 SECOND.

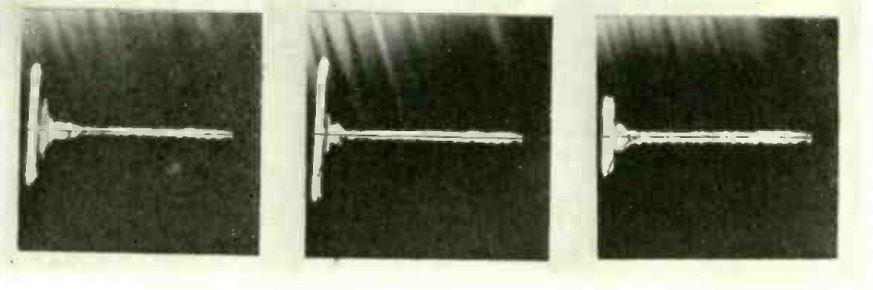
FREQUENCY: 60 CYCLES. TIME: 0.44 SECOND.

FREQUENCY: 160 CYCLES. TIME: 0.24 SECOND.


FREQUENCY: 450 CYCLES. TIME: 0.24 SECOND.

FREQUENCY: 700 CYCLES. TIME: 0.24 SECOND.

FREQUENCY: 1000 CYCLES. TIME: 0.23 SECOND.


FREQUENCY: 1500 CYCLES. TIME: 0.18 SECOND.

FREQUENCY: 4000 CYCLES. TIME: 0.12 SECOND.

FREQUENCY: 6500 CYCLES. TIME: 0.12 SECOND.

MARINE RADIO - TELEPHONE SERVICE

By F. A. GIFFORD and R. B. MEADER
Engineering Department
NEW ENGLAND TELEPHONE & TELEGRAPH CO.

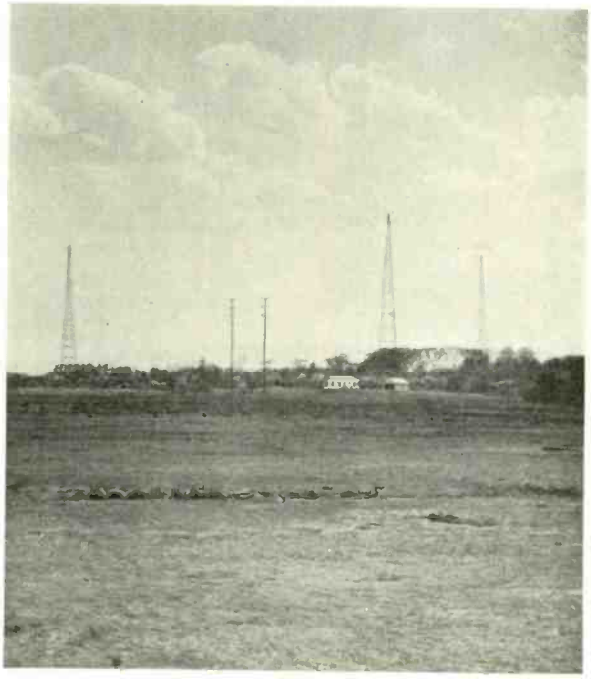
SINCE THE ESTABLISHMENT of ship-to-shore radiotelephone service by the Bell System in 1929, there has been a constantly increasing interest in a similar but less expensive service for small harbor and coastal craft such as tugboats, private yachts, coastal passenger ships, merchant craft and fishing vessels. This interest became particularly evident in New England in 1931 and since equipment suitable for the purpose had recently been developed by Bell Telephone Laboratories, the New England Telephone and Telegraph Company undertook the establishment of a marine radiotelephone service.

A survey consisting of a comprehensive series of field-strength measurements on ship board and at various points along the coasts of Massachusetts and Cape Cod Bays resulted in selecting Green Harbor as the location for a shore station. Green Harbor is in the town of Marshfield, Mass., about 28 miles southeast of Boston.

A commercial survey indicated that initially the service would be of interest chiefly to the Boston fishing industry. Consequently boat radiotelephone equipment was installed on the trawler *Flow* of the Bay State Fishing Company and the service was opened in June, 1932, on a demonstration basis. As tests with this vessel progressed, it became evident that the radiotelephone service would fulfill the communications requirements of the fishing industry. It also became apparent that a complete service of this type should include some means for determining the vessel's position at any time by means of radio.

Fishing operations are usually conducted in areas requiring accurate bearings over distances as great as 200 or 300 miles from shore radio-beacon stations. Equipment was developed to perform that function as an adjunct to the radiotelephone service. Tests of an experimental model indicate that the problem of providing suitable radio-compass equipment in the price range satisfactory to the fishing fleet owners has been satisfactorily solved.

During the period required for the development and tests of the radio compass, radiotelephone equipment was installed on several other fishing craft and on one private yacht and the service was placed on a commercial basis on July 1, 1934.



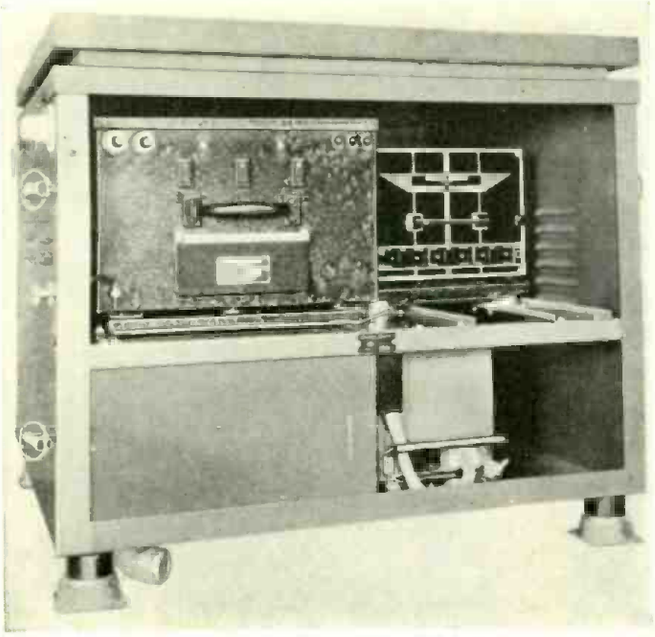
VIEW OF THE GREEN HARBOR STATION, MARSHFIELD, MASS., THE SENDING AND RECEIVING POINT IN THE NEW ENGLAND MARINE RADIOTELEPHONE SYSTEM.

RADIOTELEPHONE EQUIPMENT (Shore Station)

The shore terminal at Green Harbor (Station WOU) comprises in general a radio transmitter with associated antenna and power supply, a radio receiver with its associated antenna, and voice-frequency terminal equipment for maintaining proper speech volumes, preventing echoes and singing and providing for monitoring, talking and signaling. All the equipment is of Western Electric make.

The transmitting antenna is a single vertical wire 120 feet in height suspended from cables extending from three 165-foot steel towers 500 feet apart to a common point above the station. Advantage was taken of three towers already in existence.

The radio transmitter is a 400-watt, crystal-controlled type similar to those designed for use at aviation ground stations and adjusted to operate at a frequency of 2506 kilocycles. This fre-



CABINET ASSEMBLY OF MARINE RADIOTELEPHONE EQUIPMENT, HOUSING COMPACTLY THE TRANSMITTER (UPPER LEFT), THE RECEIVER (UPPER RIGHT), AND BELOW THE JUNCTION BOX AND SELECTOR SET, THE LATTER AN OPTIONAL FEATURE FOR EXCLUSIVE RINGING OF THE VESSEL'S TELEPHONE BELL.

quency is maintained within limits of better than 0.025 percent. The power supply for the transmitter is obtained from a rectifier consisting essentially of two three-phase and a single-phase rectifier operating on 220-volt, three-phase, 60-cycle power.

The transmitter is coupled to the antenna by means of a 500-ohm transmission line and a tuning unit containing the necessary apparatus for tuning the antenna to resonance.

The radio receiver is of the double-detection, single-control type, equipped with automatic volume control and arranged for operating over a frequency range of from 1500 to 3600 kilocycles. The receiver is coupled through a concentric conductor transmission line and tuning unit to a single vertical-wire receiving antenna 45 feet in height located 500 feet from the transmitting antenna.

In order to combine the two unidirectional radio channels into a two-way circuit suitable for connection to the ordinary wire circuits in the land telephone network, apparatus similar to that provided at the terminals of the transatlantic and high seas ship-to-shore radiotelephone circuits has been provided. This apparatus includes controls for adjusting the volume of speech into the transmitter and from the receiver to the wire lines and the usual voice-operated devices (termed "vodas") provided for the suppression of echoes and singing.

The apparatus mentioned, together with a volume indicator, means for talking, monitoring and signaling, and testing apparatus is assembled on one floor-mounted apparatus bay. This, mounted adjacent to the bay containing the receiver and a noise-suppression device constitutes the operating position. This position is continuously attended by a technical operator who adjusts the controls during the progress of each call, guided by indications of the meters provided, to insure the best possible connection under the conditions obtained at the time. Power for the terminal apparatus is supplied by a motor-generator set operating from a 110-volt 60-cycle source.

A noise-suppression device, termed a "codan"* (carrier-operated device anti-noise) is employed in connection with the receiver to insure relatively quiet conditions on the receiving line by introducing a predetermined high loss into the audio-frequency portion of the radio receiver during intervals when there is no incoming carrier. When a carrier is received, the codan action removes this loss, allowing the speech with which the carrier is modulated to pass from the receiver output to the receiving line. This device makes it possible to deliver higher speech volumes to the telephones on shore since it prevents the operation of the receiving vodas relays on radio noise during the idle intervals. It also prevents the high radio noise which would otherwise result due to the increase in gain inserted by the automatic volume control whenever the carrier is interrupted.

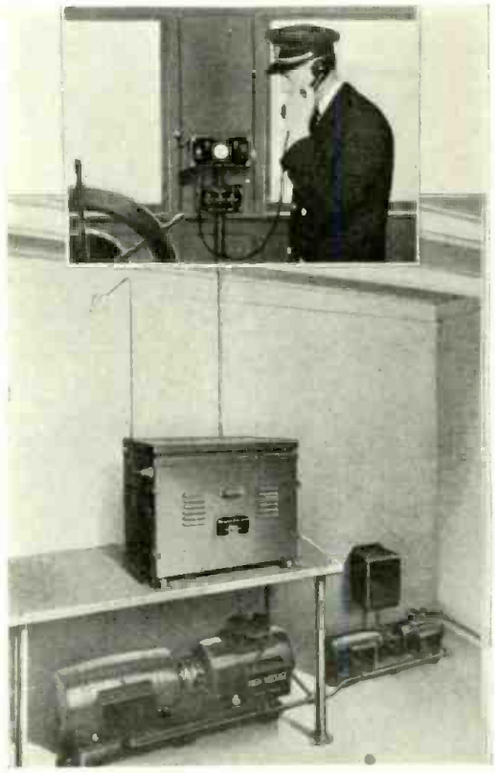
*See page 20.

It can be seen from this discussion that the codan requires that the carrier of the distant transmitter be suppressed, except when the user actually talks. This method of operation has been adopted for this type of marine radiotelephone service.

A 10-kw, 220-volt, three-phase, 60-cycle alternator, driven by a Buffalo gasoline engine, has been provided to furnish the necessary emergency power supply in case the normal commercial supply fails.

RADIOTELEPHONE EQUIPMENT (Boat Stations)

The boat station equipment consists essentially of three units: A steel cabinet, 28½ inches by 25½ inches by 25 inches, containing the radio transmitter, receiver, signaling unit and relays for controlling the circuit operating, the power-supply equipment, and a control unit including a handset of a special



MARINE RADIOTELEPHONE EQUIPMENT FOR HARBOR CRAFT, TRAWLERS AND YACHTS.

type. The details of the radio-compass equipment are not within the scope of the present article.

The boat station radio transmitter is a 50-watt crystal-controlled type in which the crystal operates at half the carrier frequency. The transmitter is arranged for the use of three carrier frequencies, any one of which may be selected by means of a single local mechanical or an electrically-operated remote control. The frequency designated by the Federal Communications Commission for use by ships communicating with the shore through the Green Harbor radiotelephone station is 2110 kilocycles. This carrier frequency is maintained within limits of 0.025 percent. The equipment for coupling the transmitter to the antenna and tuning it to resonance forms an integral part of the transmitter.

The radio receivers most recently installed are of the superheterodyne type with the frequency of the beating oscillator crystal controlled to insure that the receiver is always adjusted to the proper frequency. Two crystals are provided and the circuit arranged so that the receiver may be quickly adjusted to operate on either of two frequencies by means of a local mechanical or an electrically-operated remote control. The second receiver frequency makes possible boat-to-boat conversations on a separate frequency.

The signaling unit which is normally connected to the output of the radio receiver consists of a selector operated under the control of an arrangement of relays which in turn are controlled by incoming signal pulses of 600- and 1500-cycle tones. The bell on each vessel is operated only in response to the particular code of pulses to which the selector is adjusted. Arrangements are also included so that all the vessels of any one fleet may be called simultaneously.

The power-supply equipment depends upon the characteristics of the vessel's primary electrical power, but d-c voltages of 1050, 200 and 12 volts are necessary for the operation of the radio equipment. In the case of a vessel with a well regulated 110-volt power plant, power at the above voltages is furnished by two motor-generator sets equipped with speed regulators.

One of these motor-generator sets operates continuously while the vessel is standing by for the reception of signals and furnishes 12- and 200-volt power for the operation of the radio receiver and signaling unit. The second motor-generator set is automatically started when the handset is lifted from the switch hook to place a call or in response to an incoming signal, and furnishes power to operate the transmitter.

INTERIOR VIEW OF THE GREEN HARBOR STATION, MARSHFIELD, MASS., THE SENDING AND RECEIVING STATION IN THE NEW ENGLAND MARINE RADIOTELEPHONE SYSTEM.

On several of the smaller boats having 32-volt power supply with wide voltage fluctuations, power-supply equipment consisting of two dynamotors operated from a 12-volt battery charged from the vessel's storage battery has been employed successfully.

The control unit for the radiotelephone consists of a small panel on which are mounted a switch for turning the set on and off, a meter for indicating antenna current, a manual volume control, pilot lamp signals and a bell for announcing incoming calls. A special handset with push button completes the control unit assembly.

OPERATING POSITION AND WIRE LINES

At Boston, the marine radiotelephone traffic is handled at two positions on the outgoing toll board especially modified for this purpose. The wire lines from the Green Harbor station terminate at this point, and calls from vessels can be switched by the operator to any point connected to Bell System facilities. The normal wire lines are three loaded cable pairs. One pair is used for transmission from the shore telephone to a boat, the second conducts speech received from a boat through the toll position to the land-line telephone, and the third is employed as an order wire for communication between the operator at the marine position and the technical operator at the Green Harbor station. All of these circuits are duplicated over an alternate route for use in case of trouble on the normal facilities.

