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October
1934

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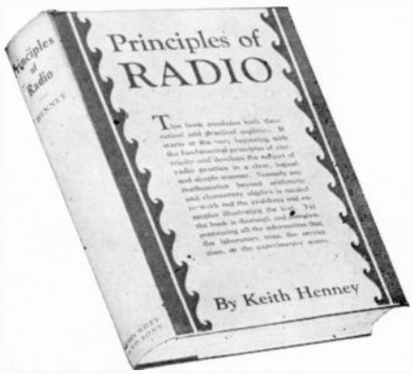

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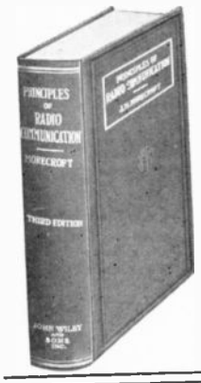

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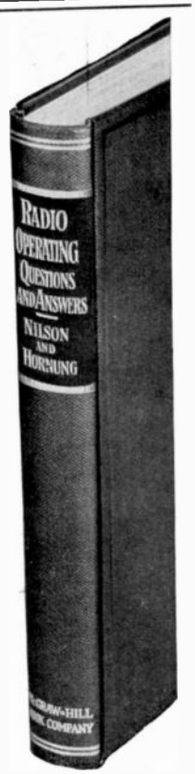

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VOLUME IV NO. 1

With this issue, we usher in our fourth volume—twelve issues to a volume, we now start our VOLUME IV, issue No. 1.

Represented in the previous thirty-six issues, we have tried to do what would be called constructive — constructive in many senses of the word. Nothing that ever went to the extreme of what would be called radical; little that could be called entirely dry.

There is much that has been accomplished, but there is much that remains to do. The point is, we have passed the day when we are entitled to three candles on our birthday cake. During one of the worst periods, not alone for publishing ventures, but practically all ventures, we have seen "growth with age."

Those readers who have been with us from the start know that what once seemed a very frail child has long been extending itself. It has been wearing bigger shoes with which to make bigger strides; it has been adding healthy weight.

To its readers it owes much; to its writers it owes thanks; to all its patrons it owes its very existence. On its start of a fourth year, it is a normal, healthy child. It has outgrown its smaller clothes, it has lost its long curls, and it readily digests heavy foods.

To those who would have liked it to always remain a baby we offer our regrets. To those who have wished it more rapid growth we apologize. Its bones must first strengthen and its formative period properly develop with age.

"Commercial Radio" was started on a basic thought. That thought is still a sound one. Time alone will reflect the trueness of its course. It is not confined to a single thought. It is not confined to a single purpose. Like anything with life it must choose its course. We hope that course proves right and true.

COMMERCIAL RADIO

(FORMERLY "C-Q")

The Only Magazine in America Devoted Entirely to the Commercial Radio Man

Contents for October, 1934

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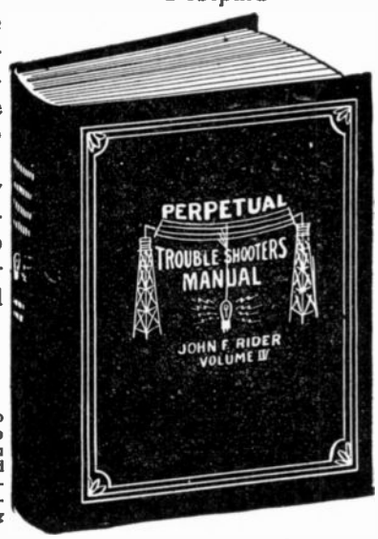

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This volume covers the period between middle 1932 and about June of 1933. It also includes some old receivers which were secured subsequent to the publication of Volumes I and II. Volume III also contains some point-to-point data and the world's only set catalog identifying about 8,000 models.

All of these manuals contain schematic wiring diagrams, socket layouts, chassis diagrams, voltage data, photographic views, resistor data, condenser data, electrical values, alignment notes, i-f peaks, trimmer location, continuity test and point-to-point data, etc., etc. All manuals are loose leaf bound in "instant-removal" type binder and contain cumulative index.

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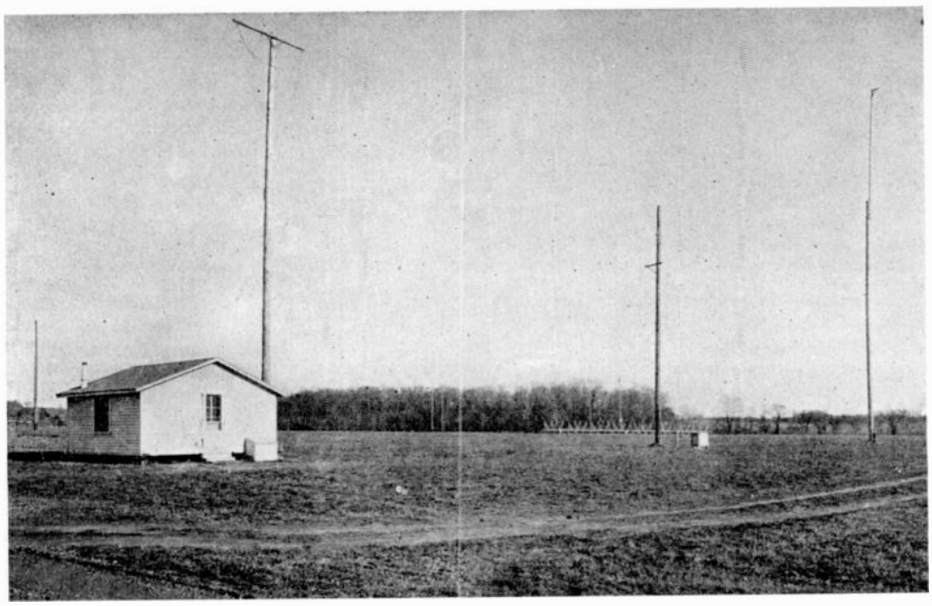
WE DO OUR PART

THE DIRECTION OF ARRIVAL OF RADIO WAVES

C. B. FELDMAN

Member of Technical Staff, Bell Telephone Labs



A SIMPLIFIED version of the mode of propagation of short radio waves, on a London to Holmdel circuit, for example, might be represented as shown in Figure I. Here the waves are shown leaving England at three different vertical angles, suffering one or more reflections in the ionosphere, and as a result being received at Holmdel at three different angles with the horizontal. The lengths of these three paths differ and thus waves travelling by them will be delayed by different amounts and, as a result, shifted in phase relative to each other at the receiving station. The amount of phase shift in degrees will vary with the frequency, and thus selective fading results.

