

BROADCAST NEWS

PAT. OFF. REG. U. S.



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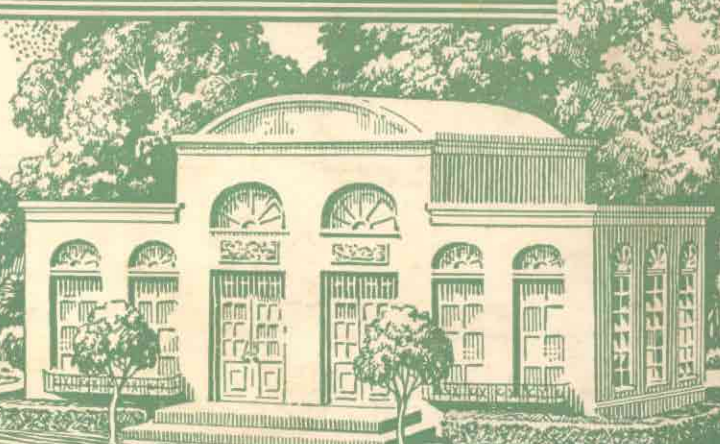
LIGHTNING PROTECTION FOR GIANT WLW TOWER

By Joseph A. Chambers

IDEA BOOSTS POPULARITY OF WPEN

—and a dozen other articles designed to keep the Broadcaster abreast of the times

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BROADCAST TRANSMITTERS
POLICE TRANSMITTERS

POWER RADIOTRONS

POLICE RECEIVERS

SPECIAL COMMUNICATION EQUIPMENT

BROADCAST NEWS

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E. JAY QUINBY

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Short-Wave High Fidelity Pioneer

By S. E. WARNER, Chief Engineer, W1XBS

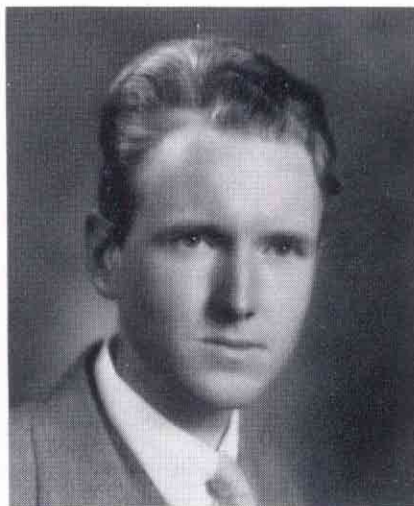
ON NOVEMBER 2nd station W1XBS broadcast its dedication program on 1530 kilocycles. W1XBS is owned and operated by the Waterbury, Connecticut, *Republican* and *American* newspapers. William J. Pape is the publisher.

Although several other stations have been operating in the high-fidelity band, from 1500 to 1600 kilocycles, W1XBS is the first to maintain a regular schedule. W1XBS is affiliated with the American Broadcasting System and also boasts an excellent selection of local programs. Morning hours are devoted to experimental transmission. The remainder of the day is devoted to a regular program schedule.

The Federal Communication Commission Act, creating the new high-fidelity band, rigidly specified new standards of broadcast transmission. These include an overall frequency characteristic, from 30 to 10,000 cycles, experiments in antenna performance and efficiency and an analysis of listener response to the new frequency.

The creation of the new high-fidelity band was the thought of Commander T. A. M. Craven, consulting engineer of W1XBS. The Communications Commission spaced stations 20 kilocycles apart on the band from 1500 to 1600 kilocycles. This allows 10 kilocycle sidebands for adjacent stations without overlapping. With the rigid standards applying to transmission the high-fidelity band will eventually become the most popular on the broadcast dial. Here will be found the most modern and efficient transmission engineering can provide.

To comply with the rigid standards the choice of station equipment was carefully considered. The final decision was to use RCA equipment throughout. Studios and offices are located at 136 Grand Street, in the Waterbury Trust Company building,



S. E. WARNER, CHIEF ENGINEER, STATION W1XBS

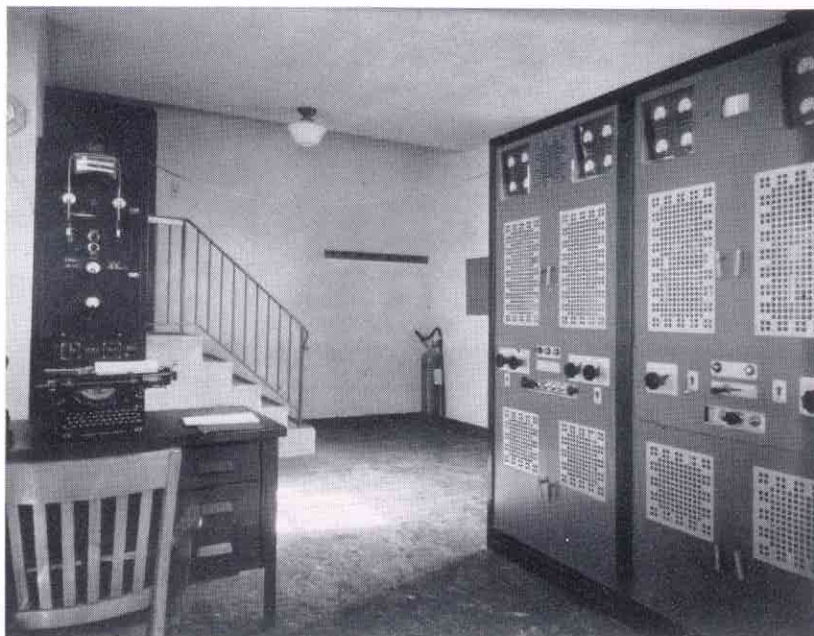
This location is in the center of the business district.

The studios are provided with type 44A velocity microphones, type 40C line amplifiers and type 4194B monitoring amplifiers with high-fidelity speakers. Amplifiers and monitoring accessories are mounted on two racks. The accompanying photograph gives a good idea of the neat layout achieved. A push-button switching system has been installed in all announcing positions with "master" in the control room. Smooth, clickless

interchange of programs is thus accomplished. Studio A measures 40 feet long, 28 feet wide and 15 feet high, and gives W1XBS one of the largest in New England. Johns-Manville acoustic treatment was installed to give the studio a reverberation time of 0.75 second. Rubber-tile flooring, damask drapes and indirect lighting have been blended into a colorful combination. A double glass window at the entire side of the studio gives clear vision into an observation room. The observation room has theatre seats, on risers, and accommodates seventy persons.

Studio B measures 22 feet by 22 feet, and is decorated to harmonize with studio A. A glass window in this studio gives clear vision into the reception room. The time of this studio is 0.65 second.

The control room measures 15 feet by 9 feet. Glass windows 8 feet by 3 feet give the control operators a clear view of both studios. All glass windows are of double-thickness plate-glass sloped to avoid reflection effects. At the rear of the control room are located two booths, each about 5 feet by 4 feet. One of these is used for transcriptions. Two RCA



THE RCA TYPE 1-D TRANSMITTER AT THE RIGHT, AND THE TYPE EX-4180 MONITOR PANEL



THE TRANSMITTER HOUSE OF W1XBS, AT PROSPECT, CONN., SHOWING THE TOWERS IN THE BACKGROUND

type UV-4210 turntables are used for high and low speed records. Batteries and accessories are also located in this booth. The other booth is used as a local announcer's position. Glass windows in these booths provide a clear view of studios and control room for the announcer and transcription operator. An OP4 with type 50-A inductor mikes is used for remote pickups.

Offices are also provided for the program, commercial and engineering departments. A spacious reception room is available for the convenience of artists and visitors.

The transmitter is located at Prospect, Connecticut, 6.5 miles south of Waterbury. This site was chosen after a survey of eleven possible locations. Located south of Waterbury it also places New Haven in the class A coverage area.

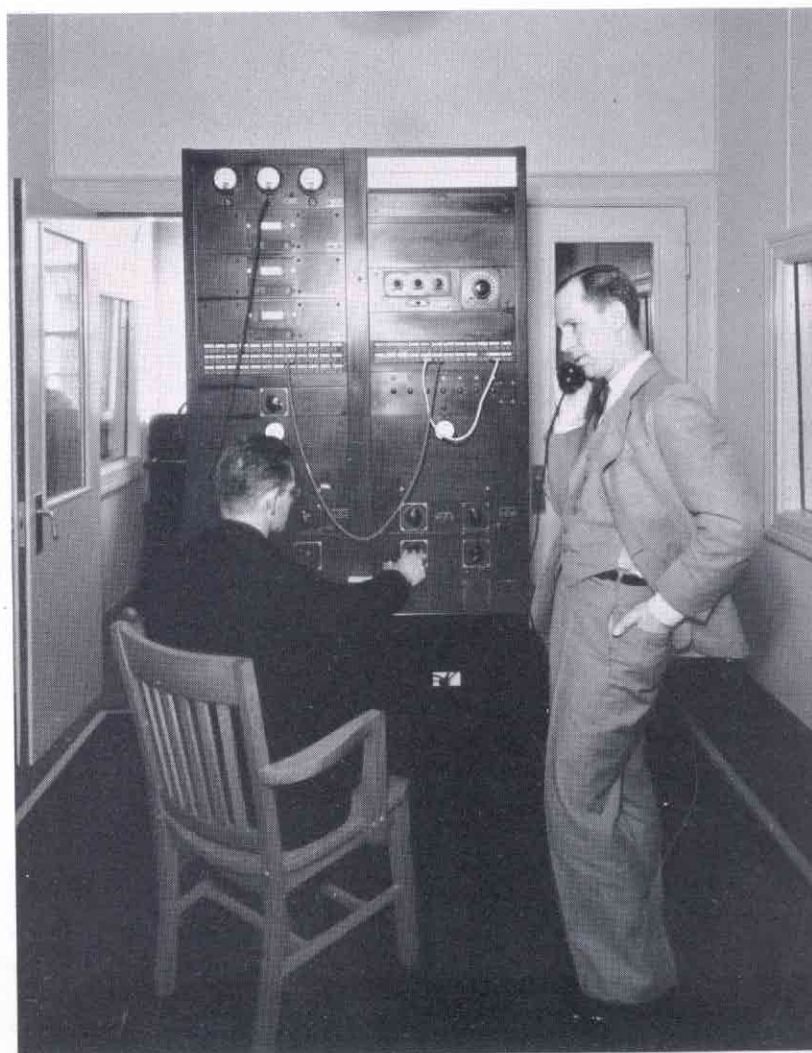
The transmitter is an RCA type 1D one kilowatt, with high-level modulation and is located in a brick addition to a colonial farmhouse. The rest of the farmhouse is used as living quarters for the operating personnel. Additional equipment at the transmitter includes a type 40-C line amplifier and an EX-4180 frequency monitor. Operation of the transmitter has been very stable. The cathode-ray oscilloscope incorporated in the transmitter offers a very reliable method of modulation control and

The antenna system is directional and consists of two three-eighth-wave

Blaw-Knox self-supporting radiator. Each antenna is fed by the Kear system through an underground concentric line with an impedance of 130 ohms. Balancing networks at the transmitter end permit different directional patterns to be utilized by operating the towers at different phase relations. Phase shifts from 0 degree to 90 degrees can be easily attained. Extensive field intensity surveys with different directional patterns and various ground systems are now in progress.

Listeners' reponse during the first month has been very gratifying. The popularity of the new high-fidelity band will continue to grow as broadcast listeners find that in this band is to be found the most modern transmission.

Engineering personnel comprises Herbert Wood, assistant chief engineer; Kenneth McLeod, chief operator; Frank Hales, John Deme, Elmer Weyh, Frank Buckley and Philip Herman.



FRANK HALES, ON DUTY AT THE STUDIO CONTROL RACKS W1XBS

Interesting Voice-Graphs

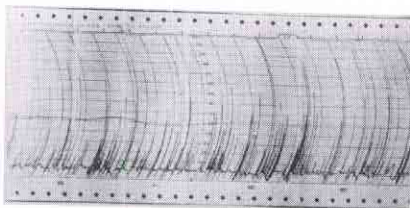
Novel Pen Tracings of Electrical Impulses Recorded at Studios Indicate Personal Characteristics

PRESIDENT ROOSEVELT'S voice, Ed Wynn's "Soo-o-o," Jeannie Lang's giggle, Walter Damrosch's "Good morning, children," and all other sounds transmitted over the National Broadcasting networks for more than eighteen hours every day are faithfully and permanently registered on endless strips of graph paper. These various sounds are pictured as a succession of jagged peaks and canyons with an occasional plateau or plain.

The graph paper moves endlessly through volume-control recorders installed in the NBC main control rooms. Inked volume indicators trace the lines, recording every fluctuation in sound carried over the networks. There are two recorders, one for the NBC-WEAF network and another for the NBC-WJZ network.

The graph line is the autograph of the radio program, according to George McElrath, NBC operating engineer. After a short study of the jagged markings, anyone can learn to identify the various types of programs and, to a limited extent, the different broadcasters. The wild, hi-de-hi broadcasts from Harlem's Cotton Club, for example, register distinctly, he points out. The lines look as wild as the music sounds.

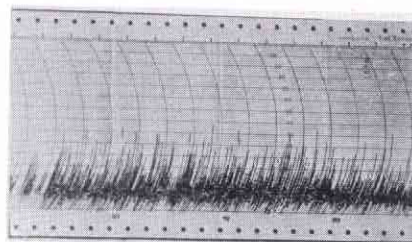
By way of contrast, chamber music appears on graph paper with less extreme peaks and with many sustained lines, indicating a consistent sound level. Soprano voices stimulate great activity of the indicator needle, while blues singers and bass voices have the least variation. Engineers find deep tones easy to control, but high, sharp



A VOICE-GRAPH OF RAMSAY MacDONALD, FAMOUS BRITISH STATESMAN, WHOSE VOICE IS ALSO SAID TO BE IDEAL FOR MICROPHONE WORK



PRESIDENT FRANKLIN D. ROOSEVELT, PHOTOGRAPHED DURING HIS FAMOUS RADIO TALK ON THE BANKING SITUATION. HE IS SAID TO HAVE ONE OF THE MOST IDEALLY-SUITED VOICES FOR THE MICROPHONE. HIS VOICE-GRAPH APPEARS BELOW



tones keep them as busy as a barrel of monkeys.

Dance bands, with their even tempo, register even, regular fluctuations and it is easy to count the beat of the music. Symphony orchestras are very irregular, and grand opera is wholly unreliable, McElrath revealed.

A study of speakers' voices is as interesting as the study of music, according to NBC engineers. The rich tones of President Roosevelt's voice, resonant and covering a wide range of harmonics, cause the needle to leave a wide band of ink instead of a third line. Former President Herbert Hoover's graph lines suggest low,

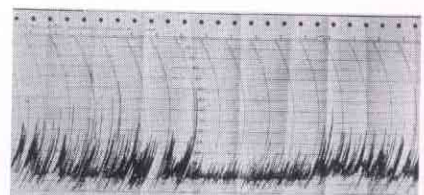
rolling prairies with an occasional bump.

The volume indicator recorders were originally installed to check the great old American game of "buck passing," McElrath frankly admitted. When complaints of poor volume were received, the control engineer, the telephone company, whose lines link the stations into networks, and the various stations each blamed the other. The recorders eliminate all that and make it possible to trace any trouble to its source.

McElrath said that within two weeks after the graph machines were put in use, service all along the line showed a marked improvement and engineers are keeping more on their toes. In addition, he added with a smile, if an artist tried to alibi poor voice by blaming the control engineer, all the engineer has to do is borrow Al Smith's favorite advice, "Let's look at the record." Graph lines, like figures, never lie.



B. A. ROLFE, WHOSE PROGRAMS OVER THE NBC-WEAF NETWORK HAVE BECOME SO POPULAR. A GRAPH OF HIS ORCHESTRA APPEARS BELOW. NOTE THE RHYTHMIC APPEARANCE OF THE PEAKS

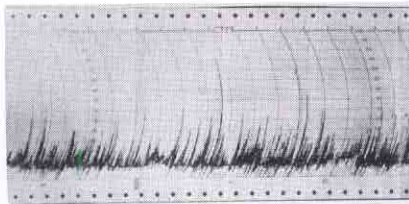


Because of mechanical limitations of transmission lines, vacuum tubes and other electrical equipment, it is necessary to keep sound volume of programs between restricted limits. The engineer checks this by means of a galvanometer on his control panel. It is his duty to hold the needle between the marks of 10 and 30 on the graduated indicator. If the volume drops below 10, he must "boost" it by increasing the electric current. Likewise, he reduces the current when the volume jumps above 30. This is called "riding the gain," and requires extensive training and experience, if the engineer is to prevent distortion.

The graphs are permanent records of the engineer's volume control and



ED WYNN, THE FAMOUS TEXACO FIRE CHIEF, A VOICE-GRAPH OF HIS FAMOUS "SO-O-O" IS SHOWN HEREWITH. THE EXTREME DEFLECTIONS OF THE RECORDER PEN EVIDENTLY ARE CAUSED BY THE CRACK OF HIS VOICE SO FAMILIAR TO HIS LISTENERS.



are invaluable aids to him in studying certain voices or various types of music which he has found difficult to control through the microphone. The smart engineer can improve the quality of many voices and eliminate many defects.

It is now possible for the broadcaster to know what his voice "looks like."

CBS Broadcast :∞: from S. S. Rex :∞:

By A. B. CHAMBERLAIN, Chief Engineer, CBS



A. B. CHAMBERLAIN (RIGHT), CHIEF ENGINEER OF CBS, SUPERVISING PRELIMINARY TESTS ABOARD THE GIANT LINER "REX"

A CBS broadcast, originated aboard the S. S. *Rex*, call letters ICEJ, when that great Italian steamship, a real queen of the seas, was approximately 2100 miles from New York on a recent voyage.