OPERATION OF THE SYSTEM

To illustrate the operation of the service, let us follow the routing of a call from an ordinary land telephone to a vessel and vice versa. Let us assume that a person in the vicinity of Boston wishes to talk with the captain of a fishing trawler. This person follows the usual procedure in placing a telephone toll call. The toll operator establishes connection with the marine operator who records the details of the call and requests the person calling to hold the line.

The marine operator then dials the code assigned to the vessel desired. The dialing operation produces the desired grouping of 600- and 1500-cycle pulses which modulate the radio-transmitter carrier frequency of 2506 kilocycles. The signaling unit on the vessel is actuated by these pulses and the bell rings. The captain raises the handset from the switchhook on the control unit, presses the push button in the handle of the handset and announces the name of his vessel. The operator then completes the connection and the conversation ensues.

In placing a call from boat-to-shore the captain or member of the crew raises the handset from the switch-hook and, after listening to ascertain that no conversations are in progress, presses the push button and calls "marine operator." The marine operator who is normally monitoring on the channel ascertains the name of the calling vessel, the

(*Continued on page* 15)

FIELD STRENGTH

By E. L. GOVE* and C. E. SMITH†
SOUND SYSTEMS, INC.

INTRODUCTION

AS BROADCASTINC HAS advanced, the technical requirements have become more exacting in every way. The rule of thumb has had to give way to exact engineering. This is particularly true in regard to the radiated energy from a radio transmitter. Quantitative measurements of this radiated energy is usually expressed in terms of field strength.

Field strength measurements can be naturally divided into two distinct classes; namely, spot measurements and continuous recording measurements. A readily portable, rugged, yet easily-operated instrument is desirable in making spot measurements, while continuous recording equipment may be of a semi-portable type, but capable of operating for long periods of time without much attention.

To meet these requirements, two measuring sets were designed and constructed. Both sets have proven to be very satisfactory in field operation. Some of the needs and applications with a description of the equipment follows:

PORTABLE FIELD STRENGTH SET

Commercial departments find it necessary to call upon the technical department to help solve the question of coverage so that equitable rates can be established. The equipment needed to accomplish this can become a very valuable asset to any progressive radio station, not only to collect coverage data, but also for the gaining of necessary information in locating new transmitter sites, determining the efficiency of radiating systems, and, when antenna improvements are made, to definitely check the degree of such improvements.

After experimenting with two portable field sets certain improvements were found desirable and so, were incorporated in the set. With portability in mind, it was built around the '30 series of battery-operated tubes, into a compact single unit, without sacrificing accuracy. Since the recording equipment covers frequencies from 550 kc to 20 mc, this set was constructed to cover only the broadcast band. The Direct Comparison Method of measurement was adopted, because of the speed and ease of operation. The calculation of field strength then reduces to simple multiplication. The set is capable of measuring field intensities from 5 microvolts per meter to 1 volt per meter.

*Technical Supervisor, WHK.
†Assistant Engineer, WHK.

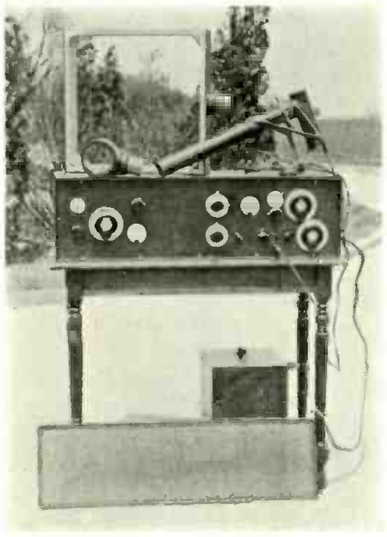


FIG. 1. THE FIELD STRENGTH MEASURING UNIT. NOTE THE LOOP AND LOOP FIXTURE.

FIG. 2. SHOWING THE LOOP FIXTURE EXTENDED THROUGH THE REAR WINDOW OF THE CAR.

MECHANICAL FEATURES

The single compact field strength unit shown in Fig. 1 can be located on the deck back of the seat in a coupe, with the loop fixtures extending through the rear window, supporting the loop above the top of the car. The entire operation of the set is then handled from within the car (see Fig. 2). When not in use the loop fixture can be removed and stored in the back of the car, allowing the closing of the rear window.

The loop fixture, consisting of an extension tube and loop rotating handwheel, plugs into the back of the case. The loop in turn plugs into the top of this fixture. Two loops were constructed with a voltage ratio of 10 to 1, or a difference of 20 decibels. The large loop is used for low field intensities, and the small one for high field intensities near the transmitter. A small cap is provided to cover the loop tube when traveling from point to point, protecting the plug and wiring from dust and rain.

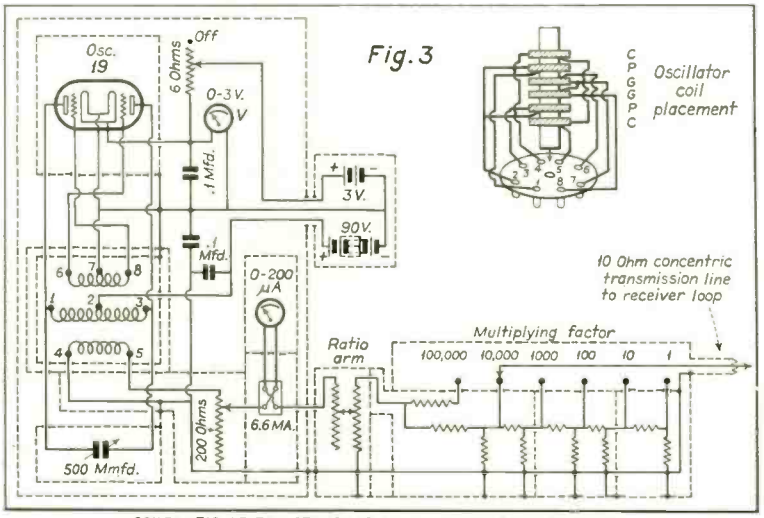
The field strength unit consists of a calibrating oscillator and superheterodyne receiver. The thoroughly shielded calibrating oscillator is located in the left hand end of the case. Next to it in the same case, though separately shielded, is the oscillator battery supply, followed by the calibrated output attenuator which feeds a standard signal into the loop circuit. The receiving set and output meter are located in the right hand end of the case. A cover lid fits over the recessed front panel to protect the meters and controls when necessary.

The receiver battery supply is in a separate case located in the rear compartment of the car. A plug-in cable makes the connection with the set through the rear window.

ELECTRICAL DESIGN

A circuit diagram of the calibrating oscillator is shown in Fig. 3. The oscillator consists of a push-pull circuit carefully and thoroughly shielded to prevent stray coupling into the loop

MEASURING EQUIPMENT



SCHEMATIC OF THE STANDARD FIELD SET SIGNAL GENERATOR.

circuit. The oscillator coils are of the small honeycomb type mounted on an Isolantite shaft; the whole assembly arranged to plug in. The coil unit is in a double-shielded compartment. Each unit of the oscillator is separately shielded and all shields are grounded to the case at a common point. This entire assembly is enclosed in a copper case and the unit mounted inside the aluminum carrying case.

The oscillator battery supply case is constructed of copper, the grounding of which is a part of the unit system, thus preventing any possibility of stray fields through the leads. The filament voltage is controlled by a rheostat and measured by a meter on the panel.

The r-f output of the oscillator is controlled by a 200-ohm potentiometer connected through a thermocouple, for metering, to the attenuation network. The attenuation network consists of a ratio arm and a multiplying-factor switch, making possible the control of the output continuously from 0.5 microvolts to 1 volt. Special care was taken in the shielding of the attenuation network, and its attenuation was checked against a known standard.

The output of the attenuator feeds into one side of the balanced loop circuit, as shown in Fig. 3. When the calibrating oscillator is connected to the loop, the resistance in each side of the loop is balanced. Half of the output of the loop feeds into a sensitive superheterodyne receiver using one stage of tuned radio frequency. The receiver selected was a standard battery-operated set. The automatic volume control was replaced with a stepped control, as shown in Fig. 4. The bias on the second detector was made continuously adjustable so that a convenient deflection could be more readily obtained on the output meter. The output stage was replaced by a phone-monitoring jack. A filament voltmeter and control rheostat were installed. A 500-microampere meter was connected in the plate circuit of the second detector, and a shunt switch provided to change the meter to read 2.5 milliamperes when less sensitivity is desirable. An audio choke coil was placed in the plate lead of the second detector to help iron out the effect of audio modulation on the carrier.

OPERATION

With the proper loop in place, the loop and set are adjusted for maximum deflection. Neutralization of either loop is quickly accomplished by turning the loop-balancing condenser to previously adjusted stop pins. The stepped volume control and bias control should be adjusted for a convenient deflection on the output meter. The loop is then turned through 90° to a null position. The calibrating oscillator is turned on and adjusted to the frequency of the station being measured. The output of the oscillator is adjusted to a predetermined calibration reading on its output meter of 56. This supplies one volt across the attenuator. The attenuator, which is calibrated in microvolts, is then adjusted to give the same deflection on the output meter as that induced by the signal being measured.

The voltage induced in the loop by the signal is then

$$0.1\,E = hfe$$

Where E = voltage output of attenuator connected to calibrating oscillator.

0.1 E = voltage induced in the loop; the value 0.1 is the result of the 1.1-ohm shunt across the 10-ohm transmission line to the loop circuit.

e = volts per meter field intensity.

f = operating frequency in cycles.

$h = \frac{k\,AN}{v}$ the effective height of the loop in meters.

Where k = 6.2832

A = area of loop in square meters

N = number of turns in the loop

v = 3×10^8 meters per second the velocity of light.

Changing *E* from volts to microvolts and *f* from cycles to megacycles gives

$e = \frac{1.82E}{F}$ microvolts per meter for the large loop

and

$e = \frac{18.2E}{F}$ microvolts per meter for the small loop.

A table was prepared as a matter of convenience covering the channels in the broadcast band and reducing the above equations to

$e = K_f E$ microvolts per meter for the large loop.

$e = 10\,K_f E$ microvolts per meter for the small loop.

Where $K_f = 1.82/f$

RESULTS

The set has proven to be very satisfactory in field operation. It has been used repeatedly during bad weather and measurements made during rain. The set can be put into operation on location and measurements made on one or more stations in a few minutes. If

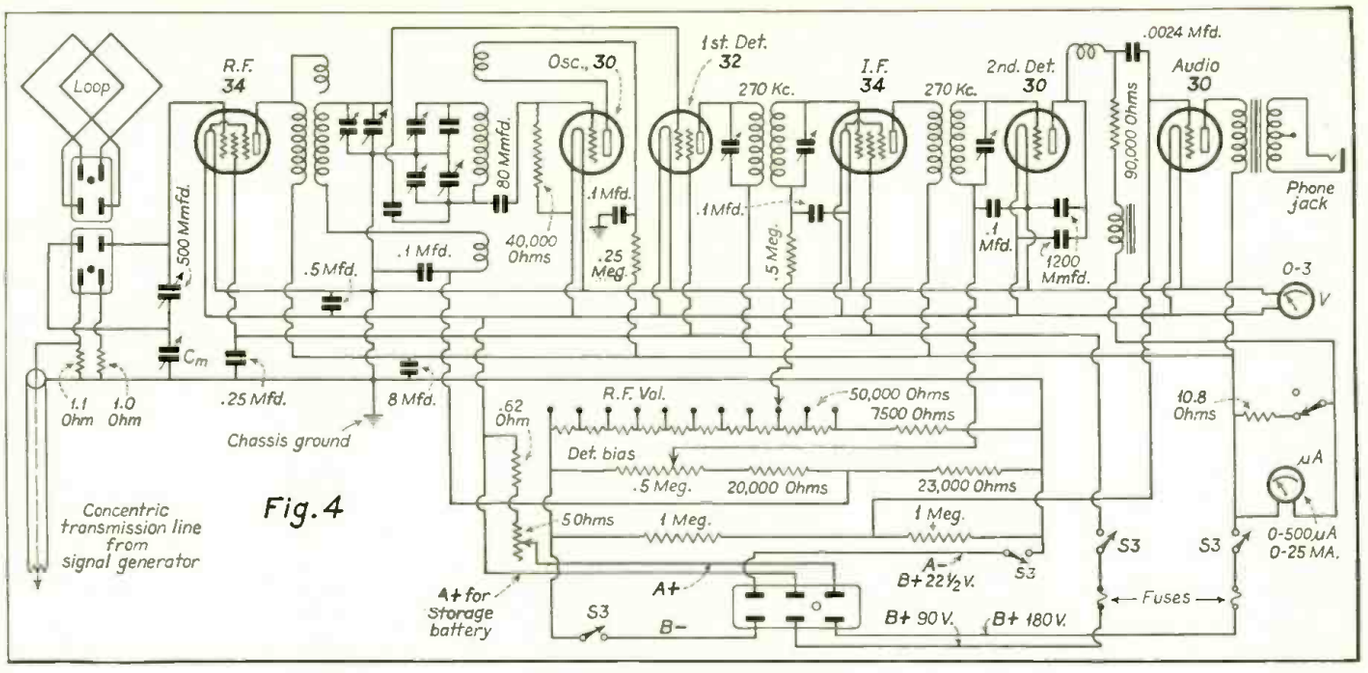


Fig. 4

SCHEMATIC OF THE STANDARD FIELD SET RECEIVER.

the road is not too rough, observations can be made while traveling along the highway. This is particularly valuable when there are discontinuities in the conductivity or other irregularities that make it difficult to arrive at the true condition by spot measurements.*

FIELD-INTENSITY RECORDING EQUIPMENT

In checking the behavior of directional arrays, securing fading data or making permanent records under any condition that may seem desirable, an automatic recording field set fills a definite need.

The set herein described was designed and built with the idea of attaining maximum flexibility and to cover a wide band of frequencies, viz., 550 kc to 20 mc. Although it has a maximum sensitivity of better than one mv/m the sensitivity can be readily controlled to keep the readings within the paper width throughout wide variations of field intensity. Alternating-current operation through a voltage regulator makes possible continuous operation with little attention. The set is ruggedly constructed and when mounted in a car can be put in operation in a few minutes after connecting to a power supply. A 200-ft. cable carried in a reel mounted on the rear of the car makes such a connection very simple.

MECHANICAL FEATURES

The equipment is divided into six portable units: (1) a calibrating oscillator antenna tuning unit; (2) a receiver unit; (3) the attenuator unit; (4) the logarithmic voltmeter unit; (5) the recording meter; and (6) a voltage regulator.

Each unit is assembled in a metal case equipped with carrying handle and protective metal cover. Power-supply connections are made through plug-in cables. The r-f connections are made through plug-in concentric transmission lines connecting directly from case to case when they are lined up side by side in proper order.

The loop is designed with an extension column so that connection can be made through the top of the car, rotation being controlled from inside the car. A built-in coupling unit makes possible the use of a conventional antenna when desired.

Each unit is thoroughly shielded so that stray fields are kept to a minimum.