Transatlantic propagation is by no means so simple as Figure 1 suggests. It involves several layers in the ionosphere and considerable non-uniformity over the circuit due to the varying latitude and longitude. Completely discrete paths are never found, but instead a number of more or less separate clusters of paths are observed, each cluster comprising several paths of nearly the same delay and angle. Sometimes an almost continuous distribution of paths seems to exist. Invariably, however, the waves of greater delay possess the higher angle with the horizontal.

Receiving antennas used at the present time have a directional response broad enough to include all the important angles of arrival. As a result, therefore, the received angles suffer a certain amount of fading because of the superposition of signals of the same frequency but differing in phase. With a view to improving short-wave reception, investigations are being carried on at the present time at Holmdel to determine the angle of reception of short waves sent out from England. Efforts to measure these angles by means of a continuous carrier signal are handicapped by interference of the several waves. The mean angle of the cluster of waves and an estimate of the angular spread can be obtained by employing a continuous carrier, but the angles of the individual waves cannot. The studies have been carried out, therefore, by transmitting a series of very short pulses spaced far apart in time relative to the duration of a single pulse. Under these conditions each single pulse is received as a sequence of echoes; the delay between the echoes being caused by the difference in the lengths of the paths they travel. Each of the echoes, on the basis of Figure 1, will be received at a different angle.

The pulses employed are approximately 0.2 millisecond in duration and they are transmitted at the rate of fifty per second. The separation of the pulses is thus 100 times their duration. They are sent out from England by the British Post Office in synchronism with the 50 cycle power system. At Holmdel they are picked up with wide-band receivers, and the envelope of the rectified output is displayed on a cathode-ray oscillograph provided with a linear time axis making sweeps in synchronism with the pulse frequency of fifty per second. This time axis is obtained with a time constant sweep circuit of the conventional type employing a saturated diode as a resistance and a gas filled tube as a condenser discharger. Synchronization of the sweep with the frequency of the transmitted pulses is accomplished by taking advantage of the frequency stability of the British and American power system. At Holmdel, where 60-cycle power is available instead of the 50-cycle power supplied at Rugby, a 60-cycle synchronous motor is geared down in a 6 to 5 ratio, and a magnetic switch, operated by the low speed shaft, is used to control the sweep circuit.

In both England and the United States the power systems are used to operate electric clocks and their average frequency is therefore maintained very accurately to the nominal value. There may be slight variations from normal over short periods, however, and to allow correction for these variations as well as for differences in phase, the motor frame is mounted in bearings so that it may be rotated with a crank, as shown in Figure 2. This crank is turned just enough to maintain the pulse patterns in a constant position on the front of the cathode-ray oscillograph.

Two receivers are employed. One is connected to a simple half-wave vertical antenna, and the other to a combination of two similar antennas spaced several wave lengths apart in the direction of the great circle from the transmitting station. The two antennas are connected through an adjustable radio-frequency phase changer. A schematic of the ar-

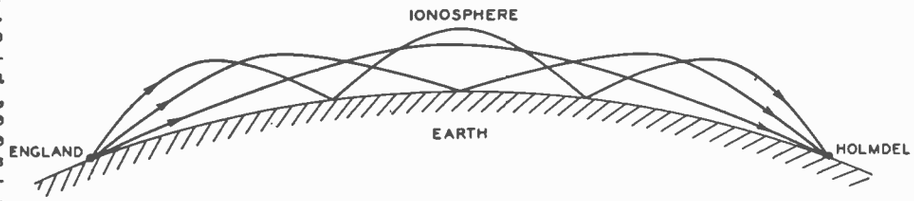
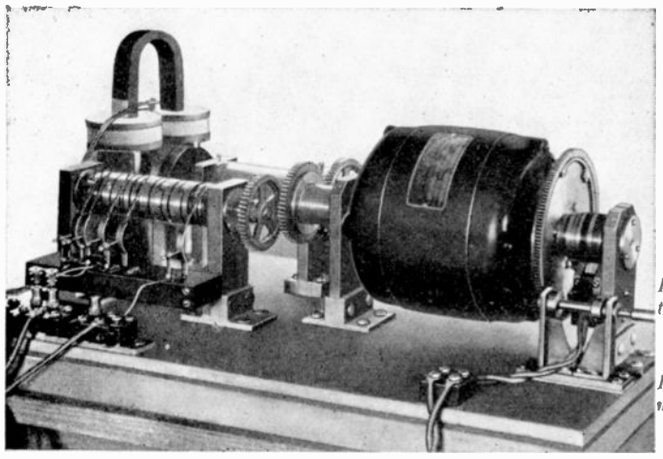


Fig. 1—A simplified conception of short-wave transmission paths between England and America



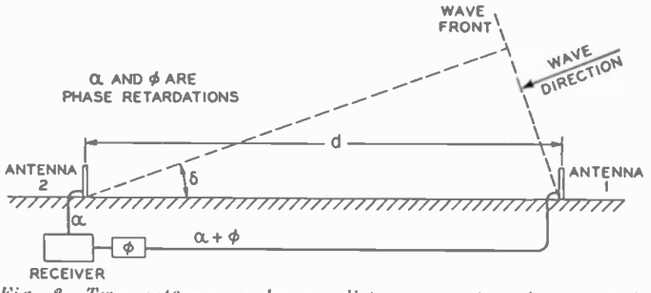


Fig. 3—Two antennas a known distance apart and connected together through a phase changer make it possible to determine the angle of arrival