Novel Combination

A three-point pickup took place during this broadcast, utilizing a standard portable RCA speech input equipment, together with the ship's Marconi 2-kilowatt transmitter. This transmitter is the last word in foreign-built jobs, uses all air-cooled tubes, and modified Heising high-level modulation is employed. The transmitter is not crystal control, but uses the Franklin circuit master oscillator and a large number of frequency doubling stages. The frequency range covers the short-wave band from 25 to 75 meters. The standard ship receivers were used for receiving

The program consisted of a speech by Cesar Saerchinger, European representative of the Columbia Broadcasting System, who maintains an office in London, together with music from the ship's ballroom and a pickup from one of the decks, of members of the crew engaged in conversation and singing. This latter microphone was also used to pick up sound effects of the "unmanufactured" variety in order to lend atmosphere and naturalness to the program.

Operators in New Role

Two of the ship's regular Marconi radio officers operated the equipment for the broadcast. Segnor Lecco was at the monitoring controls in the ship's main receiving room, and Segnor Landini was at the controls of the 2-kilowatt radio telephone transmitter two decks below. The broadcast installation was supervised by A. B. Chamberlain, Chief Engineer, Columbia Broadcasting System.

Lightning Protection for the Giant WLW Tower

By JOSEPH A. CHAMBERS, WLW Technical Supervisor

AT THE base of the giant 831-foot vertical radiator steel antenna tower of 500,000-watt WLW—the world's most powerful radio broadcasting station—a tiny "electric eye" stands guard day and night protecting the radio audience against interruption in their entertainment from the Nation's Station.

This photo-electric cell is the "brain" of a unique device recently developed by WLW engineers to protect valuable equipment against lightning and to prevent loss of broadcasting power through troublesome "power follow-up arcs" across the safety gap that carries lightning discharges from the tower into the earth.

While WLW's new vertical radiator antenna increased the station's efficiency from 50 to 100 per cent, it was soon discovered that, unfortunately, the huge 450-ton steel tower also served admirably as a giant lightning rod. It became the problem of WLW engineers to ground the electrical energy thus collected from the atmosphere while, at the same time, preventing the grounding of the stupendous 500,000 watts power generated by the transmitter.

Photo-Electric Control

The use of the photo-electric cell was resorted to after the ordinary method, that of providing a direct lightning path to the ground by means of a safety gap across the base of the tower, was found to be unsuccessful. In adjusting the gap it was discovered that one wider than two inches failed to provide complete protection, while with one less than two inches the normal peak voltages due to modulation on the 500,000-watt carrier would, on occasion, cause discharge across the gap.

An even more serious problem presented itself when it was found that once the arc was started across this gap, either by lightning discharge or by an abnormally high voltage, the



THE PHOTO-ELECTRIC "ARC EXTINGUISHER"—SOMEWHAT RESEMBLING A MACHINE GUN—IS MOUNTED ON THE WALL BEHIND THE BASE INSULATOR SUPPORTING THE 831-FOOT WLW VERTICAL RADIATOR ANTENNA TOWER. "AIMED" THROUGH THE LIGHTNING PROTECTIVE GAP, IT PICKS UP THE LIGHT OF ANY DISCHARGE AND PREVENTS POWER DRAINAGE BY MOMENTARILY INTERRUPTING PLATE VOLTAGE TO THE TRANSMITTER. WITHOUT THIS DEVICE, AN ARC ACROSS THE GAP WOULD CARRY OFF FROM THE ANTENNA VIRTUALLY ALL OF WLW'S 500,000-WATT POWER—ENOUGH ELECTRICAL ENERGY TO FILL THE RESIDENTIAL LIGHTING REQUIREMENTS OF A CITY OF 150,000 POPULATION. THE PHOTRONIC CELL AND ITS ASSOCIATED RELAYS ARE MOUNTED IN A DOUBLE METAL BOX WHICH CAREFULLY SHIELDS THEM FROM THE STRONG RADIO FREQUENCY FIELDS AT THE BASE OF THE ANTENNA. THE PHOTRONIC CELL IS MOUNTED AT THE END OF THE "BARREL" OR LIGHT TUBE. THE POWER RELAY OPERATES DIRECTLY ON THE TRANSMITTER CONTROL CIRCUITS AND ALSO OPERATES INDICATORS IN THE TRANSMITTER BUILDING

arc could not be extinguished, as power from the 500,000-watt transmitter kept it "alive," draining practically all of the station's power from the antenna into the ground.

After various types of gaps, current

unsuccessfully, WLW engineers resorted to the use of the photo-electric cell device. A Weston photronic cell, with its associated relays, was installed in a double-shielded box on the brick wall surrounding the antenna

ing light baffles, was installed, so that only light from a point directly in the safety gap could strike the photo-electric cell. The relay operated by the "electric eye" was connected in such a manner as to remove the station's plate voltage to the final amplifier whenever the photo-electric cell was excited and to reapply it the instant the arc was extinguished. Due to the high speed of the control circuits, the interruption to service is so slight as to be barely perceptible to the ear.

Silent Sentinel

Installed at the base of 500,000-watt WLW's 831-foot vertical radiator antenna to protect equipment from lightning is the recently developed photo-electric "arc extinguisher." Here an "electric eye" stands guard, day and night, to protect valuable equipment against lightning as well as to prevent loss of power and interruption in service caused by "power follow-up arcs" across the safety gap which carries the lightning discharge from the tower into the earth.

In the photo-electric box is the double shielding against radio frequency, the photronic cell and its associated relays. The power relay acts directly on the control circuits for the transmitter, cutting off the plate voltage for a bare fraction of a second, thus extinguishing the arc draining the antenna of power, then again automatically restoring the plate voltage—all in a split second.

Automatic in Operation

The photo-electric "arc extinguisher"—somewhat resembling a machine gun—is mounted on the wall behind the base insulator supporting the 831-foot WLW vertical radiator antenna tower. "Aimed" through the lightning protective gap, it picks up the light of any discharge and prevents power drainage by momentarily interrupting plate voltage to the transmitter. Without this device, an arc across the gap would carry off from the antenna virtually all of WLW's 500,000 watts power—enough electrical energy to fill the residential lighting requirements of a city of 150,000 population.

Located in "Hot Spot"

The photronic cell and its associated relays are mounted in a double-metal box which carefully shields them from the strong radio-frequency fields at the base of the antenna. The photronic cell is mounted at the end of the "barrel," or light tube. The power relay operates directly on the transmitter control circuits and also operates indicators in the transmitter building.

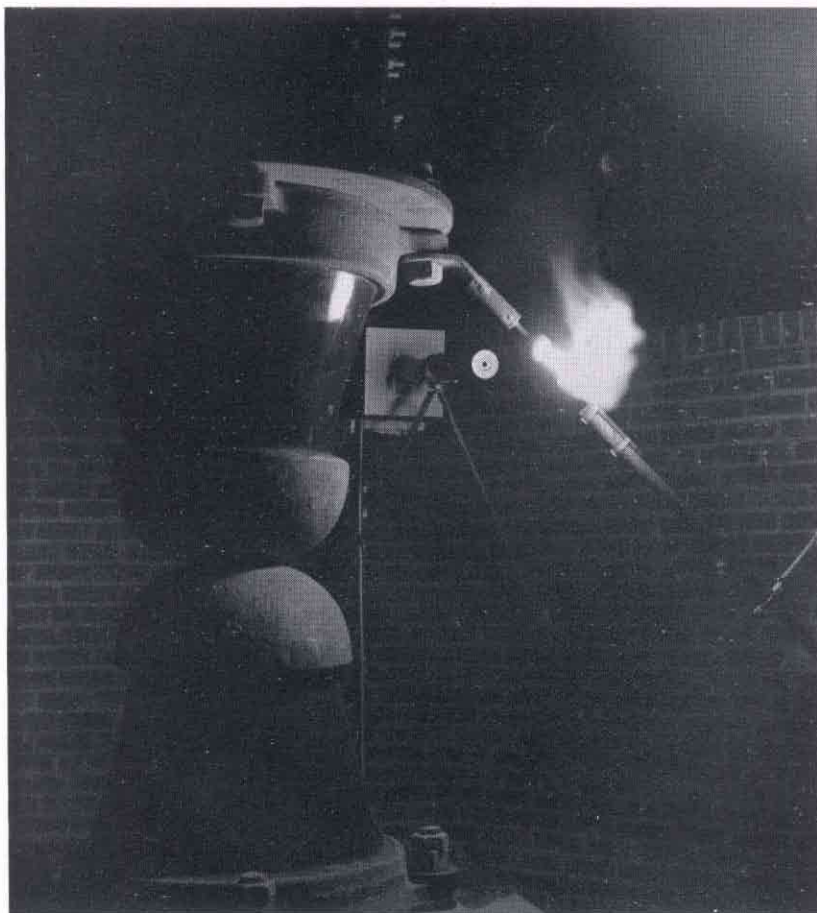
The instant an arc leaps across the safety gap at the base of WLW's 831-foot vertical radiator antenna tower, thus grounding the electrical energy collected from the atmosphere by the giant steel web, the photo-electric cell trained on the very center of the gap sets relays in motion which in turn shut off the transmitter's power for a

split second and so extinguishes the "power follow-up arc." Were this arc not eliminated, virtually all of the station's 500,000-watt power would be drained from the tower into the earth.

"Follow-Up" Avoided

The photograph is typical of a "power follow-up arc" with the photo-electric arc extinguisher (to be seen in the background) *disconnected*. With the extinguisher in operation such power follow-up is prevented and the discharge becomes but an instantaneous flash, after which the transmitter continues normal operation.

Scientists and radio engineers have evidenced a widespread interest in this most recent use of the photo-electric cell.



THE INSTANT AN ARC LEAPS ACROSS THE SAFETY GAP AT THE BASE OF WLW'S 831-FOOT VERTICAL RADIATOR ANTENNA TOWER, THUS GROUNDING THE ELECTRICAL ENERGY COLLECTED FROM THE ATMOSPHERE BY THE GIANT STEEL WEB THE PHOTO-ELECTRIC CELL TRAINED ON THE VERY CENTER OF THE GAP SETS RELAYS IN MOTION, WHICH IN TURN SHUT OFF THE TRANSMITTER'S POWER FOR A SPLIT SECOND AND SO EXTINGUISHES THE "POWER FOLLOW-UP ARC." WERE THIS ARC NOT ELIMINATED, VIRTUALLY ALL OF THE STATION'S 500,000-WATT POWER WOULD BE DRAINED FROM THE TOWER INTO THE EARTH. THE ACCOMPANYING PHOTOGRAPH IS TYPICAL OF A "POWER FOLLOW-UP ARC" WITH THE PHOTO-ELECTRIC ARC EXTINGUISHER (TO BE SEEN IN THE BACKGROUND) DISCONNECTED. WITH THE EXTINGUISHER IN OPERATION SUCH POWER FOLLOW-UP IS PREVENTED AND THE DISCHARGE BECOMES BUT AN INSTANTANEOUS FLASH, AFTER WHICH THE TRANSMITTER BECOMES BUT AN INSTANTANEOUS FLASH, AFTER WHICH THE TRANSMITTER

The Specific Transmitter Performance Required for High Fidelity

By LOREN F. JONES, Transmitter Engineer, RCA Manufacturing Company

IN spite of the widespread use of the term "high fidelity" no definite performance limits have been published to indicate what degree of excellence is inferred. The term was originated by Dr. Irving Wolff of this company when he demonstrated in 1931 a very high quality audio reproducing system and called it a "high fidelity system." Since then considerable research has been conducted by a number of organizations to determine what degree of excellence is worth while from the listener's viewpoint. Although the answer is complex and is not yet entirely known, general recommendations pertaining to broadcast transmitters are given below.

Emphasis must be placed upon the performance of the broadcast system as a system. The broadcast system consists of a number of links and, like a chain, is no better than its weakest link. We must take cognizance of the overall performance of the system from microphone to loudspeaker output. Only this overall performance is of real significance.

The transmitting and receiving portions of the broadcast system are controlled by different industrial groups. Thus the practical way to achieve a satisfactory overall performance is to set standards for the transmitting group to follow and standards for the receiving group to follow. These two sets of standards must be so formulated that the overall system performance will conform to the desired limits. Also the standards should so allocate the tolerances that the economic burden of achieving high fidelity is properly apportioned to the transmitting and receiving portions of the system. For instance, if an overall frequency droop of 7 db. were permissible at 7,000 cycles, the specifications might allow 2 db. loss in the transmission



L. F. JONES, RCA MANUFACTURING CO.

equipment and 5 db. in the receiver. Further subdivision of the performance limits into individual values for each element of the transmitting system—*i. e.*, the microphone, studio amplifiers, telephone lines and transmitter—is not permissible because certain defects are not additive. For instance, if the microphone, studio amplifier and transmitter each produce 2% harmonics, the total harmonics from these three units in series might be anything from 0% to 6% depending upon the phases of the components. Thus the division of performance tolerances into two groups, transmission and reception, is bad enough and further subdivision should be avoided. Fortunately, the two licensed manufacturers of broadcast transmitters also manufacture associated studio equipment and are able to state the overall performance, from microphone to the air, that will be had from their equipment.

With the telephone circuits now in use, high fidelity is not obtained when a long line joins the point of program origin to the point of transmission. However, short tele-

phone lines such as those between local studios and their transmitters can be equalized for satisfactory performance. High-fidelity broadcasting is already an accomplished fact from a few stations, when they transmit programs originating in their local studios.

Four Performance Characteristics

There are four and only four performance characteristics of importance in any monaural acoustic reproducing system. The first is phase displacement, the second is the frequency range, the third is volume range and the fourth is harmonic distortion. The first, phase displacement, will not be discussed here because it is negligible in any well-designed studio and transmitter equipment and in short telephone lines. It could be of importance in long telephone lines, but, as stated above, the present long lines are not used for high fidelity anyway. Each of the other three characteristics will now be considered and specific recommendations pertaining to the transmission portion of the broadcast system will be given. The characteristics pertaining to the receiver portion will not be discussed in this article, but they were duly taken into account in establishing the transmission characteristics.

Transmission Frequency Range

Taking into consideration the limitations imposed in the 550-1500 KC band by the limited channel spacing of 10 KC, about 8,000 cycles is the upper limit of satisfactory reception. Even 8,000-cycle response can be satisfactory only in the areas relatively near to high-fidelity broadcast stations. Fortunately, tests have shown that only a small improvement would result if it were possible to extend the band to 12,000 or 16,000 cycles. The improvement

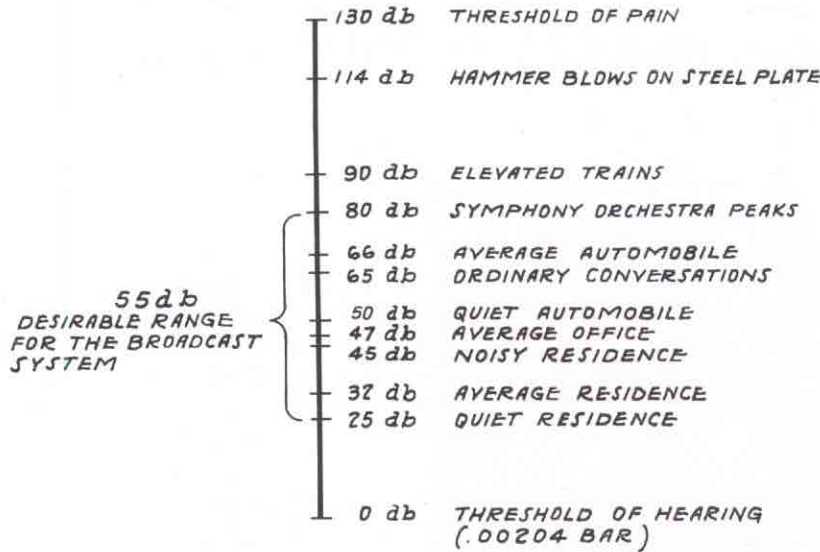


FIGURE 1—CHART SHOWING SOUND INTENSITY OF VARIOUS SOUNDS

would be noticeable mainly on certain trick sound effects of minor importance. Many middle-aged persons cannot hear above 8,000 cycles.

The low end of the band should extend to 50 cycles, with due allowance for the effect of room reverberation. That is, if the acoustic output of the receiver is measured in free space, as is recommendable, some intentional attenuation of the low frequencies should be provided to compensate for the room reverberation of the normal residence. Such attenuation normally takes place in the receiver and should not be provided for in the transmitter.

Specifically, the overall transmission characteristic, including microphone, studio equipment, telephone line and transmitter, should not deviate more than plus or minus 1.5 db. from the 1,000 cycle value between 100 and 5,000 cycles, nor more than plus or minus 3.0 db. between 50 to 100 and 5,000 to 8,000 cycles.

Transmission Volume Range

In any acoustic reproducing system the volume range obtainable depends upon two limits. One is the maximum acoustic output capability, the other is the minimum output obtainable without undue interference from extraneous noises. In the case of radio broadcasting, the receiver can be so designed that the maximum output obtainable is limited only by the discomfort of extreme loudness. The minimum useful level

under ideal conditions will be limited only by the inherent noise level in the room in which the listener is sitting. Although the original volume range of symphony orchestras might be as great as 100 db., such a range is usually unattainable and undesirable in the home due to certain differences that exist between concert hall and home conditions.

to peak output, or 100% modulation. A level of minus 55 db. is very difficult to obtain since we are referring to the sum of all noises produced in the studio equipment, transmitter, propagation medium and receiver.

The extent to which background noise is objectionable depends partly upon its amplitude and partly upon the frequency components of which it is constituted. To measure the R.M.S. value of the noise is misleading because the response of the ear, particularly at low-intensity levels, is very different at different frequencies. See Figure 2*. Any method of measuring noise that does not take into account the characteristic of the ear is in error. It is recommended that all noise measurements should be made through a filter network corresponding to the ear's characteristic at plus 25 db. acoustic level. Thus the results obtained will be properly weighted.