ELECTRICAL DESIGN

In the calibrating oscillator antenna tuning unit a variometer and varicoupling assembly make possible the use of a conventional antenna. Selection of this arrangement on the loop is accomplished through a simple transfer switch.

The thoroughly shielded calibrating oscillator is inductively coupled to the loop circuit, static shielding separating the two coils. The thermocouple for metering the applied voltage is connected across the primary coil. The oscillator power supply is secured from the receiver.

The receiver unit consists of a standard all-wave receiver modified by removing the Class B audio output system and substituting a plate-to-500-ohm transformer for monitoring phones. The 53 output socket provides the filament and plate supply for the calibrating oscillator.

The antenna transmission line terminates in a flexible lead and grid clip and can be connected to any one of three grid caps. These connections are made through a small door in the receiver panel. This gives a wide range in sensitivity, hence a wide range of field strength may be measured.

The automatic volume control was removed and the input to the intermediate amplifier connected through a concentric transmission line to the attenuator unit and back through another similar line. The attenuator unit provides for an attenuation of 110 db in steps of 1 db.

The output of the receiver is carried to the logarithmic voltmeter unit. A discussion of this type of voltmeter is given by F. V. Hunt in the December 1933 issue of *The Review of Scientific Instruments*. In this unit the grids of three type 58 tubes are connected to the elements of a type 55 tube for rectification. This current is read on an 0-200 meter. Since the output meter requires 5 ma for full-scale deflection, a direct-current bridge amplifier utilizing two type 56 tubes was added.

The power-supply unit to operate this assembly is an integral part of it. The output of this unit may be switched from an interval 0-5 ma meter or to two binding posts for connection to the external recording meter.

The recording meter selected was a

*Readings taken on reenforced concrete highways may be in error due to the presence of standing waves.—EDITOR.

standard Esterline Angus 0-5 ma graphic recording meter.

OPERATION

With the loop in place and power turned on, adjustment is made for maximum deflection on the internal output meter. To prevent overloading, the proper grid is selected and the db attenuator used for the final adjustment. The cathode-current meter should also be turned on as a check. The zero adjustment should normally be left on a predetermined marker. A warm-up period of 15 to 20 minutes should be allowed to stabilize the operation of the beating oscillator.

The set should be calibrated both before and after making a record. Within limits the thermal meter in the calibrating oscillator registers the voltage induced in the loop circuit. From calibration curves of the oscillator output meter the voltage induced in the loop circuit can be determined.

With an output meter reference point of 4 milliamperes the desired signal is tuned to maximum and the attenuator adjusted to as near 4 milliamperes as possible. If it is desirable to know the field strength for this deflection, notation should be made for future reference. Usually the equipment is calibrated and the field strength calculated from the recorder chart.

After turning the loop to minimum the calibrating oscillator is turned on and adjusted to the frequency being measured. The oscillator output is brought up to 10 or 20 microamperes and the db attenuator adjusted to give 4-ma output. If this cannot be obtained readings either side should be taken and the correct db value interpolated.

With a calibrating voltage of E_1 having an attenuation of A_1 db for a deflection of 4 ma and a signal induced voltage of E_2 having an attenuation of A_2 db for a deflection of 4 ma, A_2-A_1 gives the db above the calibrating voltage E_1, due to the incoming signal E_2 or

$$E_2 = \frac{E_1}{\text{Anti Log } \frac{A_1 - A_2}{20}}$$

Ef (1) for the field strength can be written

$$e = \frac{E_2}{hf}$$

Substituting for h the effective height of the loop and for E_2 this equation can be written

$$e = \frac{17250\ E_1}{f \text{ Anti Log } \frac{A_1 - A_2}{20}} \text{ mv/m}$$

where E_1 = microvolts calibrating voltage induced in the loop circuit.
f = frequency in kc.
A_1 = db corresponding to E_1 to give 4-ma output.
A_2 = db corresponding to E_2 to give 4-ma output.

As a matter of convenience a table was made for all frequencies in the broadcast band which reduces the above equation to

$$e = \frac{K_f\ E_1}{\text{Anti Log } \frac{A_1 - A_2}{20}}$$

where $K_f = 17250 / f$.

This equipment has had a quite varied use in the field both for spot and short record use and also long record work. It has proven very useful in definitely locating the fading wall of the station, Long records of fading and heterodyne effects between distant stations showing some very interesting phenomena have been made. Continuous runs during antenna experiments provide an accurate record of results accomplished.

MARINE RADIOTELEPHONE SERVICE

(*Continued from page* 11)

shore station desired and other necessary details, and while the calling party holds the line proceeds to call the land-line telephone and establish the connection.

When a person on one boat wishes to talk with a person on another boat, the procedure in placing the call and establishing the connection is the same as in the case of a ship-shore call, except that when both are prepared to talk, the technical operator at Green Harbor operates a by-pass key which connects the radio-receiver output to the radio-transmitter input without including the voice-operated device and other equipment associated with the land circuits. The land line is bridged on to the circuit so that the marine operator may be advised of any difficulties which arise in carrying on the conversation.

RESULTS OF OPERATION

During the more than two years that the system has been in experimental service, the transmission results up to distances of 500 miles from the shore station have been quite satisfactory. Of course, during periods of abnormally heavy static the normal range is somewhat reduced. The service is available at all times, but practically all business is handled between the hours of 8:00 A. M. and 6:00 P. M. so that the relatively poor atmospheric conditions usually existing during summer nights do not adversely affect the radiotelephone traffic. However, experience has indicated that calls originated during such periods from vessels within the normal range can be handled satisfactorily. During some period of favorable atmospheric conditions experimental transmissions over distances greatly in excess of the normal range have been successfully conducted.

On fishing vessels the radiotelephone equipment is accessible for maintenance work only at the conclusion of trips which are usually of about ten days duration. It is obvious, therefore, that the equipment must be designed for reliable operation over long periods and experience indicates that these requirements have been well satisfied.

Fishing craft normally make use of the service for reporting the details of the catch, for making arrangements to return to port and for talking with other fishing vessels to locate points where fishing is best. The radiotelephone has proved of vital importance on several occasions where engine breakdowns necessitated advice from shore in order to make repairs and having replacement parts available upon the vessel's arrival at port. In several instances of sickness and accidents to members of a crew, medical advice has been obtained or the Coast Guard summoned to remove the injured man for quick transportation to a hospital. In one case of severe damage to a trawler as a result of a collision, the Coast Guard were summoned and the owners were able to keep in constant touch with the situation.

At the present time, radiotelephone installations have been made on fishing trawlers and yachts, as well as on one Coast Guard patrol boat. Results of the marine radiotelephone system have demonstrated that the advantages offered by this type of communication service have great value both in the preservation of life and property and in the efficient operation of marine business.

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CORRECTION

ON PAGE 25 of the August, 1935, issue of COMMUNICATION AND BROADCAST ENGINEERING, the first sentence under the heading *Hamilton, Ohio, to Install Two-Way Police Radio* reads: "The first two-way police radio system in the state of Ohio will be installed this summer by the city of Hamilton." This statement is not correct.

A two-way police radio system was installed by the Radio Engineering Laboratories in the city of Springfield, Ohio, during August, 1934. This system consists of a 50-watt fixed transmitting station and nine radio-equipped police cars, with one spare for emergency service. Satisfactory two-way communication is carried on within the city limits, while the fixed transmitter is able to send out messages considerably beyond the county lines. This system has given very satisfactory service during its 14 months of operation.

WSPD Builds New Station

By GEORGE BROWN

ON AUGUST 20th WSPD, a CBS basic outlet, and the only radio station in northwestern Ohio, increased its power when it put into service the latest type Western Electric 5-kw, high-fidelity transmitter using 2500 watts daytime and 1000 watts night-time power.

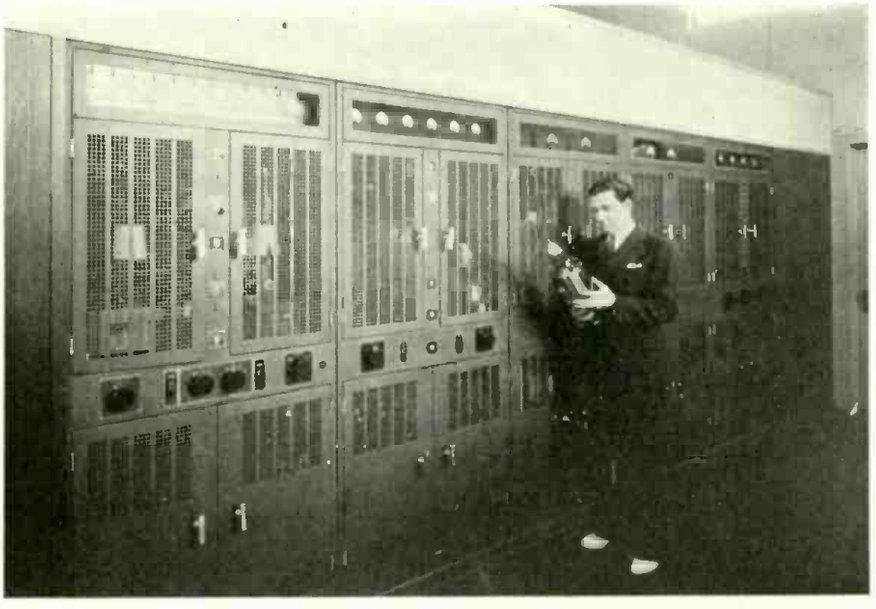
The transmitting site, which was formerly located on the Commodore Perry Hotel in downtown Toledo, is now located on Oregon Road in Wood County, Ohio, about 3.5 miles southeast of downtown Toledo. The studios and offices remain in the penthouse atop the Commodore Perry Hotel.

The present site was chosen in the fall of 1934 after Mr. J. H. Ryan, Vice-President and Manager, and Mr. Vernon C. Alston, Chief Engineer, of the Toledo Broadcasting Company made a careful survey of the territory surrounding Toledo. Two field-intensity surveys were conducted by Jansky and Bailey, consulting engineers, at Washington, D. C., before the present site was finally decided upon and construction begun.

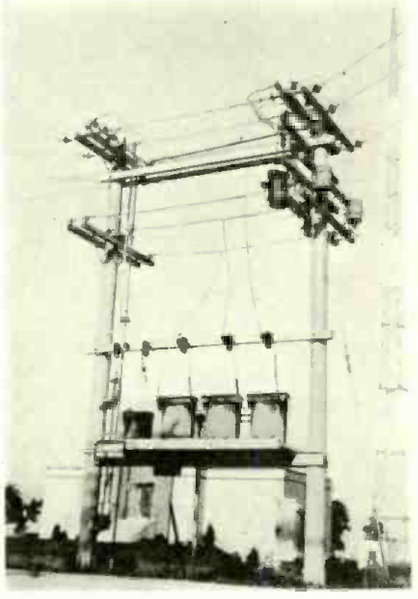
Mr. Alston designed the transmitter house and installed the transmitting equipment. Assisting Mr. Alston in installing the transmitter were William Stringfellow, Phillip Bloom, Ralph Larson, Edward Goon, Kenneth Neubrecht, and the author; members of the WSPD engineering staff.

POWER AND TELEPHONE FACILITIES

Power lines carrying three-phase, 60-cycle a-c at 6900 volts are fed from two different directions meeting at a sub-station in one corner of the five-acre plot. There it is stepped down from 6900 to 220 volts at three phase, supplying approximately 33 kw to the transmitter. One 10-kw transformer supplies power for lighting the building. In emergency or failure of regular power supply, the engineer on duty may press the second power line into use by manual switching at the sub-station. The transmitter is connected to the downtown studios with two high-fidelity program lines equalized within one db from 30 to 8000 cycles.



THE 5-KW TRANSMITTER. V. C. ALSTON IS SHOWN HOLDING A 1-KW TUBE.



A VIEW OF THE SUB-STATION, WITH STATION BUILDING AND TOWER IN BACKGROUND.

The second circuit serves as an emergency program line. Normally it is used as an order wire to the downtown control room and can be used to call and talk to any of the station's offices as well as any number on the Toledo exchanges. The program lines are also fed from two different directions, meeting near the sub-station. From this point both power lines and the 11-pair telephone cable are buried 3 feet under the ground for a distance of 200 feet, and enter the left wing of the building.

THE TRANSMITTER BUILDING

The transmitter building is of modernistic architecture, two stories in height and constructed of brown, glazed tile. Several bands of blue tile extend around the building and give it a novel effect. Another unique feature is the glass brick front to the public lobby.

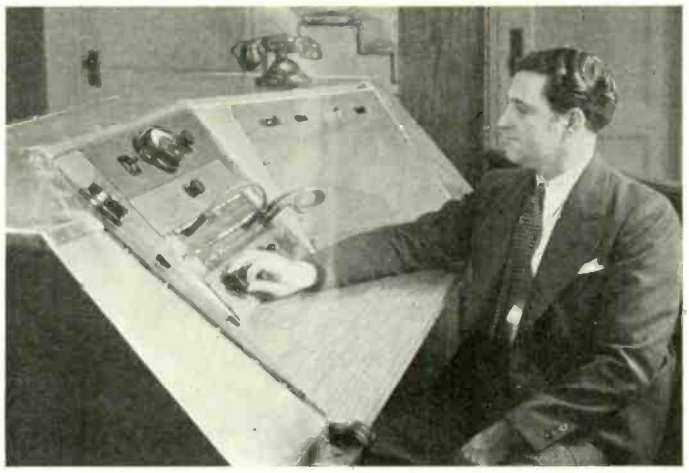
There is no basement under the building. The right wing of the first floor is a spacious two-car garage. The left wing is the power input and transform-

er room where the power and telephone lines enter. A room has been provided for a workshop directly in front of the furnace and pumping room where a deep well was drilled to furnish cold water for the air-conditioning apparatus. The entire building is air-conditioned.

In the power input and transformer room is a spiral iron stairway leading up to the generator and power-control room. In this room is housed the motor-generator set that furnishes 24 volts at 125 amps for the filaments of the 220B's. It is driven by a three-phase, 5-hp motor at 1735 rpm. Next to this is the filament filter panel, the fialment-reversing switch, and then the main-line switch.

In the opposite corner of the room is the water-cooling system for the 220-B's, a 1½-hp motor driving a centrifugal pump that circulates the distilled water through a copper vaned radiator. The radiator is cooled by a ½-hp fan. The remainder of the left wing is a storage room for tubes and spare equipment. The entire right wing of the building is a modern apartment that can be used as an emergency studio.

Entering the building from the front is the public lobby, which is completely separated from the main control room with glass panels. The control console occupies the center of the main control room and faces the transmitter. It contains all the program outlets, amplifier and volume indicator, and was designed by Mr. Alston.



MR. ALSTON SEATED AT THE CONTROL CONSOLE.