Fig. 2—The synchronous motor that controls the sweep circuit is mounted so that its frame may be rotated for the adjustment of phase

rangement is shown in Figure 3. The outputs of these two associated antennas will be out of phase by an amount which is a function of the distance between them as measured in the direction of the incoming wave. This distance is equal to the horizontal distance, d, times the cosine of the angle that the received wave makes with the horizontal. Thus, the phase displacement of the output of the two antennas is a measure of the angle of reception, and the phase displacement in turn is measured by the amount of phase shift required to bring the two outputs into phase opposition and thus to produce a null reading. Since the two antennas are spaced several wave lengths apart, however, there are several angles of reception that will produce a null reading for the same setting of the phase charger. A typical reception curve for the two antennas for one position of the phase changer is shown in Figure 4.

In determining the angle of reception the output of the two receivers, one connected to the single antenna and the other to the two associated antennas and phase changer, are alternately connected to the cathode-ray oscillograph in such a way that the two traces are displaced, that of the single antenna lying above the other. Each of the 0.2 millisecond pulses, because of multiple reflections in the ionosphere, will arrive as a series of echoes. When picked up by the single antenna they will thus cause a series of deflections of the electron stream of the oscillograph. These will be separated in time—from left to right along the tube—by an amount dependent on the difference between the lengths of the paths they travel. The relative heights of the deflections will depend on the signal strengths of the various paths.

The output of the double antenna, displayed below that of the other, will show the same received signals but the rela-

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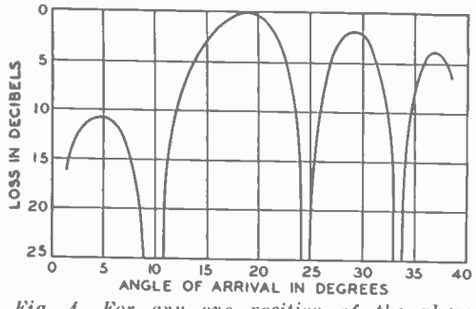


Fig. 4—For any one position of the phase changer there will be a series of vertical arrival angles that result in a null reading

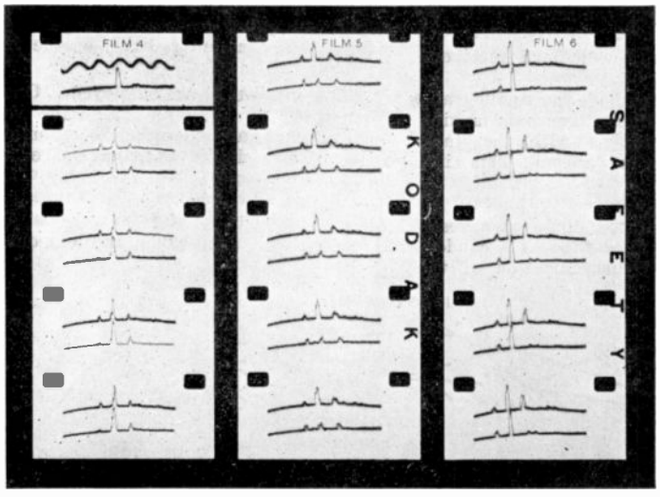


Fig. 6—Three sections of film each frame of which shows the output of the single antenna, above, and of the double, below

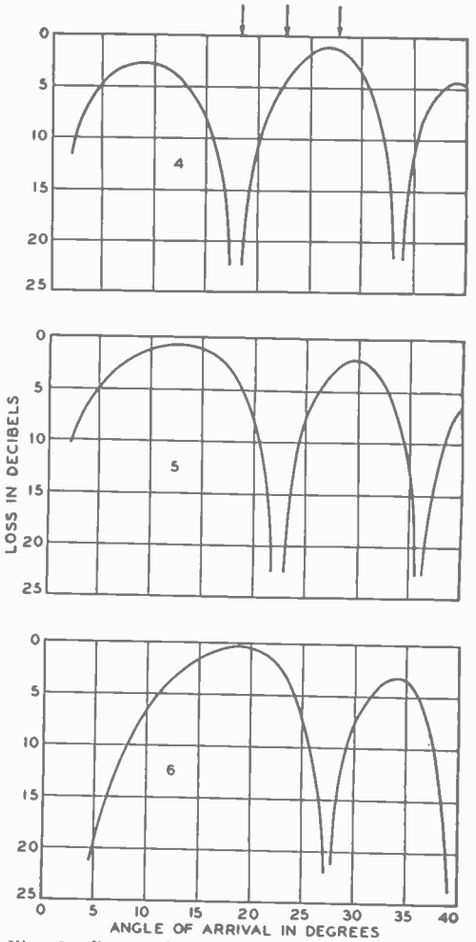


Fig. 5—By moving the phase changer the receiving pattern is shifted so as to bring the null positions to successive angles

A Real Morro Castle Disaster

Being the Unfortunate Aftermath Experienced by a Radio Operator Who Did His Duty

By FLOYD DELL

FEUD BETWEEN DEAD CAPTAIN AND RADIO ASSISTANT BARED

HANDCUFFED RADIO OPERATOR

SOS! SOS! SOS! WIRELESS AID FIRED RECORD

COULDN'T GET ORDER FROM BRIDGE FOR 20 MINUTES, SAYS RADIO MAN

Captain Willmott Warned Rogers to Lock Radio Compass; He Feared Alagna, Who "Tried to Start Riot" Aboard Liner

CALLED FOR HELP AFTER OTHER SHIPS

Everyone hearing the original news of the Morro Castle fire at sea the morning of Sept. 8, 1934, was struck with horror. The tremendous loss of life, the weather conditions along the eastern seaboard at the time, and the way the final news dragged along had an instant public response for more light on the tragedy.