The amount of noise generated during the propagation of the signal is of course dependent upon many factors such as the distance and the power used. For high-fidelity recep-



FIGURE 2—CURVE SHOWING SENSITIVITY OF THE EAR AT LOW SOUND INTENSITY

The average noise in a suburban home is about plus 25 db. acoustic level, where 0 db. is the established standard approximating the threshold of hearing. The peak acoustic output from the loudspeaker would seldom exceed about plus 80 db. acoustic level. See Figure 1. Therefore, if the background noise heard from the receiver is to be as quiet as room noise, it should be about 55 db.

tion it is essential that the noise associated with propagation and detection be limited to a very low level since the noise produced in the microphone itself (largely hiss) and in the studio amplifiers, telephone lines and transmitter can only be held to a level lower than minus 55

*Taken largely from "Applied Acoustics" by Olson and Massa of RCA Manufacturing Co.

KOA Goes to 50 KW

By **RAYMOND F. GUY**, Radio Facilities Engineer, National Broadcasting Company

STATION KOA, the mountain district outlet of the National Broadcasting Company, located in Denver, recently joined the ranks of the 50-KW transmitters, the sixth of the far-flung NBC operated network stations to use this type of equipment. The new station is located slightly over twelve miles east of the State Capitol on Colfax Avenue. It is on the main east and west highway between Kansas and the West, and driving west into Denver over highway 40 the passing motorist catches his first glimpse of it silhouetted against the towering Rockies which rise abruptly from the plains immediately beyond the city. The huge antenna structure and striking appearance of the building and grounds attract many visitors and much attention. Preliminary field survey results, better than would have been anticipated from a casual inspection of the terrain, indicated that unusually good coverage would be received. Since the installation of the transmitter a survey of the actual coverage has been made and the results were as anticipated. The soil constants to the north, south and east are approximately 100×10^{-15} and 14. To the west, over the mountains, they are approximately 40×10^{-15} and 13.

Standard Building

The transmitter building is the "standard" building adopted by the National Broadcasting Company for housing 50-KW facilities of the type used at KOA. These buildings may be executed with architectural variations to suit surroundings in any part of the United States. The KOA building is a conservative design of brick with symbolic figures of terracotta located over the entrance, in numerous other appropriate places on the building and in and about the spraying system.

The antenna system at KOA is of particular interest, as it is the tallest self-supporting steel antenna in the United States. It is 470 feet high, and 35 feet square at the base with a 30-



RAYMOND F. GUY, NBC

foot outrigger at the top. The tower is built of steel from the base insulators to the top, no intervening insulators or wooden construction having been incorporated. Since this tower is the first of its size and there was little reliable data on the characteristics of such structures having high capacity at the base, a considerable length of time was spent in investigating its characteristics and checking the design data. These measurements included curves of frequency plotted

against field strength with constant power input, reactance over the broadcast spectrum, resistance over the broadcast spectrum, base insulator voltage over the broadcast spectrum with constant power input, the effects caused by dielectric losses at the base due to the high concentration of flux, the effects of current distribution by varying the cross section of the tower at various heights, etc. It was determined that a tower of this type, engineered with due regard for height, current distribution and the reduction of losses, and operating in conjunction with satisfactory ground conditions, will produce 1750 millivolts or more at one mile, which is equivalent to nearly 8 millivolts per watt at one mile. This is very good efficiency and is to be compared with a field strength of approximately 1950 for a system 100 per cent efficient. Twelve weeks were devoted to the investigation of the tower characteristics, fading measurements and coverage measurements, alone.

Preliminary results of night-time field strength measurements, comparing the fading of the new antenna with the one formerly in use, prove a very marked improvement in fading characteristics, with a particularly no-





NBC PHOTO

LEFT TO RIGHT—MR. NELSON, MANAGER OF STATION KOA, A. L. JONES, MOUNTAIN DISTRICT MANAGER OF G. E.; A. L. SIMONS, ARCHITECT, WILLIAM HEDGES, MANAGER OF NBC OPERATED STATIONS, R. C. JENSEN, RADIO ENGINEER, G. E., RAYMOND GUY, RADIO FACILITIES ENGINEER, NBC, ROBERT OWEN, ENGINEER IN CHARGE OF STATION KOA—SHOWN AT THE ENTRANCE TO THE TRANSMITTER BUILDING

riceable reduction in selective fading which produces distortion. Measurements of daytime coverage indicate that the 500-microvolt contour over the plains is about 175 miles from the transmitter, but that with the low noise levels prevailing in that part of the country, the useful daylight range of KOA is very much greater than this. Reports of nighttime coverage were received on the opening night alone from all of the states but two. Nearly 3000 letters, 90 of them from Hawaii and the Philippines, indicate that low-angle radiation, which was looked for, was a happy fact. Every county in California reported with enthusiasm that a new station had become available to them after sundown.

Lights Tint Fountain

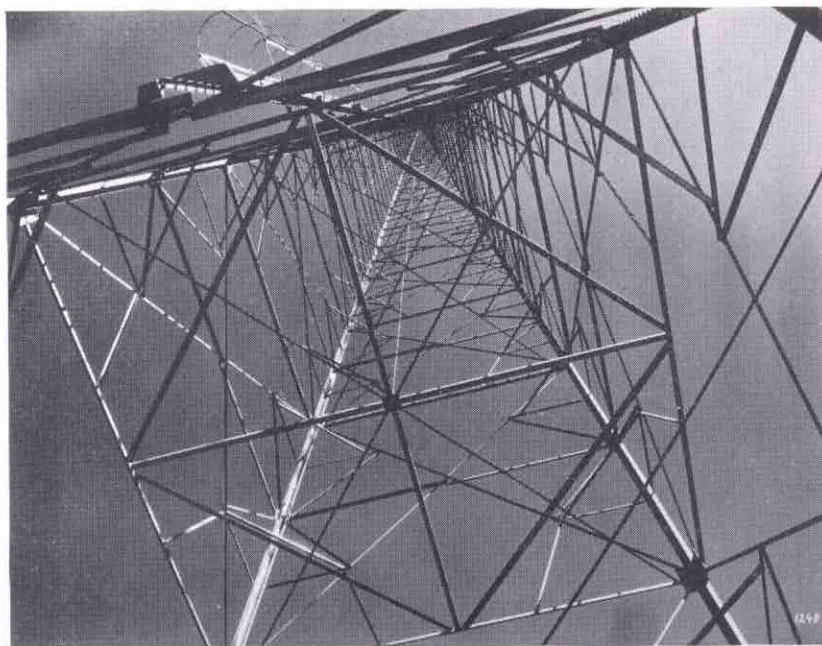
The KOA station building faces Colfax Avenue and is about 150 feet from it. The radiating system is directly to the rear of the station building, about 250 feet from it. The cooling pond is located at the front of the station building and contains General Electric colored lights with constantly changing color combinations which play upon the spray columns, making it visible at night for several thousand feet and attracting much attention.

The lower floor contains garages, rotating and general power machinery, batteries, storage space, heating plant, water cooling system for the 862 and 863 amplifier stages, and a kitchen. The upper floor contains the transmitter proper, control room, office, shop, storage space, locker-room and a reception room appropriately decorated and furnished. A 13,000-volt substation at the rear of the building forms a part of the

station and provides the advantages of primary power rates.

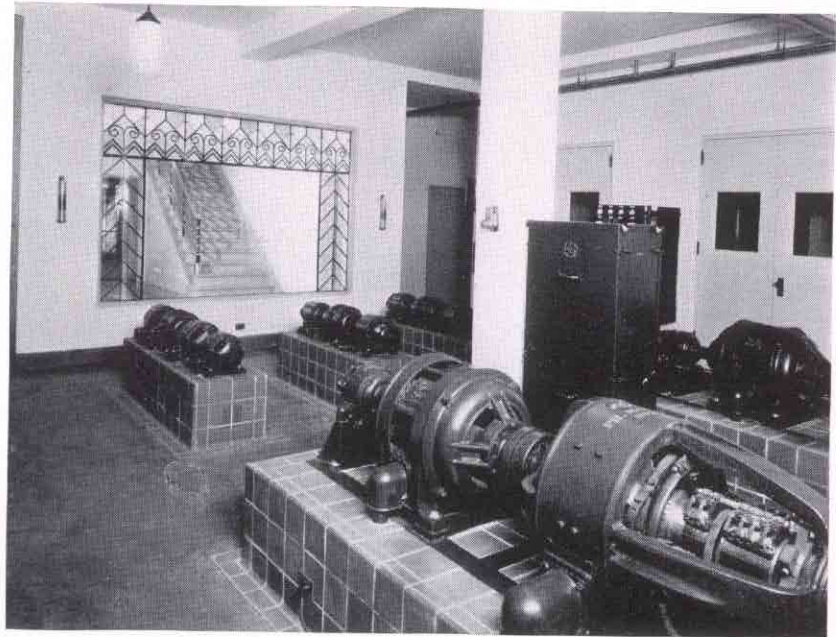
The building is of brick and is fire-proof throughout. The oil-filled transformers and reactors are mounted in fire-proof vaults with oil-escape scuppers. Due to the prevalence of dust storms in this area very careful consideration had to be given to making all doors, windows, etc., dust tight and still obtain ventilation. This was accomplished through a system of dust filters built into the walls, which are augmented by a blower system in the ceiling and roof.

The spray pond-heat interchanger cooling system is used for the transmitter cooling system. Duplicate interchangers are provided and may be used as desired by manipulating conveniently located valves and switches. Generous cooling capacity is built into the system, which is automatic in operation to keep the jacket water temperature within predetermined limits. Wide changes in ambient temperature produce small changes in the 15,000 gallons of pond water, and by the same token, small variations of distilled jacket water temperature are experienced. Copper plumbing replaces brass as NBC standard equipment for jacket water plumbing to avoid chemical by-products which reduce the water column resistance and increase the leakage losses.



NBC PHOTO

As at all NBC 50-B transmitters, the graphic recording meters were removed from their usual position in the power panel and mounted on one of the adjacent steel panels forming part of the circular transmitter layout. The quartz crystal oscillator circuits are so arranged that both crystals may be oscillated continuously, so that in the event of forced changeover the spare is at a stable temperature, including the small amount of heat generated in the crystal itself through its operating losses. A station air compressor with distributed outlets was provided to facilitate proper maintenance and cleaning. An associated spray gun enables the staff to maintain the finish of the panels and apparatus.



MACHINERY ROOM IN THE TRANSMITTER BUILDING AT STATION KOA NBC PHOTO

Emergency Antenna

An emergency antenna of simple construction is provided so that in the event of failure of either the tuning house apparatus, main antenna, or transmission line, operation may be continued with about 60 per cent of normal field strength. The emergency antenna was made slightly less than 90 degrees in length so that it would have negative reactance and no series condenser would be required. Transfer is accomplished by means of switches which make it possible to couple the 5-KW stage into the main antenna or the 50-KW amplifier, or

the 50-KW amplifier into either antenna. Such changes may be made in a few seconds.

Cathode Ray Oscillograph

A clear view of the transmitter and its associated control desk is possible from either the control room or office through double glass sound-proof windows. Duplicate volume indicator meters, high fidelity loudspeakers, and synchronous clocks are provided in the control room, and on the transmitter control desk. A direct reading modulation meter and over-modulation alarm device is built into the

operator's control station. In addition, a large cathode ray oscillograph is provided in the control room. The modulation meter, the "Carrier On" light and the antenna ammeter all operate from rectified antenna current obtained from a rectifier located in the antenna tuning house.

The antenna tuning house is equipped with fireproof apparatus, with a very large factor of safety against corona or arcover, and the tuning house and transmitter desk are connected by a simple telephone system for coordination during adjustment periods.

The frequency response characteristic is very uniform and is similar to previously published data on the 50-B transmitter. The reduction of distortion products and carrier noise has been carried considerably further than is ordinarily considered satisfactory, however. Spurious radiations of harmonic frequencies have been reduced to values much below the requirements, and beyond the second harmonic are in general too low to conveniently measure.

The transmitter needs little introduction to readers of these pages. Duplicate quartz crystals excite two UX-865 screen grid amplifiers which in turn excite a UV-860 screen grid amplifier. The output of this stage saturates the grid of the modulated UV-849 amplifier which is followed by the UV-863 balanced class "B"



W. A. FITCH, NBC RADIO ENGINEER, USING THE RCA TYPE 75-A FIELD INTENSITY METER WITH RECORDER, IN THE NBC ENGINEERING CAR, No. 2 NBC PHOTO

amplifier, and the UV-862 balanced class "B" amplifier. The audio-frequency system consists of the low power control room units, followed by two UV-211 stages and the UV-849 modulators, two in parallel. High voltage is obtainable from a UV-857—6-tube rectifier.

The UV-857 tubes are kept at the proper temperature by means of a blower system which may be adjusted during program periods from the front of the transmitter.

Batteries Floating

A and B batteries for the control room apparatus operate in conjunction with a floating system, the background noise introduced being so low that it cannot be measured with the apparatus ordinarily used for such purposes.

The new 50-KW station replaces the obsolete open type construction 12.5-KW transmitter which, after approximately eleven years' service, has been retired with some (not too much) sentimental feeling to the status of an emergency transmitter.

KOA is the property of the General Electric Company but is managed and operated by the National Broadcasting Company. The designs and layouts were prepared jointly by the General Electric and the National Broadcasting Companies' Radio Engineering Departments. KOA incorporates all of the improvements and



NBC PHOTO

ENTRANCE TO THE TRANSMITTER BUILDING AT STATION KOA, SHOWING HOW THE COOLING POND HAS BEEN UTILIZED FOR A DECORATIVE FOUNTAIN EFFECT

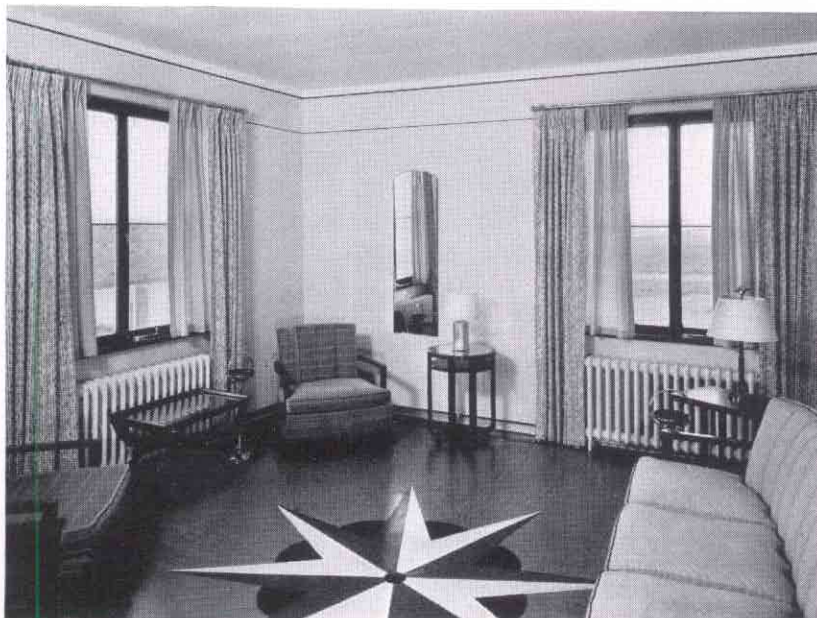
refinements in 50-kilowatt installations, based on National Broadcasting Company's operating and General Electric Company's manufacturing experience. It meets or exceeds all of the rigid standards maintained in National Broadcasting Company Radio Facilities.

Photographs show one of the new engineering cars used by the Radio Facilities Group of NBC. These cars contain facilities for all field engineering and have built into them field intensity measuring equipment and graphic recording apparatus with

associated DC amplifiers. The type 75-A field intensity measuring equipment used in these cars was developed for NBC by RCA and covers a range of from 20,000 kilocycles to 500 kilocycles and from a few microvolts per meter to about 6 volts per meter. The demountable loops are operated from the inside of the car by means of a hand wheel but where it is impossible to make accurate measurements on roads, due to the proximity of wires, etc., a small special battery box with accessories is provided and the equipment can be removed to points which are inaccessible to an automobile.

Specially Designed Cars

The rear of these cars contain space for carrying any equipment which might be required for engineering broadcast transmitters. This includes harmonic analyzers, transit, field intensity measuring apparatus, graphic recorders of two types, radio frequency bridges, portable powered transmitters and measuring oscillators, meters, audio oscillators, standard signal generator, etc. The roofs of the cars are specially reinforced to support the special loop and safety glass windows of large proportions on each side of the car, permit plenty of illumination and ventilation. For convenience in making night measure-



NBC PHOTO

VISITORS' RECEPTION ROOM AT STATION KOA. www.americanradiohistory.com

(Continued on Page 15)

NBC Broadcast Sound Effects

SOME MYSTERIES OF CRAFT EXPLAINED

TUCKED away in the vastness of NBC's Radio City studios is Room 577, which to the uninitiated might appear to be the laboratory of an eccentric, if not actually unbalanced, scientist of some mystery "thriller."

The neophyte would be convinced that he was in a ward for mentally-unbalanced persons after listening to a conversation something like this:

"Put the rainstorm in dry storage and move the swamp to that upper shelf. File the fire in that cabinet. We can hang the army on a rack, and as for those chorines, you can stuff them in that old locker."

More likely than not, a young man in the corner suddenly would begin barking, or perhaps imitate all of the known barnyard animals, with a camel and elephant thrown in for good measure.

Room 577 is one of the most unusual sights of NBC's Radio City studios. Here are the headquarters of Ray Kelly, NBC's sound-effects engineer, and his corps of a dozen helpers. Sound effects are to radio what scenery is to the theater.