THE TRANSMITTER

Seven panels of the Western Electric high-fidelity, 5-kw transmitter, a late development of the Bell Laboratories, close in the rear of the main control room. Facing the transmitter, left to right, are the speech amplifier and frequency-monitor unit, the oscillator-modulator unit, first power amplifier, second power amplifier, tuning unit and control unit. The seventh panel is a door which gives the engineer access to the rear of the transmitter and the high-voltage rectifier. The modulator-oscillator unit and the first power-amplifier unit are a complete 1-kw transmitter. Each of these units contains its own plate and filament supply.

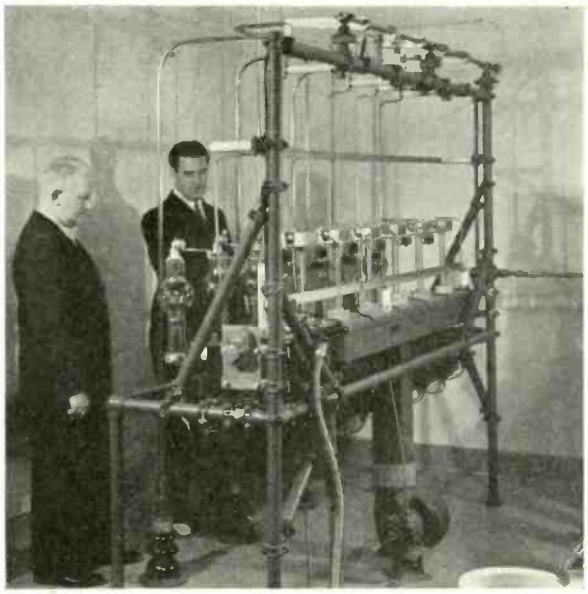
The final power amplifier uses two 220B, 10-kw water-cooled tubes. The plate supply for this unit is produced by the 12,000-volt rectifier in the rear of the transmitter room. Filament supply comes from the motor-generator set in the generator and power-control room.

WSPD is licensed for 2500 watts daytime power; therefore, but one of the water-cooled tubes is used, producing an unmodulated carrier of 2500 watts. For night operation a powerful magnetic switch, capable of handling 50-kw, cuts out the last amplifier stage and connects the driving stage to the antenna. This supplies 1000 watts output.

ANTENNA SYSTEM

The transmitter is coupled to the antenna by a 120-foot underground concentric transmission line. The inside is ¼-inch copper tubing. This is enclosed in and insulated from the 1-inch outside copper tubing, which is sealed air-tight and filled with nitrogen gas at 10 lb pressure. This line is brought out in the coupling house where it is connected to the antenna coupling unit. The power plant for the tower's lighting system is also located here, and supplies 2-kw of 110-volt direct current. The generator is a part of the antenna system and is fastened to the generator base with heavy stand-off insulators. It is coupled to the 3-hp motor by a heavy 12-inch porcelain insulator. This power plant was designed by Mr. Alston. The output of the coupling unit and the generator is fed to the antenna through a single tube concealing the lighting circuit wires. This does away with extra wires leading to the tower.

The tower is a Blaw-Knox vertical radiator, 204 feet in height, and is used at .39 wave. Radiating underground from the tower is a 60-wire ground system; each wire 175 feet long and buried 10 inches in the heavy, black soil.



THE 12,000-VOLT RECTIFIER. LEFT: J. H. RYAN, VICE-PRESIDENT AND MANAGER OF THE TOLEDO BROADCASTING CO. RIGHT: V. C. ALSTON, CHIEF ENGINEER, WSPD.

The Alternator As The Radio Power Supply

By J. DELMONTE

Providing Adequate Voltage Regulation Under Conditions of Varying Load—With Particular Reference to Aircraft Transmitters

IT FREQUENTLY becomes necessary to resort to alternating-current generators for the radio power supply. The electrical energy may then be stepped up to the desired potential by transformers and then rectified for use in connection with the radio transmitter circuit. In a number of instances the radio demands are the only loads that the alternator must be designed to meet. Consequently, when radio transmitters engage in cw or mcw transmissions, the keying alternately opens and closes the circuit, changing the load upon the alternator rapidly from no load to full load. As the load current is highly lagging due to the presence of the transformers, the voltage regulation at the terminals of the alternator is very high. The large voltage regulation leads to high voltages considerably in excess of the value for which the transmitter circuit was designed. By careful design, the circuit constants of the radio load may be corrected by condensers to give a more desirable voltage regulation.

$$\text{Voltage Regulation} = \frac{\text{Voltage (no load)} - \text{Voltage (full load)}}{\text{Voltage (full load)}} \quad (1)$$

LAGGING LOAD

In examining a lagging load upon the alternator, attention is called to the vector diagram of Fig. 1, where

AB = No-load voltage = $V_{n.l.}$
AC = Full-load voltage = $V_{f.l.}$
BC = Synchronous impedance drop = $\overline{ZI}$
CD = Effective resistance drop = $\overline{RI}$
DB = Effective reactance drop = $\overline{XI}$

The last three vectors above are characteristics of the alternator, which play a large part in determining the voltage regulation of the load. It is obvious on examining Fig. 1 that the transmitter load will not permit low voltage regulation due to the inductance introduced by the transformers; the AB vector is always larger than the AC vector for lagging currents.

On the other hand, low voltage regulation is attainable when the load current leads the voltage. This is more readily visualized by reference to Fig. 2, which illustrates a condition of zero voltage regulation (i.e., voltage no load = full-load voltage). It is of decided importance to calculate the power factor at which zero voltage regulation is achieved, for it is possible to introduce some compensating capacity in the radio circuit to give the load current a lead over the voltage. By observing this practice it is possible to eliminate a disturbing factor when the alternator is used as the radio power supply.

From trigonometry the following relation is established from the vector diagram of Fig. 2:

$$V_{n.l.}^2 = V_{f.l.}^2 + \overline{ZI}^2 - 2(V_{f.l.})\,(ZI)\cos\alpha \quad (2)$$

$$\alpha = 180^\circ - \left(\theta + \text{arc}\cos\frac{R}{Z}\right)$$

$$\alpha = \phi - \theta$$

Where

$$\phi = 180^\circ - \text{arc}\cos\frac{R}{Z} \quad (3)$$

$$\cos\alpha = \cos\phi\cos\theta + \sin\phi\sin\theta$$

and as $V_{n.l.} = V_{f.l.}$ for zero voltage regulation,

$$ZI = 2\,V_{f.l.}\,(\cos\phi\cos\theta + \sin\phi\sin\theta) \quad (4)$$

On substituting for $\sin\theta$ the value

$$\sqrt{1-\cos^2\theta}\,,$$

squaring and simplifying, the following quadratic equation is obtained:

$$(\csc^2\phi)\,(\cos^2\theta) - \frac{ZI\cot\phi}{V_{f.l.}\sin\phi}\cos\theta + \left[\frac{(ZI)^2}{(2\,V_{f.l.}\sin\phi)^2} - 1\right] = 0 \quad (5)$$

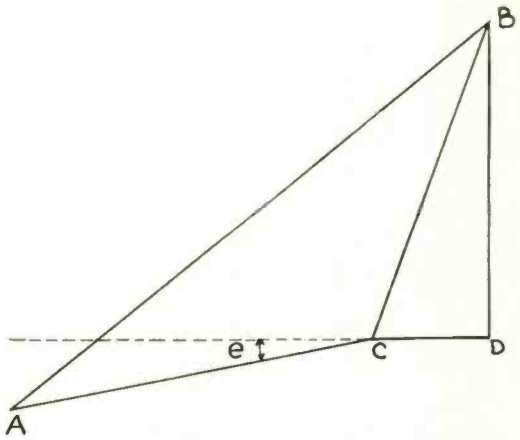


FIG. 1. VECTOR DIAGRAM, WITH LAGGING POWER FACTOR TO ALTERNATOR.

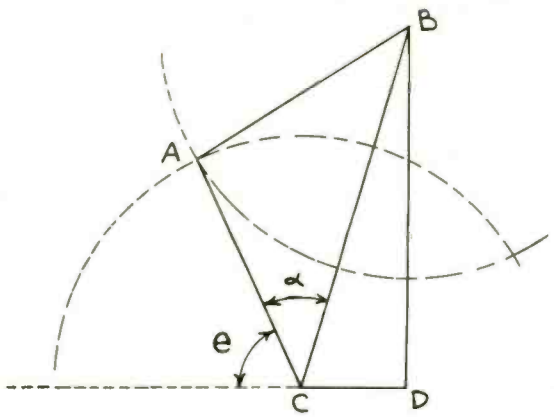


FIG. 2. VECTOR DIAGRAM, WITH LEADING POWER FACTOR TO ALTERNATOR.

On solving for cos θ, the following values are obtained:

$$\cos\theta = \frac{ZI\cos\phi}{2V_{t.l.}} \pm \frac{\sin\phi}{2V_{t.l.}}\sqrt{4V_{t.l.}^2 - (ZI)^2} \qquad (6)$$

DETERMINING PHASE ANGLE

By solving for the power factor in equation (6) it is possible to determine at what phase angle the load current must lead in order to obtain zero regulation. Referring to Fig. 2, it will be noticed that the arcs intersect each other at two points, indicative of zero voltage regulation under two conditions. These are calculated from equation (6): for one value it is plus the last term and for the other value it is minus the last term. It is sometimes possible that zero regulation may not be obtained. a condition that ensues when the impedance drop (ZI) is greater than twice the voltage ($2V_{t.l.}$). This necessitates that the alternator be designed with a reasonably low value of synchronous impedance to make possible low voltage regulation.

In equation (6) there are two unknowns, the current (I) and the power factor. While the full-load current under normal (uncompensated) conditions may be known, it is probable that the value will change with the changing of the power factor, which will be necessary to attain the low voltage regulation. As it is desirable that the power output to the transmitter be the same for the changed (compensated) condition as the original, another relation of I and the power factor is introduced:

$$W/VI = \cos\theta \qquad (7)$$

where W is the watts output to radio. And. on substituting into equation (6) the following relation ensues:

$$2W = ZI^2\cos\phi \pm \sin\phi \cdot I\cdot\sqrt{4V_{t.l.}^2 - (ZI)^2} \qquad (8)$$

Expressing the value of I in terms of a quadratic equation.

$$Z^2I^4 - (4V_{t.l.}^2\sin^2\phi + 4WZ\cos\phi)\,I^2 + 4W^2 = 0 \qquad (9)$$

On solving for I the following expressions are obtained:

$$I^2 = \frac{(4V_{t.l.}^2\sin^2\phi + 4WZ\cos\phi) \pm 4\sin\phi\sqrt{V_{t.l.}^4 - (V_{t.l.}^2\cos\phi - WZ)^2}}{2Z^2} \qquad (10)$$

SECURING COMPENSATION

On finding the value of I, which is the current that will be required by the transmitter load at that power factor which permits zero voltage regulation, a substitution into equation (6) will give the power factor for achieving the desired regulation. It is a simple matter to design the input of the radio circuit to compensate for the inductive characteristics, by the addition of capacitance. Knowing the power factor, this is solved as follows:

On adopting equivalent circuit values as in Fig. 3, the required capacitance for correcting the transmitter load may be calculated. Assuming the total power that the transmitter requires is lost in the circuit resistance (this is not strictly so as hysteresis, eddy current, etc., contribute to the losses), the equivalent value of R becomes:

$$R = W/I^2 \qquad (11)$$

if W watts are given to the radio circuit.

Let $\cos\theta = A$ for zero voltage regulation
$\cos\theta = B$ for the uncorrected radio load with the lagging power factor.

Then

$$A = \frac{R_1}{\sqrt{R_1^2 + X_0^2}} \quad \text{and} \quad X_0^2 = \frac{R_1^2}{A^2} - R_1^2 \qquad (12)$$

with R_1 the equivalent resistance when I (at 0 volt. reg.) flows. Likewise

$$B = \frac{R_2}{\sqrt{R_2^2 + X_1^2}} \quad \text{and} \quad X_1^2 = \frac{R_2^2}{B^2} - R_2^2 \qquad (13)$$

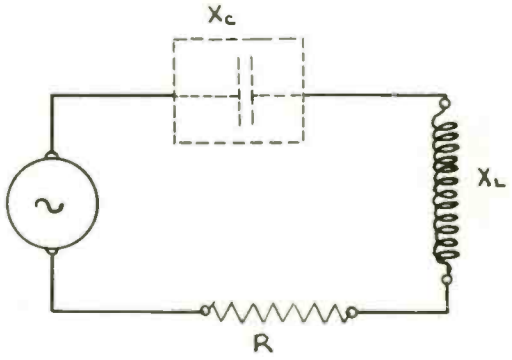


FIG. 3. EQUIVALENT CIRCUIT.

with R_2 the equivalent resistance when I (at original load) flows. Where X_1 equals the inductive reactance of the radio circuit and X_0 equals $X_1 - X_c$, solving for X_c, it is set equal to

$$1/2\pi fC \qquad (14)$$

where f = frequency of the alternator output
C = required capacity to establish the power factor of the load at *A*.

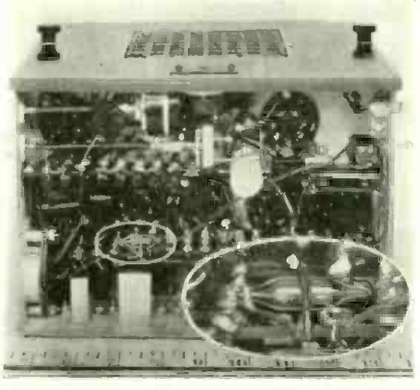
Thus from equation (14) the value of C is found which will bring the radio circuit constants to the proper values for permitting zero voltage regulation upon the alternator. As all the losses are not strictly I^2R losses, the value of C may be varied slightly from the calculated value until the circuit is tuned to that power factor which will give zero voltage regulation. When this condition ensues the keying of the radio transmitter may take place without profoundly affecting the terminal voltage of the alternator. This does a great deal toward improving the performance of the transmitter, if it depends upon a small alternator for its power supply.

TELECOMMUNICATION

PANORAMA OF PROGRESS IN THE FIELDS OF COMMUNICATION AND BROADCASTING

THE "CODAN"—AN ANTI-NOISE DEVICE FOR POLICE CAR RECEIVER

ULTRA-HIGH-FREQUENCY radio transmitters, such as are used in the Western Electric Police Systems at Newark, New Rochelle, and other cities of the country, are so arranged that carrier power is radiated from the antenna only while announcements are being made. This provision considerably reduces the operating costs both by prolonging the life of the tubes and decreasing the daily power consumption. The radio receivers used with the ultra-high-frequency system, on the other hand, are equipped with automatic volume control, which maintains a constant output from the loudspeaker regardless of the strength



OPEN BOTTOM VIEW OF THE ULTRA-HIGH FREQUENCY RECEIVER FOR POLICE CARS. THE SMALL NEON TUBE WHICH IS THE MAJOR ELEMENT IN THE "CODAN"—THE ANTI-NOISE DEVICE—IS SHOWN WITHIN THE WHITE OVAL. INSET AT RIGHT IS AN ENLARGEMENT OF THIS OVAL.

of signal picked up. When the carrier is on, the signal strength is considerably higher than noise arising from ignition systems and other sources, and as a result the noise is not normally objectionable. When the carrier is off, however, the noise, even though weak, would be amplified to the full output of the receiver by action of the automatic volume control and would be very objectionable if precautionary steps were not taken.