The harrowing experiences of both passengers and crew written up by the newspapers all over the country, chilled the blood of the readers. But, it also made them rush back to the newsstand for a later, and still later edition.

Then the inevitable appointment of various investigation committees, the immediate protecting of rights by the different interests represented, unfortunately in many newspapers the distortion of the facts, while the hull of the five million dollar Morro Castle, of the Ward line lay still smouldering in the sands at Abury Park, N J., to be viewed with awe by hundreds of thousands of curiosity seekers

In a disaster of this kind, all eyes are fixed on the radio room. The drama of the situation as from the past was slowly unwound from the different officers of the ship. The sudden and unexpected death of the Captain just before the fire began; what the public believed the lethargic handling of command by the first mate; the loss of current in the ship lighting system putting the entire ship in darkness in the middle of the emergency . . . the sequence of events all leading up to the final chapter, already known by the public, the terrible fact that more than a hundred souls were lost, either burned in their tracks, their staterooms, or perished in the sea.

The ship's Chief Radio Operator George W. Rogers was called to the stand before the United States Board of Steamboat Inspectors on September 12th. The recitation of the usual story, so well know to radio men who have gone through the same experience themselves of sticking to the key "until the finals orders are cleared." The clicking out of the CQ, CQ, KGOV, shortly after a passing liner had already inquired of Tuckerton, N. J. shore station what large liner in the neighborhood was afire, and the instructions from Tuckerton for the air to be kept clear for an emergency. The tense moments of a radio operator practically dying on the spot when he knew the boat was slowly burning under his feet, but—no orders from the bridge. The loss of ship's power to the main transmitter, the moments of fighting to hook up the ship's emergency set, the switching of the power from main to emergency set, the struggle of the two men out of three to do their duty and get that final message practically forced from the bridge on the air—and then at last S O S, S O S, S O S KGOV.

Where was that third man, just a "kid" 21 years old, as described by Chief Radio Officer Rogers. He was sent to the bridge, and had disappeared. Too bad for the good name of radio that Charles Mackay, Third Radio Operator, had to be one of the very, very few radio men, even though "just a kid," to blemish the good name of radio men at sea.

In order that there may be a proper picture conveyed, we give the actual words of the Chief Radio Operator Rogers from his testimony before the U. S. Board of Steamboat Inspectors.

He was sworn and said he was George White Rogers, of 601 Avenue E., Bayonne, N. J.

Q—How long have you been a radio operator? A. Ever since 1912.

Q.—How long have you been chief radio operator of the Morro Castle? A.—Slightly more than two months.

Q.—How many assistants did you have on the Morro Castle? A.—Two assistants, George I. Alagna and Charles Mackay.

Q.—At the time of the fire, were you on watch? A.—No, I was asleep.

Q.—Who awakened you? A.—My second assistant, Mackay.

Q.—What time was that? A.—A few minutes to 3.

Q.—What did he say to you? A.—He said, "Chief, get up; there's a fire on board."

Q.—What evidence was there of a fire? A.—The evidence was apparent. My room was full of smoke.

Q.—Mr. Rogers, will you tell us in your own words what you did from there on? A.—I got dressed and went to the radio room and assumed command of the watch as required by law. I immediately adjusted the transmitter to distress frequency. (He gave the technical details of this operation.) I told my first assistant operator, Alagna, to proceed to the officer on the bridge and obtain what orders possible.

Q.—What words did you use to Mr. Alagna? A.—I said: "George, go to the bridge and see what orders the mate has to give." I referred to Mr. Warms as mate because I always knew him as mate.

Q.—Why did you send Alagna to the bridge? A.—Because it was the most intelligent thing to do.

Q.—I am asking because I want to get from you, if I can, whether you sent that man to the bridge because you had any lack of confidence in the bridge? A. No, sir. There is a distinct law among radio men on a ship in distress or emergency that the chief operator takes the watch, the second operator goes to the bridge prepared to act as messenger to the radio room, and the third operator stays in the radio room prepared to act as messenger to the bridge. The purpose is to supplement the regular connections to the bridge in case they fail. In this instance the regular connections were the speaking tube and telephone and we also had a push button to the switchboard to tell a bellboy to deliver messages for passengers.

Q.—Then your sending a man to the bridge was in line with the routine procedure? A.—That is correct.

Q.—What was the condition of the radio room at that time? A.—The smoke was getting so heavy that it was getting difficult to breath.

Q.—When did Alagna come back to you? A.—Well, there is another incident that occurs before that.

Q.—Give us that. A.—The third operator. Mackay, whom I told to stand by in the radio room was ordered by me to soak a towel in the wash basin so I could breathe through it. Then, when Alagna didn't come back I sent Mackay to the bridge to find Alagna and see if there were orders from the bridge. I never saw him again. And I have never seen him since. (Note: Charles Mackay, third radio officer, was among the survivors.)

Q.—How long had this Mackay been with you? A.—About two or three trips; I can't recall.

Q.—Who employed him? A.—The Radio Marine Corporation of America assigns him to the ship.

Q.—We'll come back to him in a moment. Proceed now. A.—At 3:13 ship's time Alagna returned to the radio room and said: "Chief, get out of here; the whole place is afire outside and you're only going to get caught like a rat in a trap if you don't get out." I said: "How about the distress message?"

Q.—And what did Alagna say after that? A.—I can't pass on his veracity, but what he said was: "They're running around on the bridge and I can't get any cooperation."

Q.—Did you question him what their running around meant? A.—No, the emergency was too great for questioning anybody. At that moment I heard the freighter Andrea F. Luckenbach calling the shore station at Tuckerton, N. J., asking for information about a large liner burning off the coast. I heard the answer that they had no information of any ship on fire. So I thought it would be advisable to come on the air in the silent period when all ships stand by for emergency calls.

Q.—Was that order given by the master? A.—No, sir; but that could be done by the radio operator on his own initiative. I did it on my own initiative.