Early Failures

When radio came into being, it was noticeable that the first radio plays did not seem to "click." The technique was new for writers. They failed to recognize the importance of background. They failed to realize they were attempting to produce a dramatization on an "empty stage." That stage was the imagination of the listeners.

It looked for a time as though radio drama might be doomed. Then authors of radio plays began to construct, through the medium of sound, the necessary "scenery" that the listener set up in his mind as the background of the play.

It is Ray Kelly's job to set the stage for NBC's dramatic productions. It is not always an easy task. Radio listeners demand reality. A cow has



NBC PHOTO

HOURS OF EXPERIMENT ARE NECESSARY TO PRODUCE SOME OF THE SOUND EFFECTS CALLED FOR IN THE BROADCAST SCRIPTS. HERE IS RAY KELLY, OF NBC, EXPERIMENTING WITH SOME PROPELLER SOUNDS

to sound like a cow, and a waterfall has to sound like a waterfall.

For that reason the actual sound desired is produced in a normal way, such as a door closing, an actual door is shut. The audience hears the grating of a key in a lock. In the studio a sound-effects technician is placing a key in a lock before a microphone.

All sounds cannot be produced in the studio, however, and it is then that Kelly and his aids go into a long huddle and set their minds to work.

Tricks of the Trade

The violent thunderstorms you hear over your loudspeaker are nothing more than a great sheet of iron struck with a padded drumstick. The rain is sand trickling onto a sheet of cellophane, or beans in a wire cylinder. A swamp is a box of mud, fire is only crumpled cellophane which crackles like flames in the palm of the technician's hands. A lion is usually a horn or a lusty-voiced sound-effects man. Chorines are sets of dancing shoes fastened together side by side.

And the army of marching men? Even more simple. A rectangular

of wood are suspended with panel wire and tapped on the studio floor.

To create these various sounds necessary for the many programs produced over NBC networks, a huge supply of noise-making devices has been collected in the sound-effects laboratory. There are cowbells, ordinary garbage cans, wind machines, motors, tackles, ropes, hammers, knives, forks, graters, sandpaper blocks, winches, whistles, pasteboard boxes, whips and hundreds of other articles.

Kelly admits that "things are not always what they sound." For example, a scene in a recent NBC series called for the clinking of coins. The genuine device was tried, but the resultant sound during a rehearsal was far from natural. It took hours of experimentation to find a metal which would sound like coins clinking.

The report of a pistol-shot in a broadcasting studio would wreck the delicate equipment of the microphone. By accident it was discovered that snapping a spectacle case close to the microphone sounded like a gun's explosion. Striking a padded board

with a flat stick also is used to indicate a pistol-shot.

The sound of a threshing machine is produced by a combination of intricate machinery and a baby's rattle. If the roar of waves coming over the bow of a boat is desired, half a dozen marbles or shelled peas are rolled on the head of a bass drum. When the ship reaches calmer seas and the waves swish gently past, a corn-popper containing a handful of gravel is waved before the microphone.

A one-man railroad is one of Kelly's most recent inventions. He spent several hours in a freight terminal studying the sounds of trains as they rattled by. A wooden box three feet square houses the apparatus and from it come most of the noises to be heard in railroad operation.

Train Wrecks in Stock

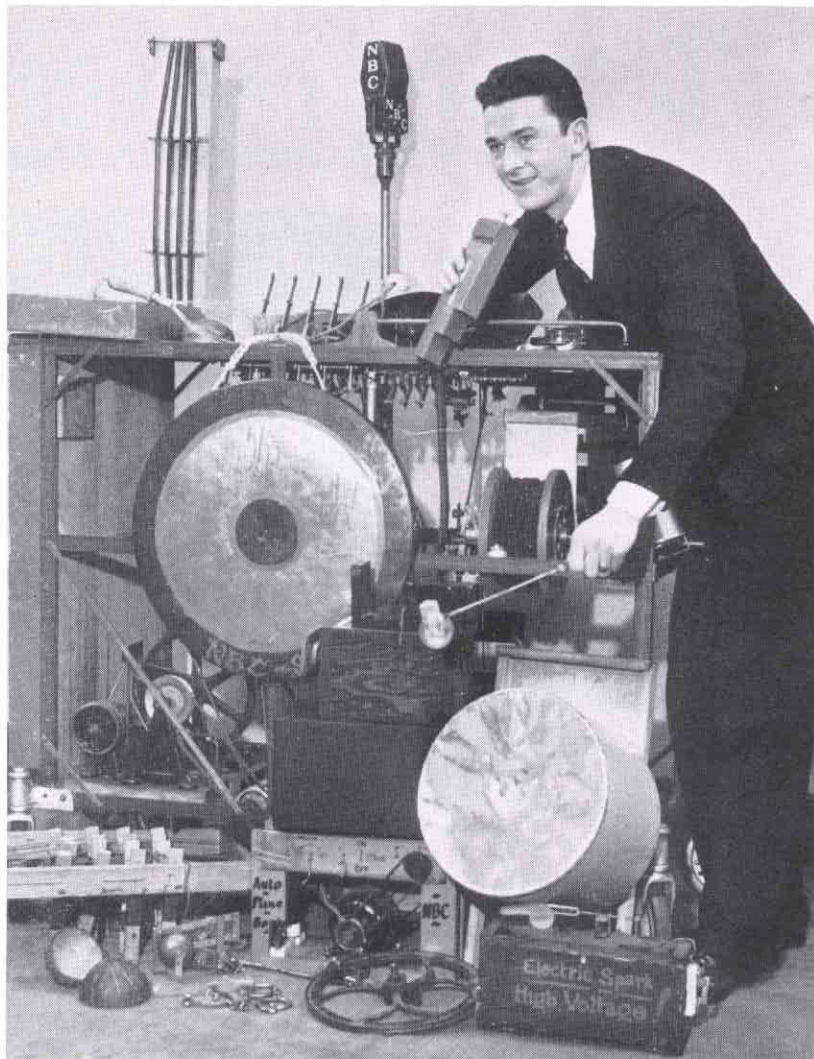
One shelf in Kelly's laboratory is devoted to the echoes of disaster, from the breaking of a window to a train wreck.

The sound room would be a paradise for a child. Thunderstorms and hurricanes lie carelessly in one corner, side by side with the zoom of an airplane and the drone of summer insects.

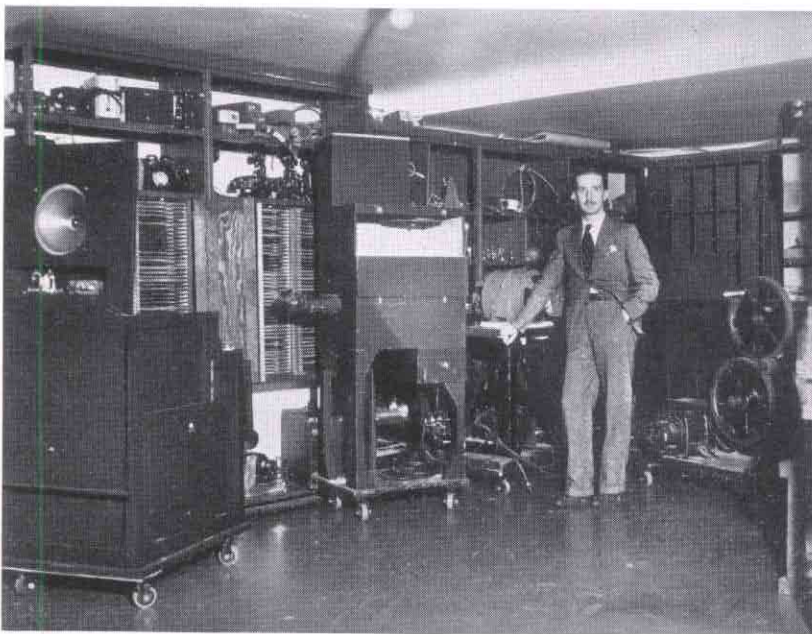
Research in sound has taken Kelly and his assistants to zoos for hours, where they studied the sounds of comparatively little-known animals, birds and insects. Several times he has had

to call on the Smithsonian Institute for aid. Another time he went down

in a submarine to study the sound of the craft in motion so that he could add reality to an NBC dramatic series.



JIMMY LYONS, NBC SOUND EFFECT EXPERT, AT THE SAN FRANCISCO STUDIOS, WITH SOME OF HIS STRANGE APPARATUS



RAY KELLY, CHIEF SOUND TECHNICIAN OF THE NBC STUDIOS AT "RADIO CITY," NEW YORK

KOA GOES TO 50 K. W.

(Continued from Page 13)

ments, of which there are considerable, special lights are distributed within the cars and a special Universal spotlight for illuminating either to the front, sides or rear is provided. For accurately determining near-by distances from antennas a transit is used. The use of maps alone has been practically discontinued because of their inaccuracies and because for many parts of the nation they are incomplete or non-existent.

The city of Denver now boasts one of the most modern broadcast stations in the world and it is an added sub-



Did You Know?



By W. S. FITZPATRICK, RCA Institutes

THAT the average plant grows one inch in eleven and a half days . . . Seventy-foot-high ocean waves have been measured . . . The earth is over one billion years old . . . Cincinnati's name was once Porkopolis . . . The swing of a pendulum in a given period varies with its location on earth . . . Seven hours of rehearsal, including technicians as well as control men, are required on the average for each one-hour radio program . . . Only six-tenths of the moon is ever seen from the earth . . . The power dissipated in a flash of lightning would light 130,000 fifty-watt lamps . . . Ship propellers are made of manganese bronze because it will bend and dent without snapping . . . Our lungs can hold ten pints of air but usually six, and one pint is breathed in and out when taking a breath . . . The average thundercloud holds about 1/200 of a cent's worth of electricity . . . Saccharin, 300 times as sweet as sugar, comes from coal-tar?—at least that's what *Popular Science Monthly* tells us in its December issue.

No Sponsors—Fans Pay

That 329,618 set owners in Australia pay the government license fee to listen to broadcast programs and that there are nineteen marine radio coastal stations in Australia?

That the increased use of all-wave receiving sets prompted NBC to speed reconstruction of the short-wave transmitters of W3XL and W3XAL to assure reception for NBC listeners in remote corners of the world?

That, quoting from the *New York Herald* of December 29, 1902, Marconi, on that day, sent a radio message to a friend in England, in which he ended, "Transmitted across the Atlantic by electricity not controlled by Broad Street" (referring to the addresses of the cable companies)? George Clark, commenting upon this contribution, adds: "He did not foresee then that the electricity flashing thousands of wireless messages to foreign countries would be controlled



W. S. FITZPATRICK, THE "RADIO RIPLEY"

from 'Broad Street'—meaning the R.C.A. Communications Building on that street in New York.

That the RCA Parts Division has announced a regulated power unit which will provide a constant source of B voltage for use in laboratories, schools, or wherever a supply of voltage free from variation with load is desired?

That "permanent waves" are now made by radio? Cumbersome wires to the curling units are dispensed with, the curlers being energized by a nearby short-wave transmitter. Aside from the convenience, the volume of heat is always under control by a knob acting in the same manner as a tuning coil (*Modern Mechanix*).

So Much in So Little

That the new RCA radio tube manual lists 62 materials, 9 gases and 37 elements used in the manufacture of RCA radio tubes?

That the New York City electric light companies say that the average cost of electricity for a half-hour radio program is one-third of one cent?

That the recent death of Paul C. Ringgold caused deep sadness throughout the Radiomarine Corporation of America? An executive of that com-

pany and marine circles as a true type of gentleman and a business man possessing a keen sense of perception. He was a deep thinker, talking little, but when he spoke, others listened. His words, devoid of extraneousness, carried the weight of conviction. Through that trait his friends shall remember him best, although they will recall, as well, his democratic spirit of justice. When he was left behind in that Brooklyn cemetery on the dreary Saturday morning of January 5th, none of the throng, even if he had desired to, could have thought of a word Paul Ringgold had spoken, or a deed he had done, against his fellow men. He went to his rest just as he had lived—at peace with the world. In the funeral procession from Lynbrook to Brooklyn, automobiles bearing registrations from six different states were noted.

Veterans to Contact Byrd

That the Veteran Wireless Operators' Association's tenth annual dinner-cruise is to be held this year on the top deck of the Hotel Montclair in New York on the evening of February 11th? George Clark, the new president, will be master of ceremonies, and the program will include a radio hook-up with Admiral Byrd's South Pole Expedition, and a transcontinental tie-up with the V.W.O.A. in San Francisco, and ladies are invited!

That a recent demonstration by Dr. Irving Wolff, held at the Hotel Pennsylvania, New York, of the RCA 9-centimeter transmitter, was attended by a delegation of 200 students from RCA Institutes?

That 96.5 meters is the wave length set aside by the Department of Commerce for aircraft distress calls?

That of the 49 broadcasts rated as last year's outstanding programs in England, 19 were heard in this country over NBC networks?

That George Clark would like to see the *Rockefeller Center Weekly* also published as an Annual—just for the sake of the initials?

That the Chatham station of the Radiomarine Corporation of America, which holds the long-distance record through maintaining daily contact with a ship traveling around the world, scored another record last month when two-way communication was established with a British airplane 8,000 miles away?

That a deaf-and-dumb radio enthusiast in Chicago has 900 acknowledgments from stations throughout the world from which he has received signals by means of a tape recorder?

That in every phase of work in the radio industry—from servicemen and operators to engineers and high executives—may be found graduates of RCA Institutes?

That the Department of Commerce reports there are 1,497 medium-wave, 56 long-wave and 140 short-wave broadcasting stations in the world?

New Sound System

That a radical new system of sound motion picture recording, using a double sound track to remove background noises, was given its first public demonstration last month by Dr. Alfred N. Goldsmith before a meeting of engineers in Cleveland? At the same time the RCA sound movie camera for amateur picture makers and the new RCA "acorn" tube were described. The demonstrations were broadcast by NBC with Dr. Goldsmith using an RCA lapel microphone, which permitted him to move about freely without affecting his voice reproduction.

That a 1000-watt broadcasting station, experiencing difficulty in covering its intended area, is trying an odd experiment in replacing the one station with several synchronized 100-watt stations, each located to serve one particular section, and all combined to "floodlight" the intervening areas? *The Broadcast Engineer*, which carries the story, comments on the idea as having possibilities and states that coverage will undoubtedly be better and the interference caused beyond the service area will be practically reduced to that of a single low-power unit.

That *Scientific American* has been published by the same family continuously for ninety years?

That since the opening of the extensive studios and plant of the National Broadcasting Company in the RCA Building in Radio City, delegations from nineteen foreign countries have made inspections of the modern installation? According to Chief Engineer O. B. Hanson, the features of greatest interest to the foreign engineers were the NBC-developed acoustical control system, the instantaneous multiple switching system, and the system of pre-setting network hook-ups to await the push of a button.

\$70,000,000 Saved!

That it is estimated seventy million dollars has been saved the public since RCA entered the field of international communications and that with the fifteen-word message in place of ten, R.C.A. Communications bids fair to repeat that record in its inter-city domestic radiotelegraph service in the United States?

That the opening of the R.C.A. Communications circuit with Japan in 1920, reduced the word rate for messages from \$1.21 to sixty-seven cents, making a difference of \$5.40 in the cost of an ordinary ten-word message?

That still another expansion of radio is exemplified in the broadcasting studio so large that it could accommodate a three-ring circus? George Clark refers to the NBC Auditorium Studio in Radio City.

That the personnel at the new WOR broadcasting station must undergo periodic examinations as to weight, eyesight and hearing with a view to determining the effects of high-frequency radiation?

99 Per Cent Fell by the Wayside

That only 1.1 per cent of manufacturers of radio sets for the home, who started eleven years ago, are still in operation? Of those dropping out, 55.8 per cent were in business less than one year.

That in Asnieres, France, the volunteer firemen are summoned to duty by a short-wave alarm signal broadcast from fire headquarters, according to *Short Wave Craft*? Through coding, the bell strikes the location of the fire, www.americanradiohistory.com committed.

Siren shrieks, so objectionable in towns, are eliminated.

That within the space of a few hours on a recent voyage of the *S. S. Atlantida*, the radio operator, Hardy D'Aquin, working a Radiomarine Corporation short-wave transmitter and receiver, established two-way communication with stations in Japan, Australia, Madagascar, Italy, Holland, Norway, England, France and Germany? D'Aquin says he found the 24 and 27 meter wave best for day work and 54 for night, but he achieved his longest distance, half-way around the world on several occasions, on 36 meters.

That Harry R. Chatham, Chief Operator of the Somerville, Mass., police radio system, once accepted, and completed, an assignment to erect a radio station on an island leper colony and, "in recognition of his humanitarian services," was presented a testimonial scroll by the mayor of Boston on behalf of the Veteran Wireless Operators Association? (*Commercial Radio*.)

Radio's Best Announcer

That for the second consecutive year James Wallington, of the New York NBC staff, received the annual trophy award as radio's best announcer—considering diction, delivery, microphone personality, adaptation and versatility—which award was made by twenty-two editors in widely separated cities?

That no statue in New York, except Civic Virtue in City Hall Park, has excited so much interest, and sometimes humorous comment, as the statue in front of the RCA Building symbolizing Prometheus bringing fire to earth from heaven? ("I got that one up myself," says G. H. C.—Then what about the others?)

That the National Broadcasting Company's famous split-second service extends even into its Press Department under the management of Wayne L. Randall?

That owing to the acoustics of the Hollywood Bowl it is possible for two persons ninety feet apart to have a whispered conversation? (*Scientific American*.)