The possibility of noise when the carrier is off is eliminated in these radio receivers by a device called a codan. This word is constructed from the initial letters of the phrase "carrier-operated device, anti-noise," which describes its function. It is not a single piece of apparatus, but a circuit intimately associated with various parts of the receiver.

Its major element, however, and one employed only for the codan, is a small neon tube. The important characteristic of this tube is that it acts as a very high impedance to all voltages up to some critical value. At voltages above this critical value, however, a discharge occurs across the electrodes of the tube and the impedance drops to so low a value as to act as a short-circuiting path. This tube is so connected in the circuit that when the carrier is off, a high voltage is impressed across it which causes the tube to discharge. Under these conditions the tube is conducting, and forms a short-circuiting path that kills the output of the audio-frequency amplifier, and the loudspeaker remains silent. With the neon tube in a non-conducting state, the receiver acts normally.

The voltage across the neon tube depends upon the average level of the received signal. When the carrier is on, this average level is high enough to keep the neon tube non-conducting, and the set operates. When the carrier is off, however, the average signal strength is low enough to make the tube conducting, and the loudspeaker remains silent. The noise impulses themselves may be quite high in intensity, but they are of extremely short duration so that their average value is too low to operate the codan.

With these codan-equipped receivers, therefore, the loudspeakers are silent as long as the transmitter at headquarters is off the air. As soon as it comes on, however, the codan operates, and the announcement comes in on the loudspeaker.

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ROCHESTER I. R. E. FALL MEETING

THE ROCHESTER Fall Meeting of the Institute of Radio Engineers is to be held November 18, 19, 20, 1935, at the Sagamore Hotel, Rochester, N. Y. The complete program follows:

MONDAY, NOVEMBER 18

9:00 A.M. Registration
Opening of Exhibits

10:00 A.M. Technical Session

SUPERHETERODYNE OSCILLATOR DESIGN CONSIDERATION
W. A. Harris, RCA Manufacturing Company, Radiotron Division

ELECTRICAL QUALITY OF RADIO COMPONENTS
C. J. Franks, Boonton Radio Corporation

12:30 P.M. Group Luncheon

2:00 P.M. Technical Session

NEW PROBLEMS IN METAL TUBES
Roger M. Wise, Hygrade-Sylvania Corporation

LATEST DEVELOPMENTS IN ELECTRON OPTICS (WITH DEMONSTRATION)
W. H. Kohl, Rogers Radio Tubes Company, Ltd.

4:00 P.M. Inspection of Exhibits
Meeting RMA Committee on Television
Meeting RMA Committee on Sound Equipment

6:30 P.M. Group Dinner

8:00 P.M. Joint Technical Session with Radio Club of America

ELECTRON MULTIPLIERS AND NEW ELECTRON TECHNIQUE (WITH DEMONSTRATION)
V. K. Zworykin, RCA Manufacturing Company, Victor Division

TUESDAY, NOVEMBER 19

9:00 A.M. Registration
Opening of Exhibits

9:30 A.M. Joint Technical Session with RMA Engineering Division

A TRAGEDY IN SPECIFICATIONS
L. C. F. Horle, Consulting Engineer

MANAGEMENT'S STAKE IN STANDARDS
P. G. Agnew, American Standards Association

12:30 P.M. Group Luncheon

2:00 P.M. Technical Session

THE STATUS OF THE RADIO SPECTRUM
C. B. Jolliffe, Federal Communications Commission

3:00 P.M. Inspection of Exhibits
Meeting RMA General Standards Committee

6:30 P.M. Stag Banquet (Informal)
Toastmaster, A. F. Van Dyck

EUROPEAN EXPERIENCES IN RADIO
L. M. Clement, RCA Manufacturing Company, Victor Division

SPEECH WITH SOUND EFFECTS
David Grimes, Philco Radio & Television Corp.

WEDNESDAY, NOVEMBER 20

9:00 A.M. Opening of Exhibits

9:30 A.M. Technical Session

INSTANTANEOUS TRACING OF TUBE CHARACTERISTICS
Otto Schade, RCA Manufacturing Company, Radiotron Division

QUANTITATIVE INFLUENCE OF

TUBE AND CIRCUIT PROPERTIES ON RANDOM ELECTRON NOISE
S. W. Seeley and W. A. Barden, RCA License Laboratory

12:30 P.M. Group Luncheon

2:00 P.M. Technical Session

DESIGN OF DOUBLET ANTENNA SYSTEMS
H. A. Wheeler, Hazeltine Service Corporation

IRON CORE ANTENNA COIL DESIGN
George H. Timmings, Meissner Mfg. Company

4:00 P.M. Exhibits Close

Meeting of RMA Committee on Broadcast Receivers

Meeting of RMA Committee on Vacuum Tubes

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ITALIAN LINK WITH ASMARA

A RADIO-TELEPHONE service between Asmara, the capital of the Italian colony of Eritrea, and Rome has been brought into operation, states a British United Press message. (*The Electrical Review, London.*)

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RADIO "DETECTOR" ON NORMANDIE

TWO FRENCH engineers have constructed and perfected a device by the means of which obstacles at sea can be detected in fog or darkness. This device is based on the principle of the reflection of radioelectric waves. It is placed forward on the ship and by a rotation movement covers the space ahead within a fairly wide angle.

The experiments made on board the S.S. *Normandie* have been fully satisfactory. The apparatus is so sensitive that even an obstacle as small as a fishing boat was detected within a radius of 3 kilometers and a buoy at 1,500 meters. (*Assistant Trade Commissioner Lestrade Brown, Paris.*)

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ITALIAN SHORT-WAVE STATION INCREASES POWER

IN ORDER to improve the facilities for Italian vessels desiring to keep in touch with their own country from all parts of the world, the Ministry of Communications recently decided to increase the existing equipment at the Coltano wireless station by the provision of a Marconi short-wave transmitter with a wavelength of 13-100 meters, and this has now been installed. The output of the transmitter to the aerial feeders is 56 kw maximum on continuous-wave telegraphy and 35 kw on telephony at 80 percent modulation, and it is, therefore, one of the most powerful of its kind in the world. The speech response of the new installation is of an exceptionally high order, a linear response within plus or minus two decibels over a band of 50-10,000 cycles having been arranged. A feature of the new installation is the provision of four spot-waves which can be selected practically instantaneously by means of a turntable mechanism which brings into circuit appropriate tuning inductances and condensers, so that the minimum of time is lost when conditions necessitate a change of wavelength. Special care has been taken in the stabilization of the transmitter, and two of the four spot-waves have a master oscillator with a stability of one in 50,000. The other two have a stability of one in 20,000, so that in this respect the equipment fully complies with international legislation. Four vertical "uniform" aerials are employed, each for a different wavelength. These are connected with the transmitter by concentric feeders. (*Electrical Review, London.*)

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NO CHANGES IN FRENCH RADIO WAVELENGTHS

THE DIRECTOR of the French Broadcasting Service (under the control of the Ministry of Posts, Telephones and Telegraph), has just announced that no change will be effected in wavelengths in France during 1935-36, according to present plans. (*Assistant Trade Commissioner Lestrade Brown, Paris.*)

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MEASURING STUDIO REVERBERATION

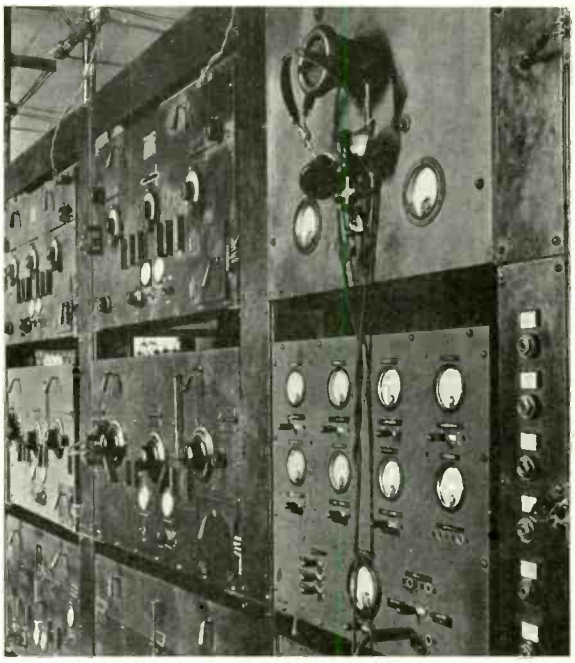
(*Continued from page 8*)

of maxima and minima. These variations are due to standing waves, but they represent accurately the manner in which the sound decays.

Fig. 3 is a plot of reverberation time against frequency taken from the results shown in Fig. 2. At first glance it would appear that the studio measured was far too "dead" when judged on the basis of actual listening tests made by Sabine and others. The answer is found in the difference between binaural and single-point non-directional pick-ups used in the two cases. The microphone used in these tests and also in transmissions from W2XR is of the non-directional type. A year of use under actual operating conditions of this studio indicates that its characteristics are, for the non-directional pick-up, much nearer the ideal than is indicated by binaural tests.

CONCLUSIONS

The method of acoustic measurement described above is accurate and easily carried out. Permanent records may be made photographically. The effects of standing waves are clearly shown. Measurements on a small studio indicate that a shorter reverberation time is required when using a non-directional single-point pick-up than is indicated by binaural listening tests.



DIVERSITY RECEIVERS EMPLOYED IN THE RECEPTION OF ADDRESSED BROADCAST PROGRAMS FROM FOREIGN COUNTRIES. AT THE RCA COMMUNICATIONS, INC., RECEIVING POSITION, RIVERHEAD, LONG ISLAND.

FEDERAL COMMUNICATIONS COMMISSION REPORTS

RULE 404 AMENDED

THE LAST SENTENCE of Rule 404 has been amended to read as follows:

"Applicants for Class C privileges must reside more than 125 miles airline from the nearest examining point for Class C privileges, or in a camp of the Civilian Conservation Corps, or be in the regular military or naval service of the United States at a military post or naval station; or be shown by physician's certificate to be unable to appear for examination due to protracted disability."

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W. G. H. FINCH RESIGNS

W. G. H. FINCH, a resident of New York, who has served as Assistant Chief Engineer of the Commission and Chief of the Telephone Section of the Engineering Department since September 1, 1934, resigned on September 15, 1935, to engage in private practice.

Chairman Prall, on behalf of the Commission, paid Mr. Finch a high tribute in the following letter accepting his resignation:

"The Commission accepts your resignation as Assistant Chief Engineer effective September 15th.

"On behalf of the Commission I want you to know that your resignation is accepted with great reluctance and with much regret. However, we are cognizant of the circumstances which have impelled you to tender your resignation, and we do not feel that we have the right to ask you to make the necessary sacrifices any further. Your services with the Commission have been most valuable, and you take with you the affection of the Commissioners individually and their best wishes for your future happiness and success.

"For several months you have been actively engaged in the investigation under Public Resolution No. 8, particularly the patent features thereof. The Commission appreciates your offer of your services without compensation for consultation in the further progress of this investigation."

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ORDER NO. 8-A

AT A REGULAR MEETING of the Telephone Division of the Federal Communications Commission held on September 4, 1935, the Telephone Division having under consideration Section 308 (b) of the Communications Act of 1934:

It was ordered that every radio-telephone common carrier (except those operating exclusively in Alaska) which holds a point-to-point telephone station license in the fixed public service shall file a supplementary statement with each application for renewal of license for the next license period only, showing:

(a) The name of the organization operating the other end of each circuit designated in the license sought to be renewed and (to the best of applicant's information and belief) its relation to other communications operating or holding companies in the same country and any affiliation which it may have with any communications operating or holding companies or administrations in other countries.

(b) The number of paid public messages, the average chargeable time and the revenue derived from such messages transmitted during the month of July, 1935, to each point specifically designated in the license sought to be renewed, showing (1) the number, the average chargeable time and the revenue of such messages originating in the United States, and (2) the number, the average chargeable time and the revenue of such messages originating outside of the United States and the names of the countries wherein such messages originate.

(c) The name of each point of communication specifically designated in the license sought to be renewed to which no paid public messages have been transmitted during the license period, prior to the date of this order.

(d) (1) The name of each point of communication specifically designated in the license sought to be renewed, to which paid messages were transmitted at some time during the license period but to which no paid public message was transmitted during the month of July, 1935.

(2) The number of such paid messages transmitted together with the average chargeable time and the revenue derived from such paid messages.

(e) The reason for not handling paid public messages at each point that may be listed under (c) or (d) above.

(f) The reason for desiring to continue inactive points of communication in the license.

(g) The number of paid messages received during the month of July, 1935, from each fixed point outside of the United States from which messages are received and the names of the countries from which such messages are sent.

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DOCKET NO. 2809

BY NOTICE given February 28, 1935, the Telephone Division has had under consideration:

"The matter of jurisdiction of the Commission under the Communications Act of 1934 over telephone companies engaged in the business of wire telephone communication; and particularly the application of Sec. 2 (b) (2)" of the Act.

Many telephone carriers claiming exemption from the jurisdiction of the Commission, except as to Section 201-205 of the Communications Act of 1934, requested of the Commission an opportunity to present arguments in support of their construction of Section 2 (b) (2) of the Communications Act; and the Commission placed this matter on the docket "for the purpose of hearing arguments by such telephone companies claiming exemption under 2 (b) (2) of the Act and any state regulatory commission desiring to be heard." Briefs were filed and oral arguments were heard on behalf of all parties requesting to be heard.

Section 2 of the Communications Act of 1934 provides:

"(a) The provisions of this Act shall apply to all interstate and foreign communication by wire . . .

"(b) . . . nothing in this Act shall be construed to apply or to give the Commission jurisdiction with respect to (1) charges, classifications, practices, services, facilities, or regulation for or in connection with intrastate communication service of any carrier, or (2) any carrier engaged in interstate or foreign communication solely through physical connection with the facilities of another carrier not directly or indirectly controlling or controlled by, or under direct or indirect common control with, such carrier; except that Sections 201 to 205 of this Act, both inclusive, shall, except as otherwise provided therein, apply to carriers described in clause (2)."

Section 3 (u) provides that for the purpose of the Act unless the context otherwise requires:

"'Connecting carrier' means a carrier described in clause (2) of Section 2 (b)."

It will be seen that Section 2 (b) (2) exempts from the jurisdiction of the Commission, except as to Sections 201-205 inclusive, carriers engaged in interstate or foreign communication solely through physical connection with the facilities of another carrier not directly or indirectly controlling or controlled by, or under direct or indirect common control with such carrier.

The Commission having heard and having considered all facts and matters presented for and on behalf of telephone carriers, and having read and having considered the law, and being fully advised, found and held that:

1. Every wire telephone carrier owning, maintaining or operating a toll line which crosses a state or national boundary is subject to all the provisions of the Communications Act of 1934.