Q.—You didn't get an order from the master then?

A.—No, sir. But the air is silent under the international rules for three minutes every half hour, starting at the quarter hour and three-quarter hour. In this period ships in international service are required to stand by and listen for emergency messages. So when I heard the Luckenbach making this request, and knowing that the silent period would follow in another minute, I thought it was best to come on with the CQ (signal to stand by for emergency call), so that when I did get the S O S I could get aid with the least delay. I started my transmitter and called CQ—CQ—CQ —KGOV. The KGOV was the radio identification of the Morro Castle.

I remember Tuckerton station breaking in on me and saying: "KGOV, wait three minutes." I knew he was warning me to stay out of the silent period. I wired: "No, QRX—KGOV," meaning the emergency was on the Morro Castle. He shut up then and didn't break in again. At the end of the silent period I remember sending the same signal again. The first was at 3:15 and the second was at 3:18. Just as I finished the second CQ—QRX—KGOV, the main transmitter that runs on the engine room power ceased functioning.

Q.—When did that happen?

A.—Approximately 3:19. I remember that was the last time I saw the hands of the radio-room clock. The smoke was so thick it was almost impossible to see anything. Now, when the ship's power fails, the emergency lighting system should come in and I wondered why it didn't. I remembered that when I came on watch the emergency light in the radio room was not lit. It operates on the emergency storage battery system and is required by law to be lighted at all times. That's one of the things radio inspectors look for each trip.

I told Alagna to unscrew the lamp and see if it was burned out. When he tried it in another socket on our own batteries it lighted. So I knew we would have to forget the ship's emergency power as well as its main power for the S O S. I got out a flashlight from the drawer and started for the auxiliary transmitter that we control independent of everything because we have the two batteries that operate it.

Alagna was in the room at that time and he reached over and threw in the auxiliary transmitter switch on the panel board and switched the antenna from the main switch to the auxiliary. I

(Continued on Page 11)

"W P E H"

Somerville Police Radio Broadcasting Station, Somerville, Massachusetts

By HARRY R. CHETHAM
Chief Operator

ONE of the pioneer police radio stations of New England. Experiments were carried on by Chief Operator Harry R. Chetham starting August 7, 1931. Station was "on the air" February 26th, 1932. This was at the old Bow Street Police Station on January 16th, 1933. Just 1200 feet due east it was reinstalled at the new police station. The original staff were Chief Operator Harry R. Chetham, William G. Sheridan (deceased) and James A. MacInnis.

The transmitter is a WE 9B 400 watt broadcast outfit with 2B rectifier. Operating on a frequency of 1712 kc and an output power of 100 watts. Six motorcycles are equipped, also five cars in the fire department and twenty-nine altogether including the police cars. There are two traffic boxes equipped. Chief operator Chetham conducts a fire and police radio school. Under his instruction 85 members of the fire department and 65 in the police department have received radiophone licenses. There are two 90 foot steel towers spaced about 210 feet apart and supporting a "T" antenna.

Chief Operator Harry R. Chetham, pioneer radioman, is one of the best known of the "old timers." He is a "thirty year member" of the Veteran Wireless Operators Association and was honored by them for humanitarian services at Penekese Island, the leper colony, in 1914. His service includes United States Navy, United States Signal Corps, Merchant Marine, and he also installed the first broadcast station in the country, WGI, at Medford Hillside in November 1915. His early apparatus 1897-1900-1902 is at the Smithsonian Institute in Washington, D. C. He has held continuous first grade and extra first grade radio licenses since August 4, 1911. (Certificate of Skill in Radio Communication.) Harry has four sons.

James A. MacInnis, first operator, holds both first commercial, first radiotelephone and grade A amateur. He was graduated from the Somerville High School and the Massachusetts Radio and Telegraph School. He has been attached to the staff since 1931.

J. J. Tegins has about twelve years service commercial and broadcast. United States Navy, United Fruit Co., and WEAF (NBC) four years. He holds first commercial and first radiophone.

Charles Sullivan is in the repair service but stands a regular watch at the station and also is a licensed radiophone operator. He is also a graduate of the Massachusetts Radio and Telegraph School.

Laurence Fortier is in charge of the repair department and is also a licensed radiophone operator and was graduated from the Massachusetts Radio and Telegraph School. A few years ago he had charge of the assembly of the broadcast transmitter at the Boston fire department, WEY.

Chief engineer J. J. Cuddihey, Commissioner of Electric Light Lines and Ra-

(Continued on Page 24)

MULTIPLE COURSES OF RADIO RANGE BEACONS INVESTIGATED

MULTIPLE courses — false "on course" indications which occur in the transmissions of certain radio range beacons in mountainous territory—were subjected to an intensive study in a series of flight investigations recently concluded by the Bureau of Air Commerce.

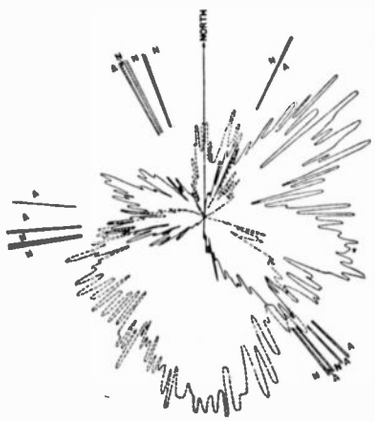


Fig. 1—Polar diagram of Van Nuys radio range

The purpose of this survey was to compile comprehensive data on the nature of multiple or split courses, preparatory to development work aimed to eliminate these false indications. L. C. Elliott, airways patrol pilot, flew the airplane used in the tests, and was accompanied by D. M. Stuart, radio engineer. They were assisted by G. C. Benzon, radio electrician.