EDDIE STANG, THE "INSPECTION ENGINEER"— HIS ENGINES TURN OVER COMPLETELY EVERY NIGHT

A RANDOM twist of the dial, and suddenly a piercing scream rends the air of our sober living room—not the blood-curdling scream of a woman in distress, but the unmistakable shriek of female laughter beyond the bounds of self-control. This, augmented by a background of other laughter, spontaneous cackles, hoarse and soul-racking guffaws—and then the voice of the "Skipper" attempting to re-establish order:

"Ladies and Gentlemen of the Radio Audience: It is too bad you can't all be on board the mythical S. S. 'All in Fun' tonight. The audience here seems to have gotten out of control for the moment, but our messboy, Tommy, has just appeared up here on the top side in a costume that I simply can't describe. You must come over here and join us on our



Sea-going experiences of ex-radio operator aid in production of novel stage broadcast, lighting up great amusement palace long dark and idle.



cruise at the Met Theatre tomorrow night, or any night during the week. The general admission price is twenty-five cents and if you prefer you may reserve seats in advance. And by the way, our downtown ticket office is no longer at Llewellyn's Drug Store, but has just been moved to Kahn's Department Store. Unfortunately (or fortunately, shall I say?), the crowds trying to buy our tickets at the drug store just about swamped the place and made it almost impossible for their regular customers to get near the establishment. Oh, before we resume the program, I want to read one more telegram which just came in:

SKIPPER OF S. S. ALL IN FUN MET THEATRE—FIRE CHIEF CALLAHAN AND NINE OF THE BOYS FROM THE DELAIR HOSE COMPANY ARE ON BOARD TONIGHT IN BOX THREE STOP GET THEM TO SALUTE THE COMMERCIAL LAUNDRY GIRLS IN THE FIFTH ROW

(Signed) MCGINTY

"Stand up, boys, maybe you're the reason why the laundry girls came out tonight! (Applause.) All right, folks, let's go on with the show now. Our Chief Engineer is going to sing the 'Little German Band on the Corner,' and he wants you all to join in the chorus. Let's go!" (More laughter and applause as the chief enters.)

Brilliant Idea Boosts

Credit Due "Skipper" Frank Shannon
Nightly with Huge Passenger List



SOME OF THE MEMBERS OF THE CAST. LEFT TO RIGHT, THEY "TOMMY ROTT" (BILL DONOHUE), SHIP'S CARPENTER BEN CABIN BOY DICK GOLDHAHN, DECK CADET

On rolled the program, with periodical bursts of mirth and applause from the audience, sometimes over a gag obvious to the radio listener, more often over some mysterious cause apparent only to those in the audience at the Met Theatre who were unquestionably "with" the performers at every moment.

Mirth Contagious

The good humor and enthusiasm



"ACE" PANCO
BILL DONOHUE
DELPHIA'S LAR
THE PERFORMER
SEA O



Popularity of WPEN

Mythical S. S. "All In Fun," which Sails Metropolitan Opera House, Philadelphia



SKIPPER, FRANK SHANNON, SEAMAN RAY FITZGERALD, MESSBOY HEAVING ANCHOR AT THE RADIATOR, STEWARD CHRIS SEITER, JACKSON AND (SEATED) SEAMAN ACE PANCOAST



WHO TAKES TURNS WITH THE CONSOLE OF PHILADELPHIA METRO OPERA HOUSE, TO PILOT AUDIENCE THROUGH A CAST MELODY



of the audience in that huge theatre-studio was so contagious that we decided, like thousands of other radio listeners, to run over there, pay our quarter, and see for ourselves.

Scramble For Seats

What a revelation the following night, when we arrived at the Met! Here was a huge institution formerly the Metropolitan Opera House built by Oscar Hammerstein in 1908, with a seating capacity of 4800. With a

"From a Shanty to an Opera House," no catch phrase, but a living reality—with reserved seats sold out two weeks in advance.



stage of tremendous proportions and the biggest theatre organ in Philadelphia, this building had stood silent and dark for five years.

But tonight the Met is a blaze of glory suddenly electrified into activity rivaling its original supremacy. As early as 7.30 P. M., the crowds are already pouring in through the lobby in order to get the choicest unreserved seats for the general admission price of twenty-five cents. (The 1750 reserved seats, at this writing, are sold out two weeks in advance!) We enter with the rest, and stroll around and up through the far reaches of this magnificent amusement palace. We inspect the "Diamond Horse-Shoe" in the balcony, where the titles and aristocracy once displayed their finery. We climb to the upper limits of the galleries, where the "masses" once found quarter to hear "Carmen."

Anchor Up!

Presently the stirring tones of the great Moller organ come rolling through this vast building—"Ace" Pancoast entertains the assembling crowd with an overture composed of popular and semi-classic selections. Before we have completed our tour of exploration, we hear the hoarse warning whistle of a liner about to sail, the footlights are on, and we hasten downstairs to be seated. To the lively



"SKIPPER" FRANK SHANNON, MASTER OF CEREMONIES DURING THE UNIQUE PERFORMANCE

tune of "Sailing, Sailing, Over the Bounding Main," the radio broadcast goes on the air and the Skipper and his crew, in their snappy white sea-going uniforms, appear on the brilliantly lighted stage. The music stops. The Skipper sings out "Ahoy on the foc'stle—heave up the anchor." Suddenly, all is "black out," and we hear the unmistakable sound of a massive anchor chain clanking up through a hawse-pipe. As the lights come on again, we are surprised to see that this is accomplished by the simple expedient of a smoking-stand being rattled across the flanges of a cast-iron steam radiator. This done, the musical program proceeds with the entire crew singing to the accompaniment of the pipe organ. Then the Skipper speaks, and his voice is re-

(Continued on Page 32)



Broadcast Station Maintenance

(SECOND OF SERIES ON VITAL SUBJECT)

By J. E. YOUNG, Transmitter Engineer, RCA Manufacturing Company

IN THE preceding issue of BROADCAST NEWS was a brief note, by the writer, stressing the importance of mechanical and electrical maintenance of broadcast studio and transmitter equipment. Because this is a subject which receives much less attention than its importance warrants, a series of articles has been arranged, to follow in the succeeding issues of this magazine, covering each phase of equipment maintenance.

The general topic of maintenance can be divided into two sub-classifications. The first of these, the importance of which is quite generally appreciated, is the mechanical maintenance of the equipment. The second, which has rather universally been neglected, is the electrical maintenance. Too often it is assumed, so long as the meters indicating the currents and voltages of the several circuits continue to show the original readings or something approximating them, that the equipment is continuing to function in its original manner. Many stations are not even equipped with an audio-frequency oscillator so that the circuits can be checked with a sustained tone under the condition of maximum modulation consistent with the capability of the transmitter, at various audio frequencies.

Mechanical Maintenance

In this article the general subject of mechanical maintenance will be discussed, and the following articles will cover the various phases of electrical maintenance, in detail. Methods of measurement of the audio-frequency characteristic, distortion, and noise level of the individual components of the equipment, and of the entire system will be shown. Such measurements are the first step in electrical maintenance, since they show comprehensively the condition of the equipment and indicate the necessity and direction of the electrical maintenance. Mechanical maintenance is usually discussed in detail in the in-



JACK E. YOUNG, RCA MFG. CO.

equipments, so the subject will be treated here in a general way.

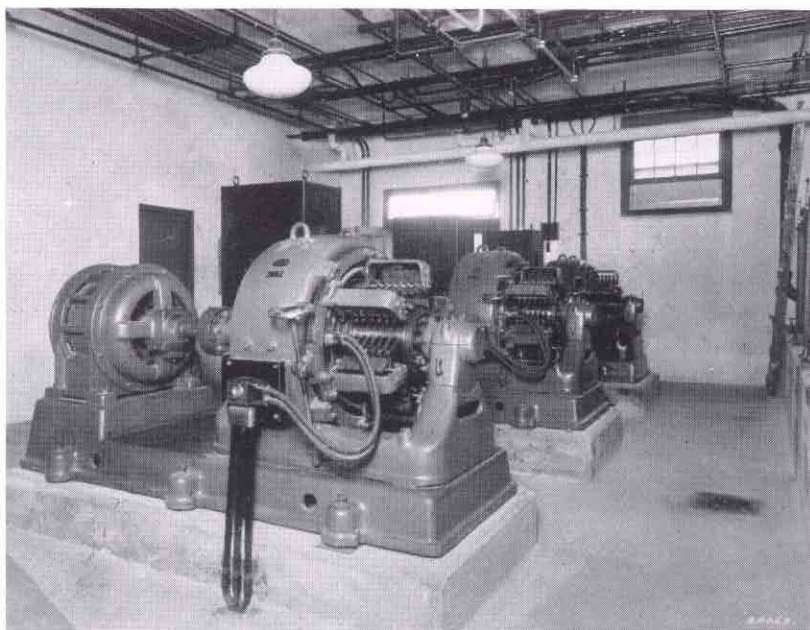
Since the studio and station are both visited by many people, who are interested in peering behind the scenes, the external appearance of all of the equipment should be pleasing and should be kept so through a regular cleaning routine. At least once a week, all exterior surfaces should be cleaned with a rag to which a little lemon oil, or other light oil, has been applied. Open bus work should be sanded and lacquered with a thin, clear lacquer upon installation. Bus

work, so treated, will not tarnish, and need only be wiped free of dust.

In addition to the above, the following weekly routine is suggested for properly maintaining studio equipment. All switches, volume controls, etc., should be checked for smooth mechanical operation. Any binding or unusual stiffness is an indication of trouble, either at hand, or soon to be. The contact studs and arms should be wiped clean, using carbon tetrachloride if necessary, to dissolve the dirt or grease which has collected. At the same time all connections to switch studs and arms can be checked for rosin joints or other evidence of poor connection; connections to other instruments, terminal boards, etc., should be likewise checked. Tubes should be removed from the sockets, and the contact pins cleaned with crocus cloth or very fine sandpaper and then wiped clean. While the tubes are out of the equipment they should be checked for emission, control, etc.

Opportune Tube Tests

A tube that has been used too long may cause distortion, or an excessively high noise-level, and such a condition



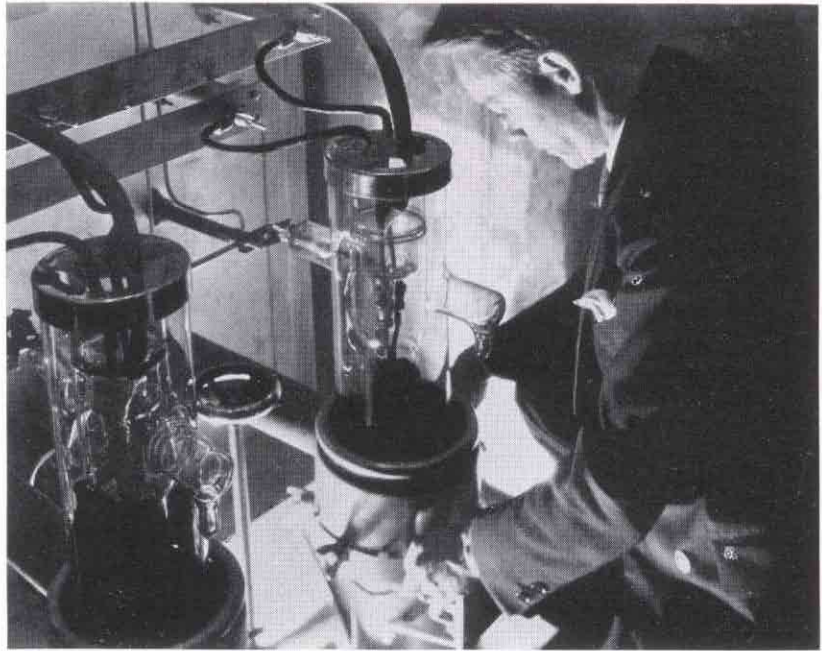
is much easier to spot, when each tube can be analyzed separately, than to locate the offending tube when the equipment is operating. Plugs should be kept clean and bright. They may be polished with crocus cloth.

While sufficient duplicate studio equipment is usually provided to make a failure of any single piece of studio apparatus less important than a corresponding failure at the transmitter, some provision should be made for storing spare parts, particularly tubes, when they are perfectly accessible, in the event of such a failure.

Storage Batteries

If a storage-battery power-supply is used, the specific gravity of a few test cells should be checked daily, and the specific gravity of all cells measured at least once a week. As a check test the cell voltage should also be measured, once every two weeks or perhaps each month. Failure of the specific gravity of any cell to rise properly on charge, and failure of the cell voltage to come up to normal for a fully-charged condition—about 2.2 volts for a lead cell—indicates defective plates and, possibly, broken-down separators. The terminals of all storage cells should be coated with a layer of vaseline. This will prevent corrosion, which, if unchecked, may eat through the terminal in considerably less than the normal life of the battery. The terminal voltage of all dry batteries should be checked weekly, using a high-resistance voltmeter. A drop of voltage of more than 10 per cent usually indicates that the life of the battery is nearly over, and that its internal resistance is increasing rapidly. The increase in resistance is usually accompanied by noise, making its operation doubly unsatisfactory. Where the filaments and plate circuits are operated from an AC source, the hum voltage and voltage at the tube sockets should be checked and maintained at the correct value. Incorrect filament voltage will either shorten the tube life or cause serious distortion, and will usually increase the noise level.

These general points apply to all studio equipments. Where special



VACUUM TUBES SHOULD BE THE SUBJECT OF SYSTEMATIC TESTS AT OPPORTUNE TIMES

apparatus is used, a special maintenance schedule should be devised. In any event a fixed maintenance schedule should be set up, and adhered to by the staff. Only in this way can the equipment be kept in good operating condition.

The Dust Nuisance

At the transmitter the same treatment should be used on the exterior of the equipment as in the case of the studio apparatus. All surfaces should be dusted at least once a week, and panels rubbed down with lemon oil or other light oil. Windows behind which are mounted high-voltage meters and the meter glasses themselves attract dust particles rapidly, because of the electrostatic attraction between the meter and the particles. These windows will therefore require extra attention; and they should be arranged so that both surfaces are easily accessible. A high-pressure air compressor is indispensable in keeping the transmitter dust-free. It will quickly clean out the most inaccessible parts of the equipment. A vacuum cleaner, such as the type used in cleaning furniture, is also handy. It can be used to remove most of the dust and dirt before the air hose is used, and will prevent the dust from being blown from one part of the equipment to another. Insulators should be wiped down,

using a damp cloth. Oil should never be used in cleaning insulators, since the oil film left on the insulator will hold loose dust particles, decreasing the leakage resistance of the insulator.

Moving Contacts

All contactors and relays should be inspected weekly. Each contactor should be checked over carefully for loose connections, loose bolts, coils, etc. The mechanism should be tried by hand to make sure that the contacts open and close properly, with the correct tension. There should be no evidence of binding in the movement of the armature. Mechanical interlocks should be tried, checking the operation and mechanical condition of the latch mechanism. A badly-worn latch may cause costly program interruptions before the source of the trouble is found. Burned contacts on large contactors should be dressed with a file. If the contact is too badly pitted, it should be replaced. Most high-current contactors are designed so that the contacts make and break by a combination of a rolling and sliding action. If the contact surface is not smooth the purpose of this contact motion is defeated, and the contacts will chatter as they make and break, still further burning the contacts.

Small control relays should be inspected weekly for mechanical and electrical condition. The operation of overload devices should be checked by

hand, carefully watching the operation of the contacts meanwhile. The contacts should be cleaned by depositing a little carbon tetrachloride on the contact surfaces, using the flat edge of a toothpick. The accumulated dirt can be softened, and scraped out with the toothpick, and then wiped away with a lint-free cloth. Burned or pitted relay contacts should be replaced. Their continued use reduces the effectiveness of the protective equipment and may result in damage to expensive equipment. The leather bellows of time delay relays should be occasionally treated with Neatsfoot oil. The oil level in dash pot relays should be checked every few months, and the operation of the piston should be checked.

Rotating Equipment

The commutators of all motor generators should be cleaned daily with a cloth, preferably canvas, to remove oil and dust. If the commutator is undercut, it should be inspected weekly, and re-slotted as soon as the bars are worn down near the mica. Dirt or copper particles collecting in the slots should be removed. So long as the commutator is bright, or assumes a deep chocolate color, it should not be sanded. If, however, it wears unevenly or is burned, as the result of improper brush setting, it may be sanded down. A commutator stone or sandpaper should be used for this

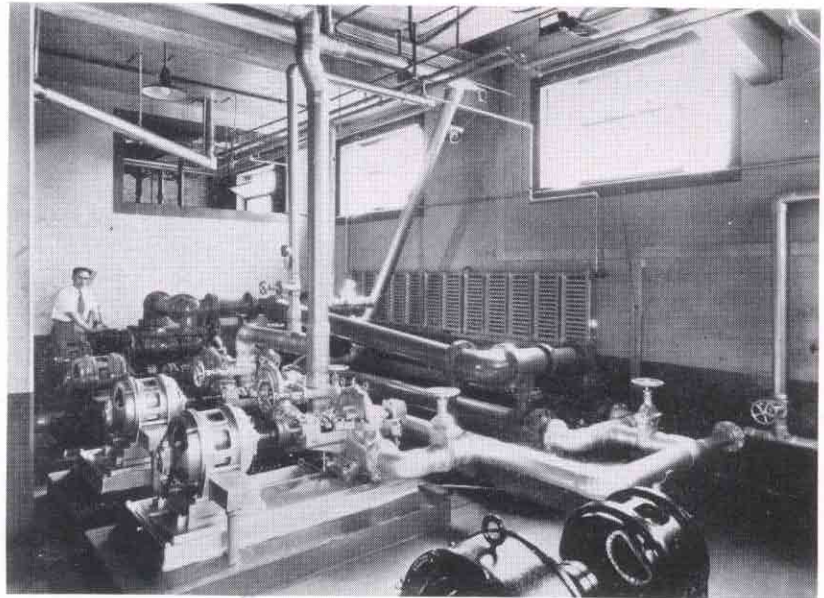
purpose. No more of the commutator surface should be removed than is absolutely necessary to restore its smooth surface. If excessive sparking at the brushes has caused the trouble, the position of the brushes and the brush tension should be checked. The brush faces should be checked and if they show evidence of uneven contact pressure they should be lined up by placing a strip of sandpaper around the commutator, and rocking the commutator back and forth until the brushes wear in evenly. It is not usually advisable to change the position of the brush arms without consulting

the manufacturer of the machine. Unless the load has changed, there is no reason why the brush position should change from its original setting. The brushes should be inspected weekly for wear and should be replaced when worn short enough to bring the tension spring or any metal part of the brush box dangerously near the commutator. Brush holders should be cleaned frequently. Accumulations of carbon dust in the spring mechanism will change the brush tension, causing excessive wear of the brush, or sparking.