2. A wire telephone carrier which neither demands nor receives any charge, compensation or commission on interstate communication or service is not subject to the Act.

3. Every wire telephone carrier with one or more exchanges, or one or more toll lines within a single state, participating in interstate communication by physical connection with another wire telephone carrier within the same state, is subject to Sections 201 to 205 only of the Act, except when the matter of control referred to in Section 2 (b) (2) of the Act is involved.

4. The phrase "directly or indirectly controlling or controlled by, or under direct or indirect common control with" as used in Section 2 (b) (2) of the Act contemplates a mixed question of fact and law to be determined in each case heard and considered by the Commission.

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CYRUS G. HILL RECEIVES APPOINTMENT

THE COMMISSION, on September 25, announced the appointment of Cyrus G. Hill, Chicago, Ill., a well-known consulting engineer on telephone matters, to direct the engineering phases of the Telephone Investigation.

Mr. Hill was graduated from Yale University with a degree of Bachelor of Arts in 1912 and from the graduate school of Harvard University with a degree of Master of Electrical Engineering in 1914. While at Yale University he was elected to Phi Beta Kappa and Sigma Xi and specialized in mathematics and physics, and took special work at Harvard in wire communications and radio telephony.

During 1914 he was employed in the factory of the Western Electric Company and later that year was transferred to the Central Group of Bell Telephone Companies in its Chicago office. This employment continued until Mr. Hill entered the Army during the war.

Mr. Hill spent nearly two years in France as an officer in the air service. In addition to his work as a pilot he reorganized the airplane shops taken over from the French and was in charge of radio communica-

tions for the Second Aviation Instruction Center near Tours.

Since 1919 Mr. Hill has been associated with the consulting engineering firm of J. G. Wray and Company. He has engaged in a large number of telephone investigations and rate cases.

The engineering organization of the Telephone Investigation will continue as a part of the regular organization of the Engineering Department and Mr. Hill will assume the duties in connection with directing work of the investigation formerly assigned to Mr. Finch.

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APPLICATIONS GRANTED FOR NEW STATIONS

Telegraph Division

August 7, 1935.

NEW ENGLAND TEL. AND TEL. CO., Motor Vessel *Faunci*, granted construction permit and license, special experimental, 329 kc, 10 watts. Same also granted for Motor Vessel *Whalen* and *SS Hekla*.

PRESS WIRELESS, Inc., Hicksville, N. Y., granted license, general experimental, for experimental research only when apparatus is not required to provide fixed public press service, 3285, 4715, 4720, 5345, 5350, 3290, 5355, 5360 kc, 1.2 kw. Also granted license to cover construction permit, 6920, 7355, 7615, 7850, 7955, 8810, 10,010, 10,750, 11,640, 14,635, 13,840, 15,700, 15,730, 15,850 17,440, 18,560, 20,800 kc, 1.2 kw.

PRESS WIRELESS, Inc., Daly City, California, granted license to cover construction permit, 6920, 7340, 7355, 7820, 7850, 8810, 10,750, 14,635, 15,640, 15,700, 17,440, 20,800 kc, 1.2 kw. Also granted license to cover construction permit, 3285, 3290, 4720, 5345 kc, 1500 watts—10 kw.

VILLAGE OF HIBBING, Minnesota, granted construction permit, police service, 2382 kc, 50 watts.

NEVADA IRRIGATION DISTRICT, (12th District), granted construction permit (3 applications), portable-mobile, special emergency service, 2726, 3190 kc, 50 watts.

CITY OF LAFAYETTE, Inc., granted construction permit, police service, 2442 kc, 50 watts.

CITY OF TERRE HAUTE, Indiana, granted construction permit, authority to communicate as a municipal police station in emergency service on an experimental basis, 30,100, 33,100, 37,100, 40,100 kc, 25 watts. Also granted similar construction permit (2 applications), portable-mobile.

August 13, 1935.

ERROL MACBOYLE AND DR. CARL P. JONES, NC-13771, granted aviation aircraft license, 3105 kc, 50 watts.

GRAND CANYON AIRLINES, Inc., NC-9645, granted license, itinerant aircraft station, 3105, 3072.5, 4937.5 kc, 50 watts.

SANTA BARBARA AIRWAYS, Coleta, California, granted construction permit, airport station, 278 kc, 10 watts.

CITY OF NASHVILLE, Tennessee, granted construction permit, 12 general experimental stations to operate in experimental service, also authority to communicate as municipal police stations in emergency service on an experimental basis. The central station, fixed, to be located in Nashville, the remaining 11 are portable-mobile; 30,100, 33,100, 37,100, 40,100 kc; 50 watts, 5 watts, respectively.

CITY OF BOSTON, Massachusetts, granted construction permit, mobile, general experimental, also to communicate as municipal police station in emergency service, 30,100, 33,100, 35,600, 37,100, 40,100 kc, 10 watts. Also granted license covering same.

CITY OF DENTON, Texas, Police Department, granted construction permit, 1712 kc, 50 watts.

CITY OF PRESCOTT, Arizona, granted construction permit, police service, 2430 kc, 10 watts.

CITY OF FORT SMITH, Arkansas, granted construction permit, police service, 2406 kc, 50 watts.

FLORIDA POWER CORP., Tarpon Springs, Florida, granted construction permit, portable, special emergency service, 2726 kc, 50 watts.

FLORIDA POWER CORP., St. Petersburg, Florida, granted license to cover construction permit, portable-mobile, 2726 kc, 50 watts.

BELMONT INVESTMENT CO., NC-14946, granted license, itinerant aircraft, 3105, 4937.5, 5592.5 kc, 20 watts.

August 20, 1935.

GENERAL TIRE AND RUBBER CO., Akron, Ohio, NC-539-M, granted aviation aircraft license to cover construction permit, 3105, 3120 kc, 35 watts.

LOFTFIELD AND MATHISON, Terminal Island, California, granted construction permit, general experimental, 31,100, 31,600, 37,600, 38,600, 40,600, 41,000 kc, 50 watts.

EAST BAY MUNICIPAL UTILITY DIST., Oakland, California, granted construction permit, portable, general experimental, 31,600, 35,600, 38,600, 41,000 kc, 50 watts. Also granted four similar construction permits for portable-mobile equipment.

CITY OF DAVENPORT, Iowa, granted construction permit, portable, general experimental, 30,100, 33,100, 37,100 kc, 12 watts.

CITY OF PONTIAC, Michigan, granted construction permit, general experimental, 33,100 kc, 50 watts.

CITY OF PONTIAC, Michigan, granted construction permit (7 applications), mobile, general experimental, 37,100 kc, 5 watts.

CITY OF KANSAS CITY, Missouri, granted construction permit (10 applications), portable-mobile, general experimental, 30,100, 33,100, 37,100, 40,100 kc, 7.5 watts.

OHIO VALLEY RADIO RESEARCH LABS., Steubenville, Ohio, granted construction permit, portable-mobile, general experimental, 1614, 2398, 3492.5, 6425, 12,862.5, 23,100, 41,000, 86,000 kc, 30 watts.

RCA MANUFACTURING CO., Inc., New York City, New York, granted construction permit, special experimental, 44,000 to 46,000 kc, 100 watts.

NORTHERN COMMERCIAL CO., Hamilton, Alaska, granted construction permit, fixed public point-to-point telegraph service, 3092.5 kc, 2 watts.

CITY OF SHARON, Pennsylvania, granted construction permit, police service, 2482 kc, 50 watts.

STATE OF OHIO, Department of Highways, Division of State Highway Patrol, granted construction permit, portable, police service, 1596, 1682 kc, 100 watts.

ROCKLAND COUNTY, New York, granted construction permit, general experimental, 30,100, 33,100, 37,100, 40,100 kc, 150 watts.

AERONAUTICAL RADIO, Inc., granted construction permit and license, portable, to communicate primarily with aircraft operating on Green Chain, 2922, 2946, 2986, 4122.5, 5652.5 kc, 20 watts.

PEORIA AIR ASSOCIATES, Inc., NR-445-H, granted license for itinerant aircraft station, 3105 kc, 15 watts.

PEORIA AIR ASSOCIATES, Inc., Peoria County, Illinois, granted construction permit and license, 278 kc, 15 watts.

August 27, 1935.

AERONAUTICAL RADIO, Inc., Miles City, Montana, granted construction permit, aeronautical, 3005, 2854 kc unlimited, 5377 kc day only, 50 watts.

AERONAUTICAL RADIO, Inc., St. Louis, Missouri, granted construction permit, aviation aeronautical and aeronautical point-to-point, 3485, 5887.5, 4690 kc, 125 watts.

CARONDELET TOWNSHIP, Missouri, police department, granted construction permit, general experimental, 30,100, 33,100 kc, 50 watts.

THE CASE OF JERRY STOWELL

IN JUNE of this year a person giving his name as Jerry Stowell was reported to be visiting various radio stations on the Pacific Coast stating that he was a representative of the Federal Communications Commission and presenting what purported to be an identification card issued by the Commission. He conducted inspections; and in some cases, claiming to have found irregularities, he obtained money on the basis of a promise that he would not take any further action with regard to the alleged discrepancy.

On or about June 15 at National City, California, the sheriff of San Diego County arrested Jerry Stowell. It was found that he had on a number of occasions represented himself to be a special radio inspector of the Federal Communications Commission and that he had obtained $15.00 from Charles Bartell on the promise that he would not destroy a short-wave set which he found in Bartell's possession. He had in his possession a card bearing the following information on the front:

Number 98
FEDERAL COMMUNICATIONS COMMISSION
Washington, D. C.
Date May 28, 1935
Zone 5—B.C.
Zone 6—S.W.
Name Jerry N. Stowell
Address 234 Cataline, Burbank, Cal.
Capacity, Radio Inspector (Special)
Signature J. Smith, Secretary.

Stowell was indicted by the Federal Grand Jury on July 13, 1935, entered a plea of guilty and was sentenced to serve ten months in the San Diego County Jail. The sentence was suspended for five years on the condition that the $15.00 be refunded to Bartell.

Other cases of impersonation have been reported from various parts of the country. The public should beware of these imposters. The Federal Communications Commission's inspectors carry a gold badge bearing the seal of the Commission which will be exhibited upon request. They are not authorized to destroy radio apparatus or to take any disciplinary action on their own motion. All disciplinary action is handled by the Commission's office in Washington, and radio receivers are not subject to regulation or inspection by the Federal Communications Commission.

Any person believing that he has been visited by an imposter is requested to report all the facts to the Commission in order that suitable action may be taken.

VETERAN WIRELESS OPERATORS ASSOCIATION NEWS

W. J. McGonigle, Secretary, 112 Willoughby Avenue, Brooklyn, N. Y.

ANNUAL CRUISE

SIMULTANEOUS CRUISES of the New York, Boston, Chicago and San Francisco Chapters of the Veteran Wireless Operators Association will be held on Tuesday evening, February 11, 1936, at leading hotels in the respective cities. Plans are under way to inaugurate cruises on the same evening in Miami and New Orleans. We are desirous of effecting a tie-in between the various cruises either by phone or code communication and we will appreciate suggestions re the most feasible plan. (*Ham radio—Ed.*)

Suggestions relative to the individual cruises should be mailed to the Chapter Secretary. Suggestions of a general nature should be sent to the Association Secretary in Brooklyn. Harry Chetham is Secretary of the Boston Chapter and may be reached at 34A Prescott Street, Somerville, Mass. The Chicago Chapter Secretary is Dwight M. Williams, address: RCA Institutes, 1154 Merchandise Mart, Chicago, Ill. V. H. C. Eberlin represents the Miami Chapter and interested radio Miamians should contact him either at the Tropical Radio Station at Hialeah, or at P. O. Box 82, Opa Locka, Fla. Ray Meyers of "Nautilus" fame will appreciate the cooperation of the California radio veterans in support of their second Annual Cruise. Mr. Meyers may be reached at the Radiomarine Corp., Marshall, Calif.

Members and friends of the Association who plan to participate in the Annual Cruise of their respective Chapters are requested to inform their local Secretary at the earliest possible moment so that the best arrangements possible may be made. A little cooperation from all interested will simplify immeasurably the task of the committees and assure the greatest measure of success. So "All Aboard" the good ship "V. W. O. A. CRUISE '36"; sailing date—February 11, 1936, from the ports of New York, San Francisco, Boston, Chicago, Miami, and New Orleans.

AWARD ACKNOWLEDGMENT

We are in receipt of a letter of acknowledgment of a Testimonial Scroll awarded to Henri Van Den Bussche, Radio Officer of the Belgian S. S. *Jean Jadot* for his work in connection with the rescue of the British S. S. *Usworth's* crew last year. The letter follows:

"I beg to acknowledge receipt of your valuable testimonial, through the intermediary of Mr. J. Gately, and presented to me for the rescue work of the S. S. *Usworth*. I certainly will accept it as a token of recognition and will be proud to have it in my possession.

"I wish to thank you very much and want you to be my interpreter to the Committee and members of your honorable Association and to present them my gratefulness for their high mark of esteem.

"I can assure you that in the future even more than in the past, I will keep up and conform to the traditions of my duty and profession.

"I let you know herewith that after the rescue of the S. S. *Usworth* in December, 1934, we went to the rescue of the M. V. *Mary Kingsley* on September 16/17th, 1935 in a hurricane near the Scilly Islands. She was bound from Liverpool to West Africa and had a deck cargo of locomotives and barges. She sent out an SOS on the 16th at 20:30 GMT. We located her by the wireless compass and steamed back towards her. Notwithstanding several nearby ships running towards her, we were the only vessel to reach her and stood by her on the 17th from 03:00 to 08:30 GMT. Then the weather moderated and we were released. She returned back to port for repairs of damage done and to disembark part of her injured crew. She arrived at Falmouth September 18th, 1935, at 1 A.M."

The interception of and response to two distress signals within less than a year is not the lot of many operators and it is true testimony of the vigilance and competence of radio operators such as Mr. Van Den Bussche.

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NEW MEMBERS

C. D. Guthrie on his recent vacation trip obtained the application of Paul G. Watson, of West Chester, Pa., for Veteran membership in the Association. . . . V. H. C. Eberlin, upon his honeymoon return trip to Miami wasted not a moment in signing R. V. Upp, who served on the U.S.S. *Montana* back in 1917, and since, at many of the Tropical Radio ship and shore stations—at present stationed in Miami, for Veteran membership. C. J. Corrigan, of the Tropical Miami staff, also made application through Mr. Eberlin for Veteran membership. His first commercial assignment was at WLK in Indianapolis, Ind., in 1922 and since that time he has served on more than a dozen ships and at several shore stations. . . . Mr. George A. Lamoree, at present Radio Officer of the S. S. *Camden*, makes application for membership and on his application gives a résumé of a very comprehensive radio career.