A radio range beacon in normal operation transmits its signals within a circle with a radius of approximately 100 miles and with the transmitter at the center. The two characters, N and A, are broadcast. The N is audible in 2 quadrants of the circle, usually the north and south, and the A is heard in the other two—ordinarily east and west. (The N quadrants may be northeast and southwest, northwest and southeast, etc. Variations are necessary to accommodate the beacons to specific airway routes.) The on-course signal is heard along the lines dividing the quadrants where the pilot hears both A and N at equal signal strength. Along these courses the A and N merge into a continuous monotone, thus forming what are frequently termed the "radio beams" of the radio range beacons, and the beacon is adjusted so that these beams coincide with routes of the airways which the beacon is designed to serve with directional guidance.

Where multiple courses exist, they manifest themselves as "on-course" monotones heard in locations where the predominant signal should be either A or N. They may lead the pilot to believe he is flying on the airway, when as a matter of fact he may be some miles from it.

Existence of the multiple courses has been recognized for several years, but specific information about their character was limited. Facts discovered in the tests just concluded form a basis for study of the principles involved, and increase the prospect of determining the exact cause and remedy for multiple courses.

Recording Meter

In order to obtain results as accurate as possible, a recording meter was used during the flight checks. The instrument recorded the A and N and "on-course" signals as well as the strength of the signal received. All records were coordinated with landmarks in order to allow a study of the radio courses with reference to topography.

Several different ideas were applied as a possible remedy for multiple courses.

The courses were set at 90°, that is, with no bend or squeeze. A rapid change in frequency of approximately 4 kilocycles was tried in hopes the irregularities of signal strength would be reduced. A rapid shift of 3° or 4° in course alinement was also tried. The effect of broadening and sharpening the courses was studied. All of the tests failed to eliminate the multiple course effect.

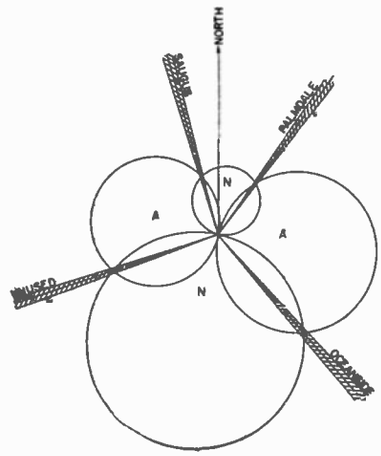


Fig. 2—A theoretical polar diagram for alinement of courses from Van Nuys radio range, Santa Ana, Calif., assuming flat terrain

Mountains and rough terrain undoubtedly cause an interference to radio waves resulting in a very uneven distribution in the signal strength producing multiple courses.

An actual polar diagram or space pattern of the Van Nuys, Calif. radio range beacon is shown in figure 1. This diagram was plotted from a record taken at a radius of 15 miles from the radio station. Figure 2 shows approximately the theoretical polar diagram that should exist over uniform flat terrain. A glance at the two shows the tremendous effect the mountains have on radio waves.

Figure 3 shows a cross section of the multiple courses extending from 1,000 feet to an altitude of 15,000 feet. Cross-course flights were made near Santa Ana at various altitudes from 1,000 feet to 15,000 feet. This cross section was plotted from the records obtained at the different altitudes. This shows that the number and width as well as location of multiple course may differ at different altitudes. For example one course was found far out over the ocean at 15,000 feet. At lower altitudes this course did not exist.

Many records were taken under different conditions and also on both the loop type and T-L type of radio range. The conclusion reached from a comparison of the loop and T-L antenna was that multiple courses are about as severe with one type as the other.

Same tests were conducted with a high frequency radio range, and while the tests were not entirely satisfactory there were indications that the multiple courses might be eliminated by using high frequency.

The large amount of data now available on the multiple-course situation is being studied by radio engineers of the Bureau of Air Commerce in the hope of finding a remedy for this undesirable condition.

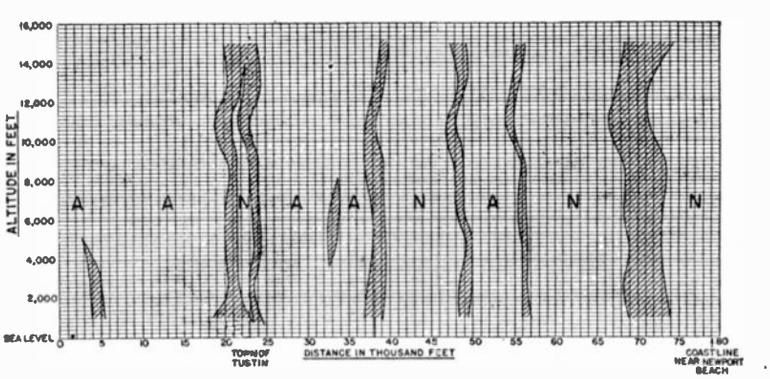


Fig. 3—Cross section of multiple courses from Van Nuys radio range taken near Santa Ana, Calif.

THE UNUSUAL NEW BEDFORD, MASS., POLICE RADIO SYSTEM

By IRVING VERMILYA Chief Engineer and Owner of WPFN

OUR police radio system is probably one of the most unique in the country and as it has several unique features about it which I do not believe are duplicated throughout any other police radio station in the United States, I am going to take this opportunity of writing a short story concerning WPFN.

In the latter part of January, 1933, shortly before the "banking holiday," the city of New Bedford, mainly through the close cooperation of Chief of Police Samuel D. McLeod and myself, decided to install a police radio system. Due to the depression and many other causes, some of which were purely local, the city of New Bedford felt as though it were not in a position to pay out the necessary cash to buy and install a police transmitter and the necessary receivers in the patrol cars, so the chief put the matter squarely up to me and asked me whether or not I would be willing to buy the transmitter and operate it for the city of New Bedford for a stated sum per week if, in turn, he would give me a contract to operate the station over a period of years. This I agreed to do, and so on March 3d, 1933, WPFN came into existence.