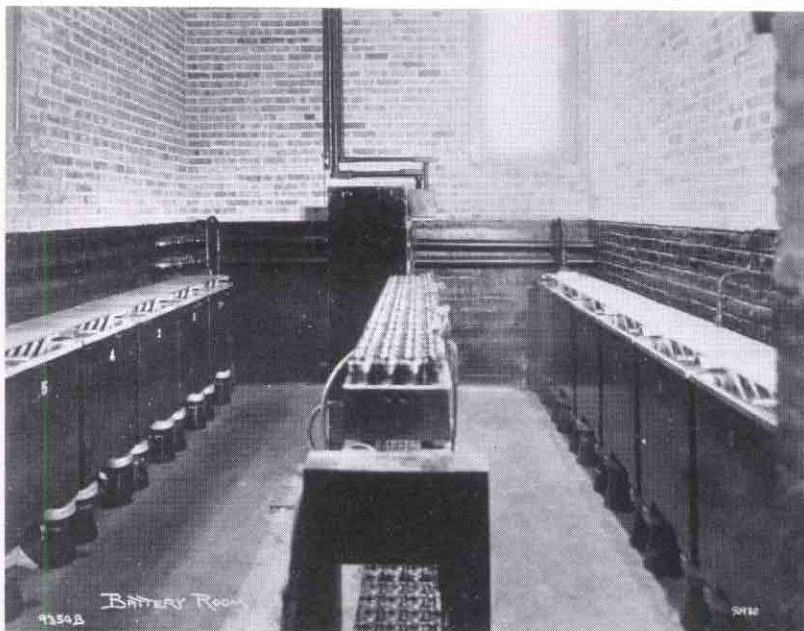
Oil and dust should be cleaned out of all rotating machines daily, and if a high-pressure air compressor is available, the windings should be blown out once a week. The operation of oil rings, and bearing temperatures should be checked several times each day, and the bearing oil level should be checked once each week. Care should be exercised, in filling oil wells, not to exceed the level marked on the bearing pedestal. Too high an oil level will result in some oil being thrown out, increasing the accumulation of dirt and damaging the commutator.

Transformers

Power transformers require little maintenance, with the exception of a weekly cleaning of insulators, checking connections, etc. Once every six months a sample of oil should be drawn from the bottom of the case



PUMPS AND BLOWERS, LIKE ALL ROTATING EQUIPMENT, SHOULD BE CAREFULLY SUPERVISED



STORAGE BATTERIES SHOULD BE REGULARLY SERVICED, AND SHOULD BE WELL VENTILATED. AT WWW.AMERICANRADIOHISTORY.COM

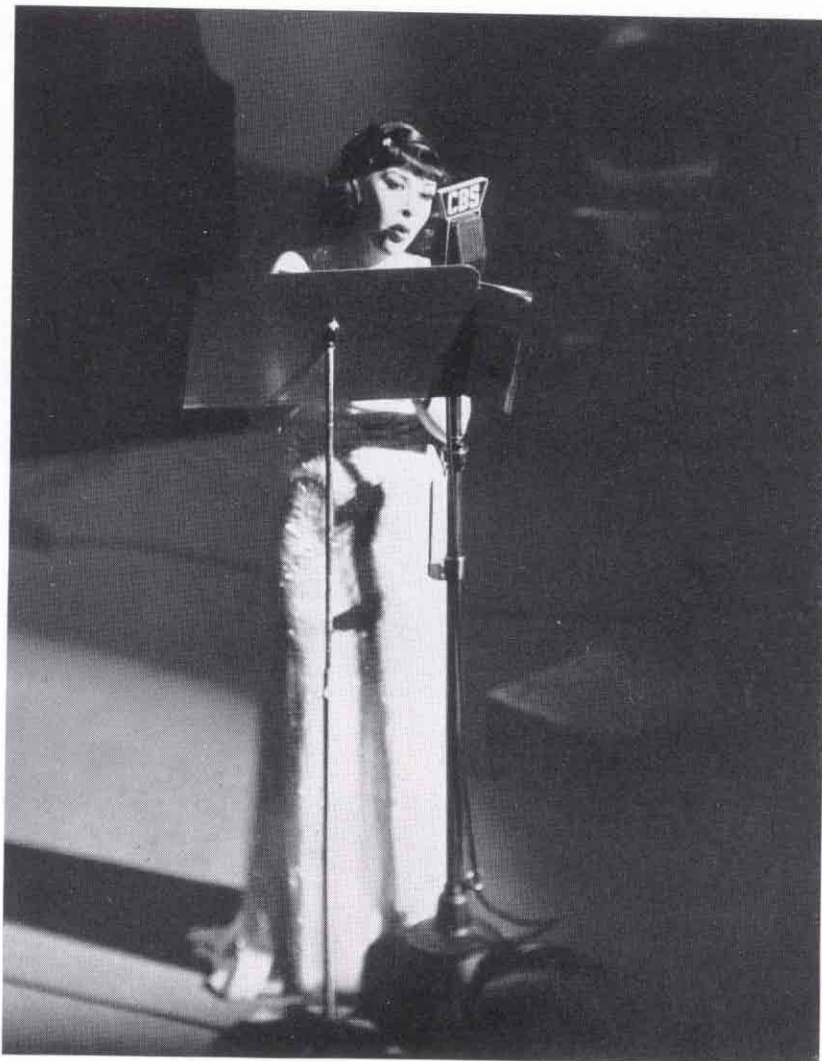
Remote Star Broadcasts for CBS

By HENRY GROSSMAN, Operations Engineer, CBS

ON A RECENT Columbia program, it was discovered that Gertrude Niesen, who was scheduled to broadcast with Lud Gluskin's Orchestra, could not appear at the studio in New York, as she was playing in Lou Brown's new show, "Calling All Stars," in Boston. Special arrangements were prepared so that it would be possible for Miss Niesen to sing before a microphone in the Columbia Boston Studios to the accompaniment of Lud Gluskin's Orchestra, located in the Columbia Playhouse No. 2 in New York, where the Exlax Program usually originates.

In Boston, headphones were provided for Miss Niesen so that she could hear her own voice coming back from New York, after it had been mixed with the orchestral accompaniment. Headphones were also provided for Lud Gluskin, the orchestra director, on the stage at Playhouse No. 2, so that he could hear Miss Niesen singing and so that he in turn could properly follow her.

The audience of 1100 people attending Playhouse No. 2 on this occasion found it quite a novelty to hear the voice of Miss Niesen over the P. A. System, while the orchestra was in plain view on the stage. They, as well as the radio audience, had been informed of the situation and seemed to enjoy the success with which the apparent difficulties were overcome.



GERTRUDE NIESEN, SINGING BEFORE THE VELOCITY MICROPHONE AT THE COLUMBIA STUDIOS IN BOSTON. NOTE THE CLEVER ARRANGEMENT OF HER HAIR, WHICH CONCEALS THE HEADPHONES USED ON THIS NOVEL REMOTE PICKUP

STATION MAINTENANCE

(Continued from Opposite Page)

and tested for breakdown. If the breakdown test indicates an excess quantity of water in the oil, it should be filtered, or replaced by fresh oil.

The purity of the water used to cool the anodes of the tubes should be checked regularly, either by means of a leakage meter or by means of a chemical test. If the total mineral content of the water exceeds 5 grains per gallon, the system should be drained and refilled with distilled

water. Impurities in the water system not only cause a power loss but also result in a scale formation on the anodes. This scale reduces the heat transfer, causing the anode temperature to increase. Failure of a tube may result. The water-cooled tubes should be removed from their sockets every three months and any accumulation of boiler scale removed.

The electrical circuits in the transmitter should be checked over each week, connections tightened, leads straightened up, etc. Switch jaws and blades should be checked and

lightly coated with vaseline. Tuning drives should be inspected and oiled when necessary. Air-cooled tubes should be removed from their sockets and contact pins and contact spring cleaned and checked for contact. Here again it is desirable to set up a definite schedule so that no single item will be overlooked. The maintenance must be thorough if any good is to be realized from it.

The outside equipment such as the antenna and transmission line should be inspected every month, and cleaned several times a year.

Old Friends Adopt New Name



DAVID SARNOFF, CHAIRMAN OF THE BOARD OF DIRECTORS OF THE RCA MANUFACTURING COMPANY, INC.



E. T. CUNNINGHAM, PRESIDENT OF THE RCA MANUFACTURING COMPANY INC., WITH HEADQUARTERS AT CAMDEN, N. J.

Logical Identification for Combined Camden-Harrison Manufacturing Organization

THE RCA Victor Company and the RCA Radiotron Company, the two wholly-owned manufacturing subsidiaries of the Radio Corporation of America, have been consolidated into a single organization known as "RCA Manufacturing Company, Inc." The new Company began operations as of January 1, 1935. The consolidation has been made

primarily for convenience of operation. The officers and management of the two subsidiary companies continue in their respective positions, and the factories located at Camden, N. J., and Harrison, N. J., will continue their operations as in the past.

The well-known trade-marks on the products manufactured by these companies will be continued through

the establishment in the RCA Manufacturing Company, Inc. of two divisions, known as the "RCA Victor Division" and "RCA Radiotron Division."

Mr. E. T. Cunningham is the President, and Mr. David Sarnoff the Chairman of the Board of Directors of the RCA Manufacturing Company, Inc.

BROADCAST PERSONALITIES

WSOC

Distance During Broadcast Hours

Among its souvenirs, WSOC has three records of long-distance reception during broadcast hours—two from John Kalmbach in Buffalo, N. Y., reporting verifiable reception at 7 and 9 in the evening, and one from Watertown, N. Y., re-

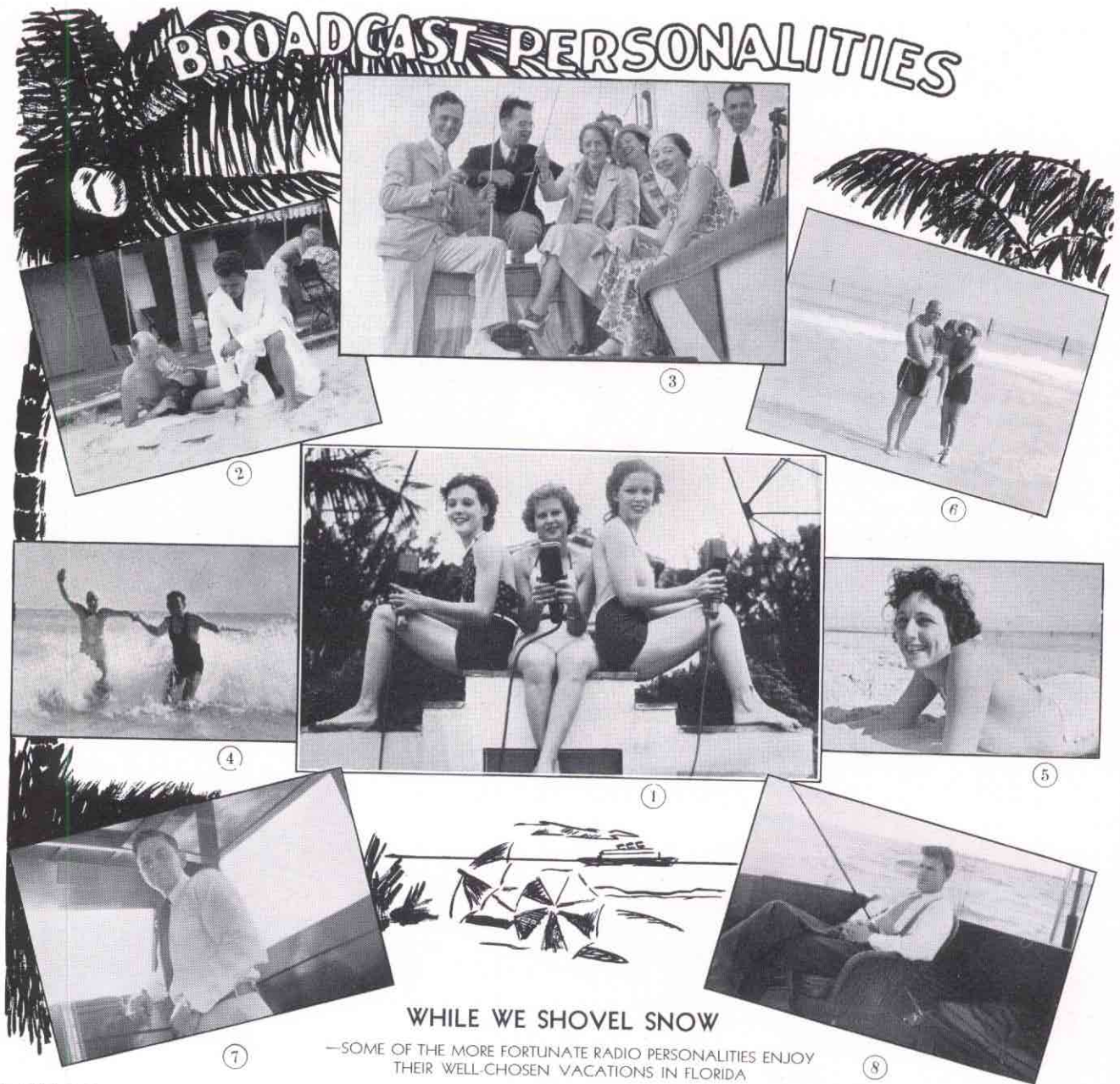
porting verifiable reception at 9.30 in the evening. At these times WSOC is operating on a power of 100 watts on a channel that includes some sixty other stations, many of whom are much closer to the reporting cities. Longest distance DX reception records go to twelve New

WBEN

R. J. Kingsley Tells Us That—

Charlie Hoover, formerly of the control room staff at WBEN, is recovering from a serious illness at the Perrysburg Memorial Hospital, Perrysburg, N. Y. He would like to hear from any of his old friends.

BROADCAST PERSONALITIES



WHILE WE SHOVEL SNOW

—SOME OF THE MORE FORTUNATE RADIO PERSONALITIES ENJOY THEIR WELL-CHOSEN VACATIONS IN FLORIDA

(1) DURING THE CELEBRATION AT THE OPENING OF **WIOD'S** NEW STUDIOS, WHICH ARE COMPLETELY **RCA** EQUIPPED, MIAMI STUDENTS ENJOY A LESSON IN RADIO BROADCASTING. LEFT TO RIGHT: **BERNICE TANSILL**, **JERRY HOWARD** AND **MAURINE KERNS**. VISITORS ALSO ENJOYED THE PROCEEDINGS

(2) **ED COHAN**, CHIEF ENGINEER OF THE **COLUMBIA BROADCASTING SYSTEM**, AND **I. R. BAKER**, TRANSMITTER SALES MANAGER OF **RCA MANUFACTURING COMPANY, INC.**, CONCENTRATE THEIR ATTENTION UPON BLUE PRINTS LAID OUT ON THE SANDS AT MIAMI BEACH, WHILE **L. F. JONES**, OF **RCA ENGINEERING DEPARTMENT**, IS DISTRACTED (IN THE BACKGROUND)

(3) GUESTS ABOARD THE YACHT OF **JESSE JAY, WIOD**. LEFT TO RIGHT: **JESSE JAY**, OWNER OF **WIOD**; **STEWART BAILEY**, OF **JANSKY & BAILEY**, CONSULTING RADIO ENGINEERS; **MRS. JAY**; **MRS. LOHNES**; **MISS MARIE BALBRIDGE**; **HORACE LOHNES**, RADIO ATTORNEY OF WASHINGTON, D.C. **PHIL LOUCKS**, MANAGING DIRECTOR OF **N. A. B.**, IS HIDING BEHIND THE LADIES IN THE CENTER

(4) **MARY LOU**, OF **SHOW BOAT FAME**, FROLICS IN THE SURF AT MIAMI BEACH WITH **BEN ADLER**, **RCA MANUFACTURING COMPANY'S** TRANSMITTER REPRESENTATIVE OF THE SOUTH-EASTERN DISTRICT

(5) THE NEW STAR OF THE **PALMOLIVE HOUR** ON THE **NBC** NETWORK TAKES A SUN-BATH AT MIAMI BEACH. **MARY LOU** HAS COMPLETED MORE THAN 2,000 PERFORMANCES ON THE AIR, AND RECENTLY WON THE AWARD FOR PERFECT DICTION AT THE WORLD'S FAIR

(6) **MR. AND MRS. ED COHAN** PREPARE TO TAKE THEIR DAUGHTER **JANE** FOR A DIP IN THE SURF AT MIAMI BEACH

(7) **F. R. DEAKINS**, SALES MANAGER OF THE ENGINEERING PRODUCTS DIVISION, **RCA MANUFACTURING COMPANY, INC.**, AT THE HELM OF **HAROLD ROBINSON'S** YACHT

(8) **RALPH WHITE**, OF THE **RCA** DISTRIBUTING ORGANIZATION IN MIAMI, DOES A LITTLE OFF-SHORE FISHING

KTHS

J. M. McDonald, chief engineer of KTHS at Hot Springs National Park, Arkansas, has a new assistant chief in the person of J. M. Moran, who was formerly with WLW and WFAA.