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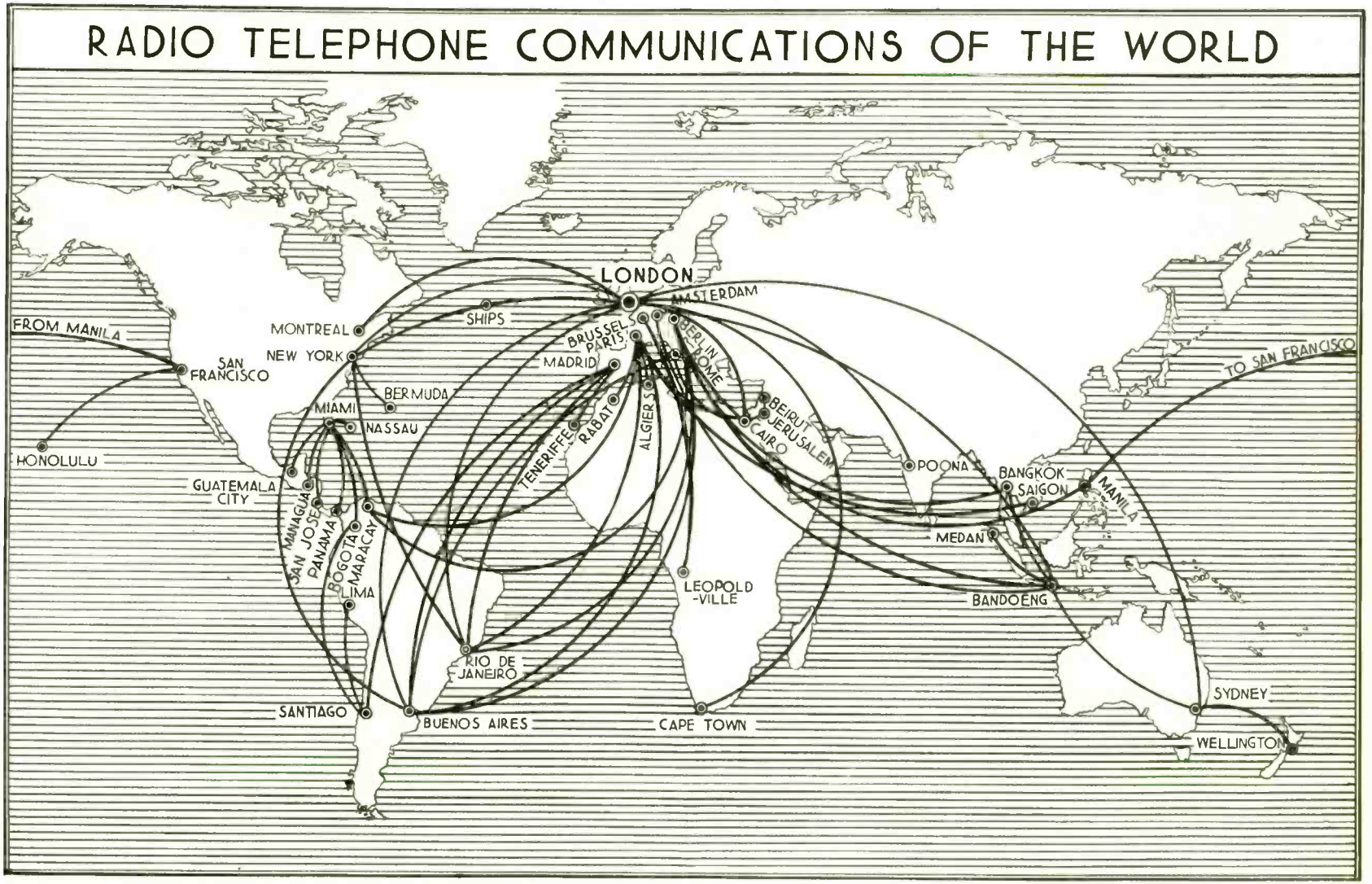
PERSONALS

George Clark, Association President, writes an extremely interesting column in the RCA Family Circle. . . . "Bill" Fitzpatrick and Mrs. contributed "A Cross Word Puzzle For, By and About Members of the RCA Family" to the same paper. To indicate its comprehensiveness, it has 237 Across and 233 Down. It contains so many references to radio and radio people that we have already reserved the first "evening at home" for an attempt at solving it. . . . From E. H. Rietzke's Capitol Radio Engineering Institute News Bulletin: "W. Martin stayed through the summer class. He is returning to his home in Singapore via London where he expects to take the British license exam." Half way 'round the world to study in an American institute for a license exam in London. Must be a record of some kind. . . . A recent trip of the Secretary to Wilmington, Del., and a delightful visit with Willard S. Wilson Association Resident Agent in the State of Delaware. Other obligations prevented partaking further of WSW's hospitality and genuine regret at not being able to participate in the nightly conversations of WSW with a cohort in France on 20-meter phone. . . . Fred Muller is now with the Magnavox Reproducers Company as Sales Engineer. Best of luck, F. M. . . . Paul K. Trautwein recently returned from an extended vacation trip much refreshed and prepared to see that the Association Treasury receives the proper nourishment. . . . From George Clark's column: "Arthur Isbell (a V. W. O. A. Director, by the way), now commercial manager for RCA Communications, once built a Marconi station at Ketchikan, Alaska. He tried to get an appropriation for a drinking water reservoir but the 1913 depression stopped him. Nevertheless, when the chief engineer visited the site later he found the reservoir built—that's how traveling salesmen get new overcoats. The station manager wished to serve the chief with four o'clock tea, but the latter glanced out of the window and saw a flock of very dirty Siwash Indians swimming in the new pool—they had scotch and soda instead. . . ." An interesting article on Noise-Reducing Antennae Systems by Arthur H. Lynch appeared in the first issue of a new magazine which bids fair to lead its contemporaries in the field—ALL WAVE RADIO. . . . The same issue of ALL WAVE RADIO contained a very comprehensive and extremely interesting article on the 1935 awards of the V. W. O. A. and the 1935 cruise. The article is entitled "RADIO HEROES" and is written by the "Footloose Reporter," G. C. B. Rowe, who attended the Cruise and interviewed the Awards recipients first hand. We suggest you get a copy and read the article. . . . "Eddie" Kamnisky led the Radiomarine baseball nine through a very successful season winning seven and losing but three. Good work, Ed. . . . Arthur F. Van Dyck, V. W. O. A. Life Member and Engineer-in-Charge of the RCA License Division Laboratory, authored "Radio and Our Future Lives," a stimulating panaoramic view of radio's present developments and some glimpses of possible future trends, appearing in the September issue of *The North American Review*. "Bill" McGonigle, Association Secretary, was recently elected President of the Telcoli Radio Club, an organization of radio amateurs in the Telephone Company. . . . The RCA Victor Booth at the National Electrical and Radio Exposition was in the charge of Henry Kasner under the direction of Advertising Manager Joyce of Camden headquarters. . . . O. B. Hanson, Association Life Member, and Chief Engineer of the National Broadcasting Company, tells us that the NBC facilities in the Merchandise Mart tower in Chicago have been supplemented by three new studios, an organ chamber, two echo rooms, and additional office space occupying some 11,500 square feet which brings the Chicago headquarters floor space to 76,500 feet and the total studios to eleven. . . . Maurice Schatt, New York

(*Continued on page 26*)



MAP No. 11--London, the World Center of Telephone Communications.

SHOWING THE DIRECT CIRCUITS AND RADIOTELEPHONIC CHANNELS RADIATING FROM LONDON TO ALL PARTS OF THE WORLD.

OVER THE TAPE . . .

NEWS OF THE RADIO, TELEGRAPH AND TELEPHONE INDUSTRIES

STEVENS RECEIVES APPOINTMENT

The Muter Company, manufacturers of Candohms, as well as other radio accessories and parts, announces the appointment of Mr. Fred Stevens as mid-western Sales Manager.

Mr. Stevens has been connected with the radio industry since the early part of 1924, during which time he has been associated with Magnavox, Rola, and recently with the Quam-Nichols Company.

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SAYRES APPOINTED DIRECTOR OF SALES FOR KYW

On September 3, 1935, Radio Station KYW, Philadelphia, Pennsylvania, announced the appointment of Ralph A. Sayres as Director of Sales. Mr. Sayres, who has long been associated with the radio industry, is wished every success in his new position.

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TRANSMITTING EQUIPMENT PARTS GUIDE

The "1936 Transmitting Equipment Parts Guide" is a bulletin covering insulators, plugs and jacks, transmitting condensers, transmitting inductors, antenna and transmission-line equipment. It may be obtained from the E. F. Johnson Company, Waseca, Minnesota.

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NEW OFFICE FOR NORTHWEST SOUND SERVICES

The Northwest Sound Services announce that they will soon be located in their new Seattle office. The present location is No. 19, The Creso Court, 521 S. Ainsworth, Tacoma, Washington. The Northwest Sound Services will devote their efforts to representation of manufacturers of public-address, theatre, recording and specialized sound equipment. A service also included is the engineering consultant service offered free to broadcast stations, distributors, etc. The organization is under the direction of James V. Griffith, who for several years has been associated with the various branches of the Sound Industries and more recently operator of the Griffith Sales Co., Tacoma, Washington.

•

NEW WESTERN UNION SERVICES

The "tourate telegram," said to be the first service of its kind in history, was proposed to become effective October 14, in a tariff filed recently with the *Federal Communications Commission* by the Western Union Telegraph Company.

"Tourate," a combination of "tour" and "rate," is a special telegram for travelers at a flat rate of thirty-five cents for fifteen words between any two Western Union offices in the United States. The telegram may tell of the progress of the trip by giving the time of arrival, the point of overnight stop, the health of the party and the state of the weather, a characterization of the trip, and the next point of overnight stop. Any words in excess of fifteen relating strictly to conditions of the trip are to be charged for at the regular telegram additional-word rate.

This novelty in the telegram industry, indicating a further step forward in the drive to popularize the use of telegrams in every-day correspondence of a non-business nature, follows on the heels of the twenty-five-cent, flat-rate birthday greeting telegram proposed to the *Federal Communications Commission* by Western Union for inauguration October 1. In the case of the birthday greeting telegrams, the flat rates apply to standard messages of fixed text to be selected and sent by number, while the "tourate telegram" contemplates the composition of the sender's own message, but within the restrictions prescribed.

•

OLESEN INSTALLS SPECIAL DEPARTMENT

The Otto K. Olesen sound studios, Hollywood, have installed a special department for the sale and service of recording machines to radio stations.

The first set was furnished KHJ, Los Angeles, in September, in the form of a double turntable apparatus and amplification.

The station will use the equipment to make its own audition records for agencies and sponsors, as well as transcribing certain sustaining and commercial programs for future use and reference.

The machine operates at 78 and 33 rpm and is adaptable either to wax transcription work or any type of instantaneous discs.

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TECH LABS PRODUCTS

Tech Laboratories, with a factory located at 703 Newark Avenue, Jersey City, N. J., is now engaged in manufacturing a line of standard and special precision resistance instruments and allied products, for industrial and laboratory use.

The standard line includes—Attenuators, Potentiometers, L- Pads, T- Pads, H- Pads and other impedance-matching networks, Line Equalizers, Sound Level Indicators, Tap Switches, Precision Wire-Wound Resistors and Geophysical Instruments.

For attenuators and potentiometers impedance values range from one to a million ohms. Standard accuracies; two percent. Special accuracies; down to one-tenth of one percent. Steps; from one to sixty, any circuit, any loss per step.

These units are compact in mechanical design. They are entirely noiseless, and frequency characteristics are flat from zero to 50,000 cycles, it is said.

The first of a series of bulletins on this type of equipment and its application is now available.

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TALK ON CATHODE-RAY TUBE FOR TELEVISION

On October 9, Dr. I. G. Maloff of the RCA Manufacturing Company presented a paper before the Radio Club of America, Inc., New York City, on the design and operation of a cathode-ray tube for use in television.

Dr. Maloff discussed the scanning requirements for pictures of varying degrees of definition and explained the methods used in constructing the tube to meet these requirements. Cathode-ray tubes now available can, according to Dr. Maloff, produce an image which approaches the average home movie screen in brilliancy.

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VWOA NEWS

(*Continued from page 24*)

Representative of the Capitol Radio Engineering Institute, is one of the Association's most enthusiastic "boosters." He travels about the eastern part of the U. S. and makes known the work of our organization to all he contacts. . . . Radio Engineer Henry Treger of NBC was aboard the S. S. *Dixie* as a passenger on that ship's fateful trip when the hurricane which lashed the Florida coast dashed the vessel on a Florida reef. Mr. Treger was of invaluable assistance in the re-rigging of the antenna which subsequently resulted in the successful summoning of aid to the distressed vessel. Mr. Treger rates commendation for volunteering his services in time of need. The Radio Officers, James W. Hodges, Chief, and Richard Schroeter, Second, deserve the highest praise for a job of communications well done. At no time was the outside world apprehensive as to the exact conditions ensuing aboard the stricken vessel. Able-bodied seaman Heinz Lahmeyer, of Scarsdale, N. Y., risked his life to climb to the top of each mast to clear fouled wires and halyards, making the actual rigging of the temporary antenna possible. We pay tribute to all of these men for a job well done.

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IN MEMORIAM

Charles Crittenden Galbraith, 74, a pioneer in equipping steamships with wireless, an Honorary Member of our Association, passed away of heart failure on September 15, 1935.

Mr. Galbraith became interested in wireless telegraphy in 1901, and while with the De Forest Wireless and the United Wireless Companies he was instrumental in having wireless equipment placed on many vessels operating on the Atlantic and Pacific Oceans and the Great Lakes. On leaving the wireless field Mr. Galbraith founded the firm of C. C. Galbraith & Sons, manufacturers of lifeboats, lifesaving devices and marine supplies. He was active until two years ago when his health began to fail.

Our Association, of which he was one of the earliest supporters and maintained an interest in our affairs until condition of his health prevented further participation, extends deepest sympathies and condolences to his bereaved family.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF MARCH 3, 1933, OF COMMUNICATION & BROADCAST ENGINEERING

Published monthly at New York, N. Y., for October 1, 1935.

State of New York, } ss.:
County of New York, }

Before me, a Notary Public in and for the State and county aforesaid, personally appeared B. S. Davis, who, having been duly sworn according to law, deposes and says that he is the Business Manager of COMMUNICATION AND BROADCAST ENGINEERING, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of March 3, 1933, embodied in section 537, Postal Laws and Regulations, to wit: 1. That the names and addresses of the publisher, editor, managing editor, and business manager are: Publisher, Bryan Davis Publishing Co., Inc., 19 East 47th Street, New York. Editor, M. L. Muhleman, Mt. Vernon, N. Y.; Managing Editor, Ray D. Rettenmeyer, Madison, N. J.; Business Manager, B. S. Davis, Scarsdale, N. Y. 2. That the owners are: Bryan Davis Pub. Co., Inc.; B. S. Davis, Scarsdale, N. Y.; Roy T. Atwood, Albany, N. Y.; G. R. Bacon, Douglaston, N. Y.; J. C. Munn, Union City, Pa.; J. A. Walker, Richmond Hill, N. Y.; A. B. Goodenough, New Rochelle, N. Y. 3. That the known bondholders, mortgagees, and other security holders owning or holding 1% or more of the total amount of bonds, mortgages, or other securities are: None. 4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where a stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also, that the said two paragraph's contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

(Signed) B. S. DAVIS, Business Manager.