At that time I was also owner and operator of WNBH which is the only radio station located in the city of New Bedford. The studios of radio station WNBH are located at 261 Union Street in the city of New Bedford. The transmitter is located at the plant of the Atlas Tack Corporation, across the river, and in the town of Fairhaven, about two miles from the studio.

The transmitter of radio station WPFN, the police transmitter, is also located at the Atlas Tack Corporation in Fairhaven and sets on the floor right alongside of WNBH. One set of operators works both transmitters and needless to say because of the nature of the work our transmitting station is never closed down, working seven days a week and twenty-four hours per day.

Since March, 1933, I have sold out my interests in WNBH but have been retained to manage this station for the new owners for the next three years and I still own outright the police transmitter, WPFN, and I am still renting the service to the city of New Bedford.

The microphone for the police transmitting service is located at the central police station in the city of New Bedford and all of the messages transmitted to the cruising cars, which incidentally number six in New Bedford, each manned by a ranking officer and a policeman, are sent from what is known as the Captain's Room at police headquarters. We are also giving service to the town of Fairhaven who have three cruisers in operation and who are connected up by a private telephone line from the Fairhaven police department to the New Bedford police department. The Fairhaven messages are transmitted to New Bedford over this telephone line and the New Bedford police in turn transmit these messages to the Fairhaven patrol cars. When a message is sent, it is heard in both the Fairhaven and New Bedford police cars, nine in all, and through this method very close cooperation is had between the two police departments.

WPFN operates on 175 meters or 1712 kilocycles and is what is known as a 100 watt high level transmitter.

We guarantee and give to the police department a 30-second service. In other words, we have a signal system between the New Bedford police station and the Atlas Tack in Fairhaven (closed circuit) and when they want the transmitter they signal to us over this circuit which rings a large eight-inch gong at Fairhaven. Upon hearing this gong, the operator immediately lights the tubes of the transmitter and in 20 seconds the plate current comes automatically. We then signal New Bedford to go ahead and the message is broadcast. When they are through, they signal us back and we shut the transmitter off.

Besides this signal circuit, we also maintain a private telephone line between the transmitter and police headquarters for telephone conversation with no central office on the line; it merely being necessary to turn the crank and deliver the message.

To play doubly safe, we have a microphone at the transmitting station so that in case of trouble between the police station and the transmitter, the boys on watch can get the message over the private telephone and transmit it from Atlas direct to the cruisers.

Since the installation of this equipment we have had a test call every half hour throughout the day and night and have transmitted thousands of messages to the cruising cars with very effective results; in fact, in some cases we have caught burglars red-handed and rescued attempted suicides and various other almost unbelievable episodes. The chiefs of both departments are thoroughly satisfied and very thankful for the service and it is operating 100 percent efficient. I don't believe we have lost one hour's total time since the inauguration of the service.

The antenna of WPFN stands 180 feet in the air and also it is in the clear, and I have been able to pick this station up in my automobile hundreds of miles from Fairhaven; in fact, in broad daylight if other stations were not operating on the same frequency I was able to hear WPFN in the city of Fitchburg, Massachusetts which must be all of 100 miles from Fairhaven. At nighttime I have heard WPFN in the White Mountains of New Hampshire, in Vermont and anywhere in the state of Massachusetts and recognized the voice of the officer giving the call.

The station is still manned by the same group of operators that run WNBH and will continue to do so for at least the next three years and probably for a longer time.

We practically built the transmitter ourselves and when I say practically, I mean that while the job was done in the city of Boston by an individual working for himself, we practically rebuilt the machine after it arrived in Fairhaven so that today we have all the little kinks and bugs out of it and it is working 100 percent efficient.

The transmitter is what is known as a pushpull high level transmitter in which two 50-watt tubes are used in the last stage in pushpull and two pushpull 845 watt tubes are used to modulate this stage. The entire outfit is crystal controlled having two crystals and two ovens, and cost in the neighborhood of $3500.00 to build.

I think that is all I can say about the outlay at present, but I want at this time to extend an invitation to all police officers or police operators who may be interested in the operation of police transmitters to call on us at any time and we will be very glad to show our little outfit to any of them.

Notes at Random

Some of our readers will be sorry to hear that Coyne, the well-known Chicago maker of radio men, recently decided that 500,000 names of prospects received between 1929-33 were hopeless prospects for them, and the list is now being retailed at $8.50 a thousand to all comers by a compiler of mailing lists.

"Re Sofadosi Canadian DX Relay Sofadofa Lado Dofamiso Don Lee Dofafado Refalaso Sue Royal," an enterprising press agent of a 1350 kc New York station tells us is English equivalent of 110 words. This is called the new radio language, and we wonder if they will teach it to announcers of advertising sponsored programs.

The members attending the National Association of Broadcasters meet at Cincinnati, Sept. 16-19, enjoyed visiting WLW. It is claimed that the visitors' registry at the transmitting station shows visitors from China, Brazil, Australia, India, Hawaii, Norway, and other distant points.

Just in case we forgot to mention it before Joseph Chambers of WLW claims he is not a bad aviator, as well as a good radio station engineer.

If any listener finds "Adventures of Jimmie Allen" defective as to description of radio devices described in the series of the West Coast stations, H. C. Bernstein, Edison Bldg., Los Angeles, would appreciate hearing from him.

The Universal Microphone Co. of Inglewood, Cal. have a new aero-type handimicrophone, which is well adapted for police work as well. They also make a combination earphone and microphone which is mounted similar to French phone handsets, which is designed for five meter transmitters.

Columbia Broadcasting claims that with the Shreveport, KWKH Station they now have 100 units in their chain.

David Sarnoff, President of RCA, recently stood sponsor to the statement that facsimile transmission on ultra short waves will be the answer to the television problem. He claims the speed of transmission with relay stations properly placed will do the job.

Senator C. C. Dill at the Cincinnati meet recently came out flat-footed against the present news announcements system of broadcasting, stating that if the newspapers did not allow greater latitude in announcements, the broadcasters may find it necessary to create their own news agency system.