KFRO

One of the first new 100-watt stations granted by the F. C. C. under the new local station regulations is KFRO at Longview, located in the famous East Texas Oil Field. This

station is owned and operated by the Voice of Longview, Inc., of which Mr. James R. Curtis, Longview Attorney, is President. Mr. Curtis has acquired the services of Mr. T. R. Putnam as General Manager, and Mr. Ralph

DuBois as Chief Engineer. Both Mr. Putnam and Mr. DuBois have been associated with broadcast stations in Texas, Arizona and on the West Coast.

KFRO went on the air January 15th, completely equipped with the latest type RCA broadcast equipment throughout, including the new all AC operated Type ET-4230 Transmitter and a High Fidelity speech input system. An attractive building was erected as the home of the station, large enough to contain the studios as well as all the equipment and the offices for the station personnel.

Mr. Curtis reports that within a few days of operation numerous compliments were received on the excellent tone quality and good reception furnished by the station.

KPRC

KPRC, Houston, Texas, the station of the Houston Printing Co., recently moved their studios from the Shell Building to the Lamar Hotel. Very attractive and modern studios were constructed under the supervision of Mr. L. C. Miller, their chief engineer.



B. T. (BEVO) WHITEMIRE, MANAGER OF WFBC, GREENVILLE, S. C.

WFBC

B. T. (Bevo) Whitemire, manager of WFBC, *Greenville News Piedmont* station (S. C.), is pictured herewith in the studio, and we also show Milton Ponder and Bill Bivens, two versatile announcers of the same station. These two boys put on specialty acts of their own, Ponder



MILTON PONDER (LEFT) AND BILL BIVENS, TWO ACE ANNOUNCERS AT WFBC, OF THE "GREENVILLE NEWS PIEDMONT" (S. C.)

doing the WFBC Saturday night "Hay Ride," with big studio attendance. Bivens does a three-mornings-per-week sketch called the "Kup o' Koffee Klub," which has enrolled 11,458 members in a few months.

State-Wide Network Carries Address by Governor

For the first time in recent years a state-wide network of radio stations covering the four major cities of North Carolina was formed to broadcast the address of Governor J. C. B. Ehringhaus before the opening session of the State Legislature. WPTF, Raleigh; WWNC, Asheville; WSOC, Charlotte, and WBIG, Greensboro, were the stations comprising the new "network." Through the facilities of these four stations the Governor's address was made available to every nook and cranny of the state and surrounding states as well. Key station for the broadcast was WPTF in Raleigh. The WPTF Program Department handled all arrangements for the actual pickup. The four stations were linked by the regular A. T. & T. broadcast equipment. The broadcast, lasting for three-quarters of an hour, proved to be of great interest to North Carolina radio listeners. Each of the four stations was deluged with telephone calls both before and after the broadcast. In-

teresting side-light on the broadcast was that this was the first time in the history of broadcasting in this section that affiliates of the two major networks were linked together to form an independent network. WSOC, WPTF and WWNC are NBC affiliates; WBIG, a Columbia outlet.

WCAU

In a recent advertising campaign, Station WCAU, Philadelphia, makes the following statement: "99.999 per cent efficient. The size of WCAU's habitual audience results from consistency of WCAU performance. 'Time out,' the bane of football, is positively fatal to radio listener interest. During 1934 WCAU operated over 8,000 hours with a *total* interruption of but 7½ minutes.

"This consistency of efficient performance is no accident in a station representing peak achievements in radio engineering development. Such a record is just another detail of the complete perfection of WCAU's service (staff and equipment) to advertisers. It helps to explain our clients' satisfaction in WCAU. . . ."

This statement is sponsored by Dr. Leon Levy, President of the WCAU Broadcasting Company. The equipment?—RCA, of course.

New RCA Equipment Installed in WCAU Auditorium Studio

By KENNETH W. STOWMAN, Publicity Director, WCAU

THE installation of a new RCA speech input rack and public address amplifier has been completed in the control room of the WCAU Auditorium Studio, second floor, 1622 Chestnut Street, Philadelphia. With the addition of this new rack the equipment now used in the WCAU studios is exclusively RCA.

This unique studio has been constructed to seat approximately three hundred persons in the audience, with room on the stage to accommodate between forty and fifty entertainers. With this new installation it is possible to broadcast and amplify the programs with the highest possible fidelity.

Every afternoon the WCAU Women's Club, under the direction of Elsie Carol, well-known home economist and food authority, conducts the "WCAU Women's Club of the Air." A model kitchen is located in the rear



A COOKING DEMONSTRATION IN THE WCAU AUDITORIUM STUDIO BEFORE A CAPACITY AUDIENCE. RCA SOUND RE-ENFORCEMENT SYSTEM AND RADIO FACILITIES ARE EMPLOYED

of the stage and the cooking demonstrations are presented before the visi-

ble audience and broadcast to the radio audience, from 2.30 to 3 P. M. daily, over WCAU. On special occasions when well-known national authorities are scheduled to speak the time is extended.

This auditorium is also used for the radio programs where an audience is invited, and also for promotional and sales meetings. If an advertiser is introducing a new product to the radio audience as well as his sales force, he is invited to bring his group to the auditorium for a special meeting and also hear his new radio program.

When these programs are presented two velvet drapes are drawn across the back of the stage, thus taking from view the model kitchen.

The new RCA Velocity microphones are being used to make the pickup from this studio as well as in the other eight studios used by WCAU. For all outside broadcasts the WCAU Remote Control Division is now using exclusively RCA 50A type inductor microphones.



THE CONTROL ROOM OF THE WCAU AUDITORIUM STUDIO—COMPLETELY RCA EQUIPPED. www.americanradiohistory.com

CLEVELAND-NAGLE STUDIOS

Hum Compensator for Broadcast Stations

By LOY E. BARTON, Radio Engineer, RCA Manufacturing Co.

THE high voltage DC generators required for plate supply in early moderate powered broadcast stations gave way to rectifier systems for the plate supply in the modern radio transmitter. The high voltage generators became obsolete principally because of the inherent service requirements to obtain reliable operation and because of inherent voltage limitation of the machine. Another serious objection to the generator is that it is a rotating machine. The filament supply for broadcast transmitters has been almost exclusively direct current generated by low voltage machines until quite recently, because of excessive hum generated by using AC heated filaments. It is obvious that the DC filament machine requires essentially the same service to keep in good condition as high voltage machines formerly used. Another objection to filament supply is that the high power filament requirements in large transmitters require an expensive machine as to initial cost, maintenance, and space requirements.

AC Operated Filaments

The low voltage filament machines may be eliminated in low power transmitters by careful design to eliminate hum as the result of AC operated filaments. However, when



LOY E. BARTON, RCA MFG. CO.

larger power tubes such as the UV-863 and UV-862 are used, AC operation of the filaments causes the generation of a hum because of the pulsating magnetic field around the filament due to the alternating filament current. This magnetic effect about the filament is known as the magnetron or axiotron effect. The magnetic field about the filament reaches a maximum value at a frequency corresponding to double the filament supply frequency. At the time of maximum magnetic field about the filament, the electron path to the plate is caused to deviate most from its normal path,

thereby causing the plate current to pulsate. These slight pulsations are non-sinusoidal, so that a 60-cycle filament supply produces a 120-cycle hum component and several harmonics of 120 cycles. Any unbalance of the filament center tap results in a 60-cycle hum. The generation of hum in the smaller tubes is limited mostly to unbalanced filament center taps because the filament current is so low that the magnetron effect is negligible.

Hum Compensation

Because of the higher value of hum generated in the tubes with relatively high filament current, special precautions are required to reduce the hum when operating the filament on AC. In the new RCA 5 KW and 50 KW transmitters, the filaments are operated on two or three phase systems in such a manner as to cause the hum generated by one filament to be largely compensated for by the hum generated at a different phase in another filament. In case two or more tubes are used, each tube may be lighted from a separate phase. The new Type 5-C, 5 KW broadcast transmitter uses two UV-863 tubes, the filaments being operated from a 2-phase supply. The new Type 50-C, 50 KW transmitter uses a new RCA-898 tube, which is similar to the UV-862 except that it has a special filament arranged for 3-phase operation. The two or three phase operation of the filaments in the new transmitters reduces the hum level to a relatively low value. However, the hum level is somewhat high for present day standards of performance, especially when high fidelity receivers are used. To reduce the hum still further various schemes were considered, after which it was decided to use a hum compensation system that would not impair the quality of the transmitted signal. Systems in which degeneration or its equivalent is used were ruled out because of the distortion such systems may introduce.

The hum compensation system used is essentially a phase and ampli-

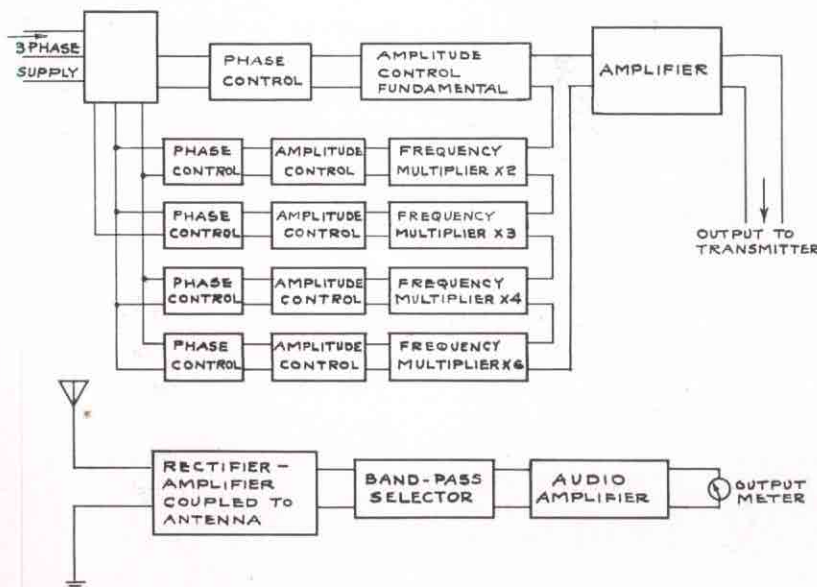
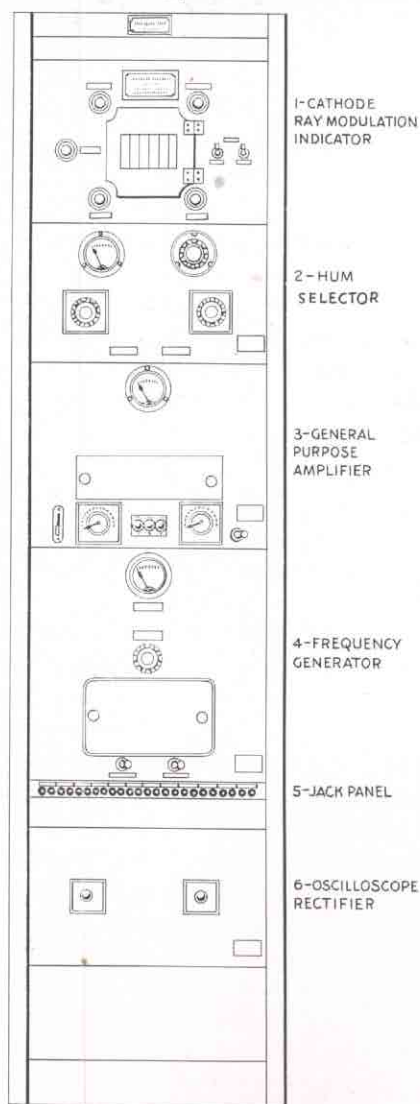


FIGURE 2. FUNCTIONAL DIAGRAM OF HUM COMPENSATOR SYSTEM

tude control for a frequency multiplying network for each of the principal hum frequencies of 60, 120, 180, 240 and 360 cycles. Measurements indicated the components of hum other than the above frequencies were negligible in amplitude. These hum frequencies from the compensator are fed into the audio system of the transmitter at such phase and amplitude that the hum generated by the transmitter is balanced to essentially zero.

Standard Rack Mounting

The Type AW-4232 Hum Compensator has been built into a rack as shown in below. The Type 49-A Cathode-Ray Modulation Indicator with a Type AP-4257 plate supply voltage is incorporated with the hum compensator rack to add to the general usefulness of the rack. This is also true for the Type 40-C General Pur-



AW-4232 - HUM COMPENSATOR - FIGURE 1

pose Amplifier because this amplifier may be used as a speech amplifier, a monitor amplifier, or used in conjunction with the Frequency Generator Type UZ-4255 as a hum voltage indicator to facilitate the proper adjustment of the hum compensator for minimum hum from the transmitter. The 40-C amplifier is used only when actually making hum adjustments.

Operation

The general operation of the hum compensator may be explained by referring to the diagram in Figure 2. The 3-phase supply is preferably obtained from the filament power source so that the phase relation of the filaments and the input to the hum compensator will be fixed. This fixed phase relation is necessary in order that the generated hum frequency will maintain the proper phase to balance the hum generated by the filaments.

To adjust the hum compensator, each hum frequency is adjusted independently and in general, the amplitude controls are initially turned to zero. It is easiest to balance the highest hum component first and progress to the next highest component. For 2-phase operation of the filaments, the 240-cycle component is highest. In this case, Type UM-4256 Hum Selector unit is turned to 240 cycles and the gain of the audio amplifier so adjusted as to obtain a convenient transmitter hum reading on the output meter. The amplitude of the 240-cycle frequency multiplier is increased from zero slightly and the phase control turned for a minimum output meter reading. The amplitude control is next adjusted for minimum reading of the output meter. The band-pass selector is then turned to another frequency and the same procedure followed to obtain the minimum hum output.

The hum compensator panel is so arranged that the compensator adjustment may be conveniently checked at regular intervals, although no appreciable readjustment should be necessary except in remote cases of tube failures or other service requirements. The entire hum compensation panel is self-contained, including the cathode-ray modulation indicator, and is

supply. The compensator may be connected to any AC operated transmitter for the purpose of reducing hum, and in addition full use may be made of the cathode-ray modulation indicator, and of the 40-C amplifier as a speech amplifier or a monitoring amplifier.

HIGH FIDELITY PERFORMANCE

(Continued from Page 9)

db. with considerable difficulty. In fact, such an accomplishment in general would be so expensive that 50 db. is suggested as a compromise. The recommendation for the transmission end of the broadcast system is that the overall noise level should be held to minus 50 db. as compared to 100% modulation, the noise being measured by means of a weighted filter and a rectifier coupled to the transmitter output, with the entire transmission system in operation including studio equipment and microphone, the microphone being located in an absolutely quiet studio.

If this recommendation were conformed to, a volume range of about 50 db. could be satisfactorily transmitted. This would represent a very great improvement over present day practice and would truly deserve to be termed "high fidelity."

Transmission Harmonics

It is a well-known fact that low order audio harmonics such as the second have a less objectionable effect than do the higher order harmonics. Thus it would seem logical in specifying harmonic limits to use a weighted index rather than a simple arithmetic sum. Exact data as to the correct method of weighing are not available. In any case the ideal method would be complicated because the phases of the individual harmonics are of importance. Thus it seems expedient to preliminarily propose a method which although not ideal is very useful. It is recommended that the individual harmonics up to about the tenth be measured and that the percentage of the second be multiplied by two, the third by three, the fourth by four,

(Continued on Page 36)

IDEA BOOSTS POPULARITY OF WPEN

(Continued from Page 19)

enforced by the RCA Public Address system, booming out:

"Welcome everybody tonight for a two-hour cruise out over the sea of entertainment, on board the S. S. 'All in Fun'—that mythical vessel of joy with seventeen decks and two straw bottoms. The Chief Engineer says he has his engines turning over all right now. What's that, Chief? The left-side engine is upside down already? Well, who cares? Let's go!"

Soon we discover one cause for the unrestrained laughter of the audience which we heard over the air last night. "Tommy Rott" (Bill Donohue) strolls in from the wings to do a turn at the mike—and what a makeup—what a costume! He plays the part of an absolute "goof." There's lots of spontaneous comedy and lots of informal gaiety on the program.

Shades of H. M. S. "Pinafore"

Besides "Skipper" Shannon and messboy "Tommy," the cast includes "Inspection Engineer" Eddie Stang, who specializes in German songs and



THIS LITTLE SHACK IN WOODSIDE PARK, PHILADELPHIA, SERVED IN 1930 AS THE HOME FOR BOTH THE TRANSMITTER AND STUDIO OF WPEN, WHERE THE S. S. "ALL IN FUN" HAD ITS MODEST BEGINNING

recitations; "Ace" Pancoast (Seaman), who is expert at both the organ and the piano; "Steward" Chris Seiter, whose specialty is delighting widows with his voice and his guitar; the yodelling "Cabin Boy," Dick Goldhahn, who besides singing, plays guitar, ukelele and several other musical instruments; "Able Seaman," Ray Fitzgerald, of the silver-toned

voice; Al Kilbride (a "seaman" whose Irish songs are ever popular); "Deck Cadet," Arthur Jackson, who sings and also plays a mean harmonica, and last, but not least, "Chips" Ben Eckert (the "Ship's Carpenter"), who leads the audience in song and adds many other intimate touches to the program. In fact, he and "Tommy" spend quite a bit of their time right in the audience.

However, the prize for low-brow and side-splitting foolishness goes to Tommy, the master comedian of the cruise. To say he is a riot is to put it mildly. No wonder women shriek and men roar. Our own diaphragm aches before the evening is over, and, to cap the climax, at the end of the program, this same Tommy, in his burlesque sailor suit, steps down off the stage and, seated at the console, plays the closing signature in masterful style, with audience and cast joining in the song. The anchor is lowered away (at the steam radiator) and the cruise comes to an end. In a trice, it seems, two hours have slipped away.