Sworn to and subscribed before me this 25th day of September, 1935.
(Seal) J. A. WALKER, Notary Public.

Queens Co. Clk's No. 3149. Reg. No. 7476.
New York Co. Clk's No. 831. Reg. No. 7-W-514.
Commission expires March 30, 1937.

THE MARKET PLACE

NEW PRODUCTS FOR THE COMMUNICATION AND BROADCAST FIELDS

OUTPUT SWITCHING PANEL

A new output switching panel for speech-input equipment designed by Bell Telephone Laboratories for Western Electric, provides facilities for dispatching programs from as many as six amplifier channels over four output circuits to line amplifiers. This panel may also be used to assign any one amplifier channel simultaneously to a combination of two, three or four outgoing circuits for independently controlled networks to separate destinations. Preselection of amplifier channels for the group of programs which is scheduled to follow is a feature of this new panel.

The panel is particularly adaptable to installations such as multi-channel systems and key stations in which both local programs and programs from outside sources are amplified and dispatched simultaneously to one or more radio transmitters and also to program networks. This panel is fully described in a Western Electric bulletin entitled "Output Switching Panel 271A."

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ANSLEY DYNAPHONE

The Ansley Radio Corporation, 240 West 23rd St., New York, N. Y., have announced a new portable combination electric phonograph and public-address system known as the "Dynaphone."

Operating on a-c or d-c, and weighing but 35 pounds including the dynamic speaker, the whole outfit folds into a compact unit. It is designed for use with 16-inch records and has a patented crystal-type pickup.

To make practical the use of the new type 48 high output tubes in a universal amplifier, a new patented balancing circuit was devised to eliminate a-c hum.

The amplifier uses 6 tubes in three stages. A jack for connecting a microphone to the amplifier for use as a public-address system, is provided. Both volume and tone controls are included.

The loudspeaker unit uses an 8-inch moving coil speaker in a narrow compact area. The baffle is increased by the addition of two swinging sides which can be swung into any desired position. These sides also serve as side supports for the container when packed into one unit with the phonograph section, the loudspeaker section forming the cover.

•

BALL-BEARING MIKE STAND

Moving up and down with a smooth pneumatic action, the new stands by Amperite are said to require only ⅛ turn for a positive stop, free from "creeping." This action is obtained by the use of a ball-bearing clutch, which also permits the stand to be rotated without loosening. There are no parts to wear out, no adjustments to be made, and the action is always positive and smooth, it is stated.

This stand is rugged throughout, and can be obtained in either a chrome or black finish.

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NEW UNIVERSAL POLICE EQUIPMENT

Universal Microphone Co., Inglewood, Calif., has started to produce three non-catalog items for police departments.

One is an emergency appliance with a clip and two wires set in the same casting as the five-meter hand set. It can be used by highway patrols that want to get in immediate connection with headquarters to answer radio calls. The policemen can tap the nearest available telephone line and clip the conductor cords and clips on to the regular line.

The second item is a 'phone line coupler which is a special unit by itself in a square box with a cord on one end and 'phone tips for earphones on the other. Through the aid of this device, police officials can listen or speak via 'phone lines without disturbing automatic systems, or calling the attention of operators if a manual system. The device, of course, is produced solely for police use and is not available for private or personal distribution. A corrective degree of sensitivity and damping allows its use under adverse conditions of car rumbling and other attendant noises, it is said. Blue prints are available.

Still a third item is the new police hand-mike stand for the automobile dashboard. It clamps to the board and firmly holds the instrument even when traveling at high rates of speed.

•

NEW PRESTO DISCS

The Presto Recording Corporation of 139 West 19th Street, New York City, has announced their improved chemically-coated acetate disc for instantaneous recording. Improvements in the coating material and manufacturing methods have been made, it is said, and this has resulted in an extremely efficient recording disc.

Instantaneous recording requires that the disc be soft enough to be cut and at the same time hard enough to be reproduced a reasonable number of times with steel needles. The new Presto disc is said to meet these requirements fully.

The texture and hardness of the coating used on this record is such that frequencies up to 6500 cycles have been recorded using lateral cutters. With vertical or "hill and dale" cutters, frequencies up to 9000 cycles have been recorded. These frequency limits are almost equal to wax limits, and considering that these discs are permanent records, this frequency range is remarkable. The surface noise of these records is far below that of standard shellac recordings, it is stated.

These discs are absolutely free from dirt, air bubbles, craters, and any foreign materials.

For processing, where over-sized discs are required, the following sizes are available: 17¼" discs for 16" pressings, 13½" discs for 12" pressings, 11½" discs for 10" pressings.

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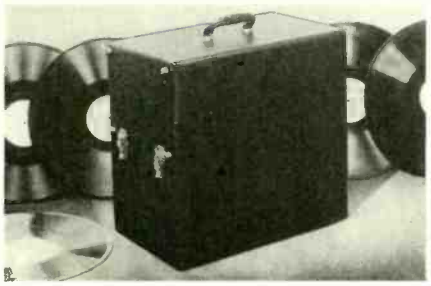
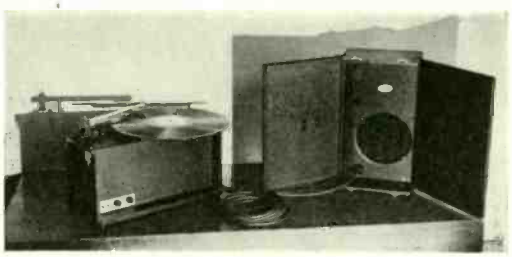
RADIOTONE ALL-WAVE RECORDER

A new model instantaneous recorder incorporating several novel features has recently been announced by the Radiotone Recording Company of Hollywood, Calif.

This model, known as the A-100, is housed in an attractive console cabinet. This recorder incorporates a recording chassis, amplifier for microphone recording, auditorium dynamic speaker for reproduction of recordings and an all-wave radio receiver allowing recordings of local broadcast and foreign short-wave radio programs to be made.



THE ANSLEY DYNAPHONE FOLDED INTO ITS CARRYING CASE.



THE DYNAPHONE SET UP FOR OPERATION.

THE Group Subscription Plan for COMMUNICATION AND BROADCAST ENGINEERING enables a group of engineers or department heads to subscribe at two-thirds the usual yearly rate.

The regular individual rate is $3.00 a year. In groups of 4 or more, the subscription rate is $2.00 a year. (In Canada and foreign countries, $3.00.)

Each subscriber should print his name and address clearly and state his occupation—whether an executive, engineer, department head, plant superintendent, or foreman, etc.

Remember this Group Plan when *Your* Subscription Expires

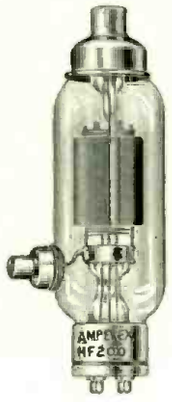
(Communication and Broadcast Engineering)

Bryan Davis Publishing Co, Inc.
19 East 47th Street
New York, N. Y.

NEW AMPEREX TRANSMITTING TUBES

Amperex Electronic Products, Inc., 79 Washington St., Brooklyn, N. Y., has introduced two new tubes specially designed for ultra-high-frequency operation, known as the H.F. 200 and H.F. 300.

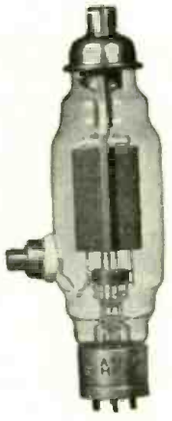
It is stated by the manufacturer that a plate power output as high as 500 watts has been obtained from a single tube, made possible by the fact that the tubes are said to have the highest ratio of transconductance to inter-electrode capacitance yet attained in any tube, together with the



ability to withstand abnormally high voltage and handle the resultant large circulating r-f currents. Their high mu, in combination with their high transconductance, reduces the requirements for grid excitation to a minimum.

The large plate area and the planer filament suspension results in a low plate resistance and a high transconductance. Large power outputs may therefore be obtained from these tubes with comparatively moderate plate potentials.

The conventional insulator between plate



and grid is eliminated and with it the losses due to dielectric absorption. An ingenious grid support permits high insulation between grid and filament at the stem and the exclusive "channel supports" offer a positive contact low-loss path for the r-f plate currents.

The plate itself is made of graphite and, in the case of the H.F. 300, represents a heat-radiating surface of 14 square inches.

The grid and plate terminals are designed with large heat-radiating areas and silver soldered to their respective leads.

The H.F. 200 has an attainable plate power output of from 300 to 400 watts, while the H.F. 300 has an output of from 400 to 600 watts.

NEW NON-DIRECTIONAL CRYSTAL MIKE

An announcement of interest to microphone users is the recent development of a "Spheroid" crystal microphone with new constructional features. The "Spheroid" is a product of Shure Brothers Company, 215 W. Huron St., Chicago.

As may be inferred from the name, the new microphone has the form of a sphere, and is only 2¼ inches in diameter. Sound enters the unit through a horizontal annular slot, and because of this symmetry of construction, pickup is said to be non-directional through an angle of 360 degrees.

The frequency characteristic of the "Spheroid" is said to provide high-fidelity reproduction with a wave-response within 5 db from 40 to 10,000 cycles. Due to the absence of horizontal directivity, this frequency-response characteristic is not changed for sound approaching from any direction in the horizontal plane.

The "Spheroid" combines high output level with non-directional high-fidelity wave response, it is stated. The crystal element is a newly-developed "Grafoil" bimorph (Licensed under patents of the Brush Development Company) which is cantilever supported and driven by a specially-shaped small dural diaphragm, horizontally enclosed within the instrument. This diaphragm and crystal system is said to produce an output level of approximately minus 55 db.

The "Spheroid" (Model 74A) may be mounted upright on desk or floor stands in the usual manner, or suspended by its cordage from the ceiling. The complete unit weighs only 6 ounces and is furnished with a newly developed three-conductor, completely shielded, moisture-proof, locking plug and convertible suspension or stand receptacle.

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DIAMOND ANTENNA SYSTEM

The Atlas Resistor Company, 423 Broome Street, New York City, N. Y., recently introduced a diamond antenna system for the short waves. This antenna system, which is shown in the accompanying illustration, was designed by Don. C. Wallace, W6AM.

Each tower serves as a support for the directional antenna and is used for both reception and transmission. This tower is constructed of wood, the corner pieces being 2 x 2's and the cross pieces 1 x 2's. The entire tower is 4 feet in diameter at the middle, tapered toward the ends into a 4-inch x 6-inch at the top and 6-inch x 8-inch at the bottom.

The telephone pole is guyed with three steel cables, but outside of that there are no "official" guy wires, it is stated. The antenna is so arranged, however, that they tend to guy the top, thus affording additional protection.

A complete list of various constructions and designs are available by writing to the main office at 423 Broome Street. Foreign inquiries should be addressed to the Atlas Resistor Co's. export department at 15 Laight Street, New York City.

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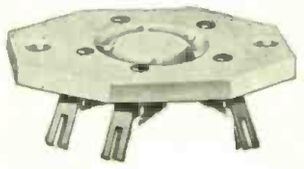
"GUIDE-GROOVE" ISOLANTITE SOCKET

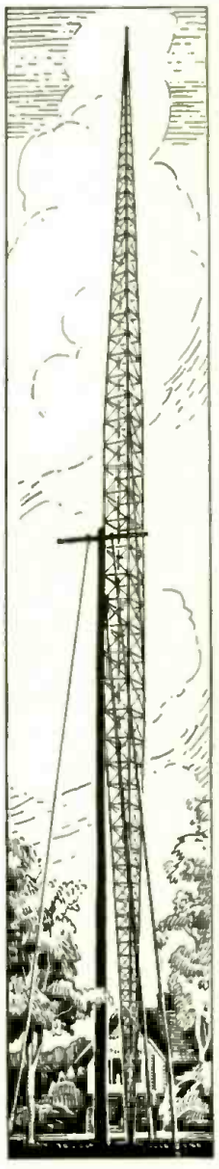
Another interesting development—a high-frequency socket with a circular "Guide-Groove"—has just been completed in the laboratories of the Hammarlund Manufacturing Company, Inc., 424 W. 33rd St., New York City.

The lowest loss, strongest Isolantite made—grade "B-100" substance—is used exclusively. The top and sides of the socket are glazed and underneath it is "Ceresin" treated to afford high surface resistivity and



prevent moisture absorption. A new method of prong anchorage is used. The prongs are gripped in square insets. With this new grip, the contacts cannot twist, loosen, or shift their position with changes in temperature or humidity. Long leakage paths are also said to be assured with these new positive side gripping contacts. Soldering is simplified by the long semi-looped contacts. This construction also guarantees a sturdy connection.

The new circular "Guide-Groove" feature not only makes insertion easier, but prevents errors in tube installation. These new sockets are made in 4-, 5-, 6-, and 7-prong style with a large and small base 7-prong type also available.



THE DIAMOND ANTENNA SYSTEM DESIGNED BY DON C. WALLACE, W6AM.

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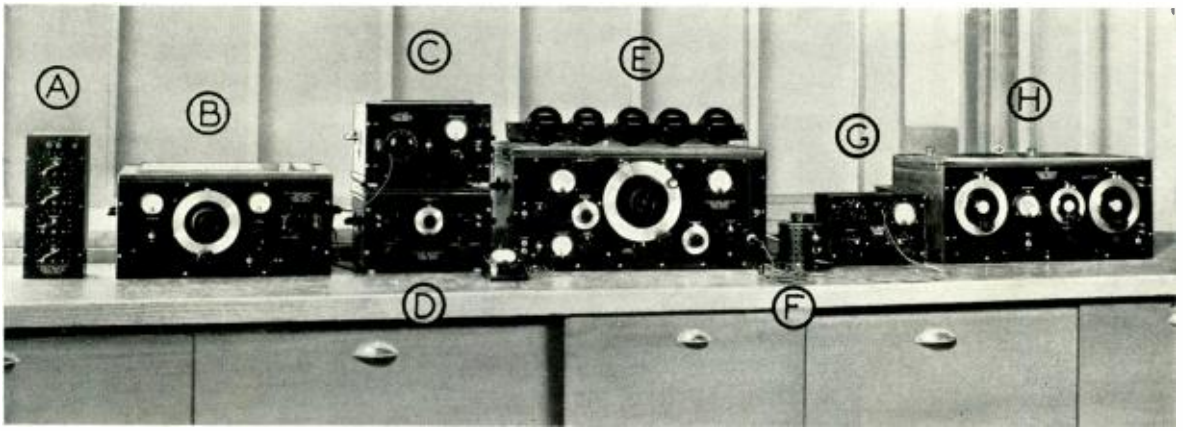

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