Now the Skipper and Tommy, and, in fact, the whole cast are down off the stage mingling with the audience, each one surrounded by swarms of girls pleading for autographs. It is interesting to note that 95 per cent of the attendance is composed of the fair sex. Do these boys enjoy this popularity?—Who wouldn't!

Fans Swamp Phones

When this program was temporarily off the air for a few days last October, the station received over 75,000 letters from indignant fans. On the first night this feature was off the air, 50,000 phone calls were put in over the Bell System alone (there is also the Keystone System in the Philadelphia area), and it was impossible to put through more than 20,000 of these calls. The system was literally "swamped."

The miracle of an apparently simple idea like this is spellbinding. It has rescued a huge opera house from idleness. It has boosted the popularity of a 500-watt broadcast station so that sponsors are clamoring for time. It has brought revenue to the theatre proprietors and the broadcast station

ployment is provided not only for musicians, vocal artists, and other performers, but also for electricians, box-office cashiers, ushers, cleaners, and all the rest of those persons necessary for the operation of the theatre-broadcast.

And now every night during the week between two and three thousand persons attend these stage-broad-



H. S. FRAZIER, CHIEF ENGINEER OF WPEN, STRIKES "8 BELLS"

casts. Further evidence of popularity is found in the fact that literally hundreds of telegrams come in during each performance, addressed to individuals or groups in the audience, and many of these are read aloud by the Skipper—with startling and humorous effect. These boys seem to get their audiences in a condition to laugh at almost anything or almost nothing.

Augmenting the gate receipts is the income from the various sponsors whose announcements are periodically injected into the continuity.

"From a Shack to an Opera House"

"Skipper" Frank Shannon and his crew are kept plenty busy creating and rehearsing new continuity material for each performance. These boys spend most of their waking hours right in the Met Theatre, either performing or preparing new material. They deserve lots of credit for the feature which has completely outgrown the confinements of WPEN's studio auditorium, which has a seating capacity of 700, and overnight is filling the biggest showhouse in Philadelphia.

This feature in embryo form originated six years ago in the modest shack which served as the transmitter and studio building at WPEN'S first

location in Woodside Park, Philadelphia. It was then a one-man show, with Frank Shannon making announcements, doing monologue stunts and playing phonograph records. Gradually he has built up this feature, added artists and characters and color. As its popularity increased, larger and better studio quarters were acquired in the heart of Philadelphia. A bigger and better transmitter has been installed at an improved location. This feature, within the span of six years, has actually graduated "from a shanty to an Opera House."

Progressive Management

Clarence H. Taubel is the President and General Manager of the William Penn Broadcasting Company, proprietors of WPEN, Paul Alger is the Publicity Manager, and H. S. Frazier is the Chief Engineer. The control operator assigned to the broadcast of the S. S. "All in Fun" from the stage of the Met Theatre is John Stoudt, and from all indications he has a busy time of it keeping up with the cues of this fast-moving production. An RCA velocity microphone is suspended high over the center of the audience so that when they are joining in the songs, when the organ is being used, or when some of the performers are circulating amongst the audience during the course of their novel acts, this material will be properly picked up and reproduced. The transmitter is an RCA installation, as is the Public Address equipment.

Veteran Wireless Operator

Oh yes, we nearly forgot, "Skipper" Frank Shannon (erstwhile mystery announcer) used to be a radio operator on ships at sea, having served overseas as Chief Radioman in the U. S. Navy, during the World War, and later was Service Instructor at the RCA Institute in Philadelphia, and served a number of years as broadcast station engineer. No wonder there is such splendid nautical atmosphere in this novel production, which since November 1, 1934, has resulted in more than 100,000 paid admissions!

NEAR AND FAR



JOY LYNNE, EXOTIC YOUNG SINGER OF TURKISH DESCENT (HER PARENTS CAME FROM THE LAND OF HAREMS), IS HEARD ON THE GENERAL TIRE PROGRAM OVER NBC-WEAF NETWORK

High Fidelity is of great importance in Chinese for the clear reproduction of the many peculiarities of speech in that language.

利達公司總理

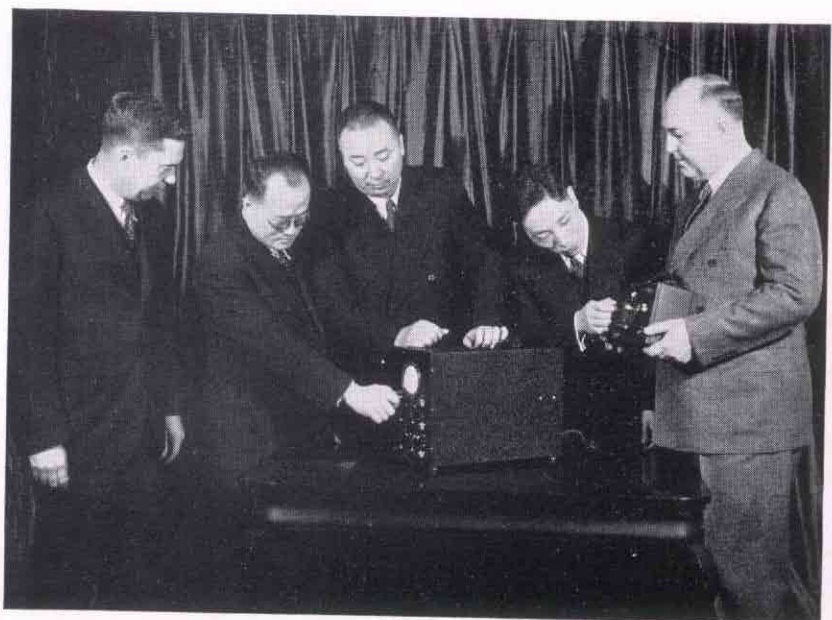
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CALLED AT "RADIO HEADQUARTERS"

Recently Mr. F. Ceeyin Ede, Managing Director of the Leede Engineering Corporation, 395 Bubbling Well Road, Shanghai, China, dropped in to discuss some radio transmitter equipment at the offices of the RCA Manufacturing Company, Inc. Camden, N.J.

(We hope we have shown Mr. Ede's card right side up!)



CHINESE COMMUNICATIONS COMMISSION VISITS RADIO HEADQUARTERS

E. C. GRIMLEY, MANAGER INTERNATIONAL DIVISION OF THE RCA MANUFACTURING COMPANY, EXPLAINING THE OPERATION OF THE NEW RCA CATHODE-RAY OSCILLOGRAPH INSTRUMENT WHICH ANALYZES RADIO WAVES AND CIRCUITS AND PERMITS THE SERVICEMAN TO "SEE" WHAT HAPPENS INSIDE THE RADIO RECEIVER. LEFT TO RIGHT: MR. GRIMLEY, OF RCA MFG. CO.; PAO FENG WOO, TECHNICAL ADVISER, MINISTRY OF COMMUNICATIONS, GENERAL YU FEI PENG, VICE MINISTER OF COMMUNICATIONS, NANKING, CHINA, WHO HEADS THE COMMISSION; CHANG CHIE-HWA, TECHNICAL ADVISER, AND MAJOR J. T. CLEMENT, VICE PRESIDENT

**SEE
IMPORTANT NOTICE
ON BACK COVER**

NBC Syndicated Program Service

Transcription Activities Increasing



C. LLOYD EGNER, MANAGER NBC
TRANSCRIPTION DEPARTMENT

IN April 1934, the National Broadcasting Company announced the inauguration of a transcription department.

This news was received with interest by stations and advertisers throughout the country. The great contribution such a department could make in advancing the cause of better programming in local and spot markets was recognized immediately.

In less than a year much has been accomplished by this department under the management of C. Lloyd Egner, who was commissioned to guide the destiny of the new NBC undertaking, and to utilize properly the vast resources that lay behind it. One of his first moves after having laid the foundation on which the department was to be built, was to inaugurate the NBC Syndicated Recorded Programs Service.

In an article announcing the new series, which has, in so short a time, carved a niche for itself in the transcription field, Mr. Egner said:

"One of the controlling reasons for the National Broadcasting Company entering the electrical transcription field was to make available to stations associated with it, its extensive program resources and to

aid in the sale of local facilities to local advertisers. We have during the past few months interviewed and corresponded with nearly 100 stations in a position to know local program requirements. The information so obtained has been carefully studied and is the basis for NBC Syndicated Recorded Program Service. It can, therefore, be said that this service has been designed to meet the stations' requirements."

Broadcasters who attended the NAB Convention in Cincinnati and who visited the NBC Transcription Exhibit had the opportunity to observe at first hand, to what extent the service is designed to meet the stations' requirements. Hundreds of delegates who stopped, looked and listened to the Syndicated Recorded Series, satisfied themselves that NBC had something they and their advertisers could use to advantage.



FRANK CHASE, DIRECTOR, NBC
RECORDED PROGRAMS

What is NBC Syndicated Recorded Program Service?

It is a service that provides stations and advertisers with complete ready-to-use programs in series of 13, 26, 39 and 52 fifteen-minute



NBC PHOTO

PEG LA CENTRA, IRVING KAUFMAN AND CAMERON ANDREWS IN A SKIT FROM

units. Each series is intended primarily for local sponsorship, but it may be used, if desired, for local sustaining programs. Again recalling the remarks made by Mr. Egner in his article, he alluded to the fact that the programs are planned and built in accordance with the general needs of stations. As presently will be seen, the range of these series is fairly wide, varying from a symphony to a children's program.

The series are prepared and produced by the National Broadcasting Company Program Department under the direction of Frank Chase, writer and producer of many popular network shows. The entertainment quality of the programs is of network calibre. The great reservoir of NBC programming ability, talent and facilities is drawn upon in the planning, building, casting and production of all NBC Recorded Programs. They appeal to all classes of listeners, and are suitable as settings for the selling messages of a large number of products and advertisers.

RCA Victor Recordings

The high quality of NBC Syndicated Recorded Program Series is maintained throughout from conception to recording. The recording of all program series is done by the RCA Manufacturing Company. Each 15-minute program unit is recorded on 16-inch, $33\frac{1}{3}$ r.p.m. discs. The records can be used with good results on all types of standard turntable equipment. The mechanical quality of the recordings is of the present high order achieved by RCA Victor System; one which has received considerable praise from radio stations for life-like reproducing quality and freedom from the surface noise which detracted so much from earlier recordings. This fact was conclusively demonstrated at the Cincinnati Convention where many station managers offered sincere commendations on the reproducing quality of the recordings.

Additional Characteristics

Each program in the series runs for approximately 13 minutes thus allowing sufficient time for local commercial announcements at the



NBC PHOTO

JULES LANDE PLAYING ON HIS \$50,000 STRADIVARIUS, WHILE EUNICE HOWARD AND WILLIAM JOHNSTONE LISTEN. (ROMANCE AND MELODY—SR NUMBER 2)

beginning and at the end of each broadcast.

While some of the programs contain announcements appropriate to the program material, these should in no way conflict with local commercial announcements, or commercial sponsorship.

The series are designed to permit the use of two or more 15-minute units in a single broadcast, thus giving stations the opportunity of building a well-balanced half-hour program.

No program may be broadcast more than once by the same station and the service is exclusive within the primary trading area of the station using it.

The programs are sold to stations at a flat price for each series, and at a cost low enough to make them attractive to local sponsors. The price is so reasonable that they may also be used by stations as sustaining

While at the outset the series were available only to NBC associated stations, they are now offered to certain independent stations.

Broadcasters Invited

The NBC Syndicated Recorded Program Series so far completed in every way, maintain the high standard of NBC network programs.

Broadcasters with special program problems seeking a quick, effective and economical solution of their advertising requirements, will find the National Broadcasting Company, through Mr. Egner and his associates, ready to cooperate to the utmost.

For further details regarding the NBC Syndicated Recorded Program Series briefly described in this article, write Mr. C. Lloyd Egner, Transcription Department, National Broadcasting Company, 30 Rockefeller Plaza, New York City.

Police Radio Installations

CITIES REMOVED FROM CRIMINALS' PREFERRED LIST

W5XB

W5XAB, Fort Worth, Texas. The City of Fort Worth, Texas, was one of the first cities in the South to install the RCA Terra-Wave Police radio equipment, and still is one of the largest cities using this type of equipment for police communication.

Chief Henry B. Lewis of the police department is very enthusiastic with the results obtained with this system during the past two years. He operates twenty-eight squad cars in addition to several fixed-point receiving stations. The efficiency of the system, together with the excellent manner in which it is operated by Chief Lewis and maintained by the radio engineer, Mr. J. E. Palmer, is indicated by the following tabulation figures submitted to the F. C. C. with a report on the operation of the station during 1934:

Annual Report of Fort Worth Police Department for 1934

Messages received	19,694
Messages missed	57
Calls missed	9
Number of runs	19,694
Average running time	1 min., 55 sec.
Miles traveled	466,852
Arrests on runs	4,367
Arrests on view	4,843
Cars recovered	115
Value of cars recovered	\$15,305

Keeping Them on the Run

Recent installations of RCA "Terra-Wave" police radio equipment in cities scattered over the United States indicate the increased trend of progressive police departments to use this new and effective medium to combat crime.

Delaware

The city of Wilmington, Delaware, was recently equipped with an RCA "Terra-Wave" transmitter and twelve police cars with RCA receivers.

Three Cities in South Carolina

In the state of South Carolina, three cities have recently been equipped by the RCA Manufacturing Company, Inc., namely, Columbia, Greenville and Greensboro. The number of RCA police radio cars

equipped were six, four and ten, respectively.

California

The city of Stockton, California, was equipped with RCA "Terra-Wave" apparatus at police headquarters, and nine RCA receivers in cars.

Illinois

Danville, Illinois, has been equipped with an RCA "Terra-Wave" transmitter and four police radio car receivers.

Two Cities in Georgia

In the state of Georgia, both the city of Rome and the city of La Grange have been equipped, RCA transmitters being placed at police headquarters, with four radio cars in the former city, and two in the latter location.

Two Cities in Pennsylvania

In Pennsylvania, Sharon Hill and McKeesport have recently been equipped with RCA "Terra-Wave" installations, including transmitters and car receivers.

Missouri

Springfield, Missouri, has also been equipped with the "Terra-Wave" system, including transmitter and five RCA car receivers.

Two Cities in North Carolina

In the state of North Carolina, an RCA "Terra-Wave" transmitter was installed in the city of High Point, along with four RCA police radio car receivers, and the city of Salisbury with a "Terra-Wave" transmitter and two car receivers.

Tennessee

In the city of Kingsport, Tennessee, the RCA "Terra-Wave" system has been installed with a transmitter at headquarters and three police cars RCA equipped.

Ohio

Lima, Ohio, is also now a "Terra-Wave" city, with RCA equipment at police headquarters and in three police cars.

Naturally, all of the above listed locations have now been removed from the criminals' preferred list. Let's keep them on the run—right across the borders of the nation.

SEA GOING BROADCAST

(Continued from Page 28)

capable of operating the transmitter for several hours. All of this equipment is presided over by Carey Sweeney, NBC engineer, who stands a daily trick as ship's radio operator in addition to putting on the short-wave broadcasts and testing for them over various channels the day before they go on the air for rebroadcast to NBC audiences.

As a result of this careful preparation, the average of successful transmission to date has been extremely high, and out of more than thirty broadcasts, Sweeney has been unable only a few times to get a usable signal through to the radio audience.

HIGH FIDELITY PERFORMANCE

(Continued from Page 31)

etc., and that the sum of these products be known as the "harmonic index." This method of weighting is only a suggestion, but it does give greater weight to the higher harmonics and there is some reason to believe that it is a reasonable method to use. It is recommended that the harmonic index for the transmission equipment from microphone output to antenna output should be limited to 40 at 50 cycles and to 25 at 200 and 1,000 cycles at all percentages of modulation between 50 and 95%, and that only half of these index values be permitted at modulation percentages below 50%.

When receivers of proper performance are in general use and when a greater number of broadcast stations have brought their equipment into conformance with the above transmission recommendations, high-fidelity entertainment in the home will be general and the value of broadcasting will be greatly enhanced.

RCA Cars Call at Nation's Capitol



NATION-WIDE TOUR ORGANIZED

A FLEET OF GAILY DECORATED CARS, SPECIALLY DESIGNED AND EQUIPPED TO DEMONSTRATE THE VARIOUS PRODUCTS OF "RADIO HEADQUARTERS," CAMDEN, N. J., IS NOW TOURING THE UNITED STATES. EACH OF THESE CARS DESPATCHED BY THE RCA MANUFACTURING COMPANY, INC., CARRIES AN ASSORTMENT CONSISTING OF "MAGIC BRAIN" RADIO RECEIVERS, RADIOTRONS, ELECTRIC PHONOGRAPHS AND VICTOR RECORDS, SOUND MOVIE CAMERAS AND PROJECTORS, PUBLIC ADDRESS EQUIPMENT, POLICE "TERRA-WAVE" TRANSMITTERS AND RECEIVERS, AVIATION RADIO EQUIPMENT AND MANY OTHER DEVICES. ENTERTAINMENTS AND DEMONSTRATIONS ARE STAGED IN THE TOWNS AND CITIES ALONG THE ROUTE OF EACH CAR, SO THAT PEOPLE IN ALL WALKS OF LIFE MAY BECOME MORE CLOSELY ACQUAINTED WITH THE RCA FAMILY. SIMILAR CARS ARE ALSO EQUIPPED BY RCA MANUFACTURING COMPANY FOR VARIOUS OTHER NATIONAL ADVERTISERS.

NEW BULLETINS ISSUED

Just off the press — and available to those interested, upon request to the Transmitter Sales Section, RCA Manufacturing Company, Inc., Camden, N. J.

Bulletin 47—100 / 250 watt High Fidelity Broadcast Transmitter, Type ET-4250

Bulletin 50—Air Cooled Radiotrons for Broadcast Stations

Bulletin 51—Water Cooled Radiotrons for Broadcast Stations



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