Columbia claims that their log shows that their recent Antarctic, London, Buenos Aires, Honolulu, Chicago, San Francisco, New York, Los Angeles, and Atlantic City combination went through without a hitch on the mechanical side. That's a big combination to tie in one right after another without some slip-up.

THE PRESS AND RADIO

A Little Insight on Press Wireless, Inc.

A SMALL innocent item like Press Wireless, Inc. (WEE) assigned Power 5 KW, Points of Communication London, Havana, Paris, Mexico City, often tells a big story of the news processes of today. Let us go further and we find (WIII) Points of Communication Rome and Mexico City, and (WIIL) Points of Communication Havana and Buenos Aires, and (WJQ) Points of Communication Paris, Rome Buenos Aires, London, Halifax, (WJS) Points of Communication Rome, London, Mexico City, (WPJ) Points of Communication Buenos Aires, (WPK) Points of Communication London, Havana, and Mexico City.

Then we wonder what it is all about. Nor does the matter that all of these stations are operated by Press Wireless, Inc. at Hicksville, Long Island, N. Y. seem to impress us. But then we notice some more points requested for the separate stations such as Amsterdam, Berlin, etc.

What is this that American Telephone & Telegraph, Mackay Radio & Telegraph Company, American Cables, Inc., Commercial Cable Company, and Western Union Telegraph Company should be interested in?

Brother, it is The Press of 1934, the press today. It is the movement which says GET THE NEWS, AND GET IT FIRST. For Press Wireless, Inc. is the Delaware corporation organized on July 5, 1929, formed as the result of the Commission's order that certain frequencies be granted to the press on the express condition that a single public service corporation be formed to serve all the press alike with twenty transoceanic frequencies.

Who are the companies interested in this $1,000,000 authorized capital stock company, of which $150,000 of stock has been issued?

To the following extent they are:

Boston Monitor, $25,000
Chicago Daily News, $25,000
Chicago Tribune, $25,000
N. Y. Herald Tribune, $25,000
New York Times, $25,000
Los Angeles Times, $12,500
San Francisco Chronicle, $12,500

The principal place of business is located at 435 N. Michigan Ave., Chicago, Ill., with other places of business at New York, San Francisco, Honolulu, Hawaii, and Paris.

The Radio Commission also granted twenty frequencies to the press to be used in the domestic service, which of course is the Press Wireless, Inc. At one time it looked as though there would be fourteen of these points of communication established in the United States for this company but it did not mature.

In a hearing on the station it was stated that it appears that the applicant, Press Wireless, Inc. has generally operated at a loss but losses have been absorbed by capital stock assessments; that the future looked much better for the financial side of the press wireless. The firm stated that it was anxious to have the facilities used as widely as possible, and by as many news organizations as possible, in order to place the company upon a paying basis.

At any rate today Press Wireless, Inc. offers the following points of service to the press, so you will know in a better way what it is all about when you see at the top of your article, "By Wireless Special to the ———."

Hicksville to or from: Brussels, Winnipeg, Santiago, Havana, London, Paris, Berlin, Amsterdam, The Hague, Rome, Mexico City, Halifax, Los Angeles, San Francisco, Washington, Chicago, and Buenos Aires.

San Francisco to or from: Vancouver, Shanghai, Honolulu, Mukden, Mexico City, Manila, Chicago, New York, Los Angeles, Portland, Washington, and Buenos Aires.

Chicago to or from: Winnipeg, Vancouver, Havana, London, Paris, Rome, Mexico City, Halifax, San Francisco, New York, Los Angeles.

Washington to or from: London, Mexico City, and Halifax.

Honolulu to or from: Fairbanks, Manila, Shanghai, Tokio, Mukden, Seattle, San Francisco, and Los Angeles.

A REAL MORRO CASTLE DISASTER

(Continued from Page 8)

remember that I had the flashlight about six inches away from the transmitter while our auxiliary batteries kept it in operation waiting for the signal from the bridge. I sent the first officer back with a request for any orders to send a distress signal.

Q.—Was he to report conditions in the radio room? A.—He was to ask for explicit instructions. When he left I suddenly became conscious that my feet were blistering and when I put my hand on the floor I found it was too hot to touch. The bulkhead separating us from the emergency room was beginning to show discoloration. A shift of the wind blew the fire in through the porthole and the settee under it started burning.

Q.—You spoke of a shift of the wind, was the ship anchored then? A.—I don't know. I was listening through the receivers and the air was quite a little static, due I suppose, to the heat of the fire causing static around the ship. I had a wet towel over my mouth and I could hardly breathe when Alagna came back. It was about 3:25 or 3:30. He said: "Okay, chief, send out the S O S."

Q.—Did you have any conversation with him as to how he got that instruction? A.—No, I didn't bother then. He told me later.

Q.—What did he tell you? A.—He said he had to fight his way to the bridge through the fire and smoke. Mr. Hackney, the acting second officer, had told him he was off Sea Girt, N. J., but not being able to take the order from Mr. Hackney, who was not the ranking officer, he went to Mr. Warms, who was in one wing of the bridge and told Mr. Warms that the chief operator was dying in the radio room and if he didn't send a message almost immediately it would be too late to send a message at all. He told me that Mr. Warms said to send the S O S.

Q.—Were you in bad condition by that time? A.—Yes, almost unconscious. I remember Alagna coming back to the radio room and saying, "Okay, chief, send the S O S: we're twenty miles south of Scotland Light." I immediately sent: "S O S—S O S—KGOV (Morro Castle). Twenty miles south Scotland Light."

Q.—Where did you get the information?

A.—The second officer told Alagna. I was only halfway through the S O S when the corner of the radio room which housed some of our batteries exploded. There was a loud puff in the corner and quite a flash and the room filled with sulphuric gas from the battery solution. The boiling acid spilled over the floor. That meant the receivers were out of commission, but I continued to send the S O S because the transmitter was still running. When I finished the generator stopped.

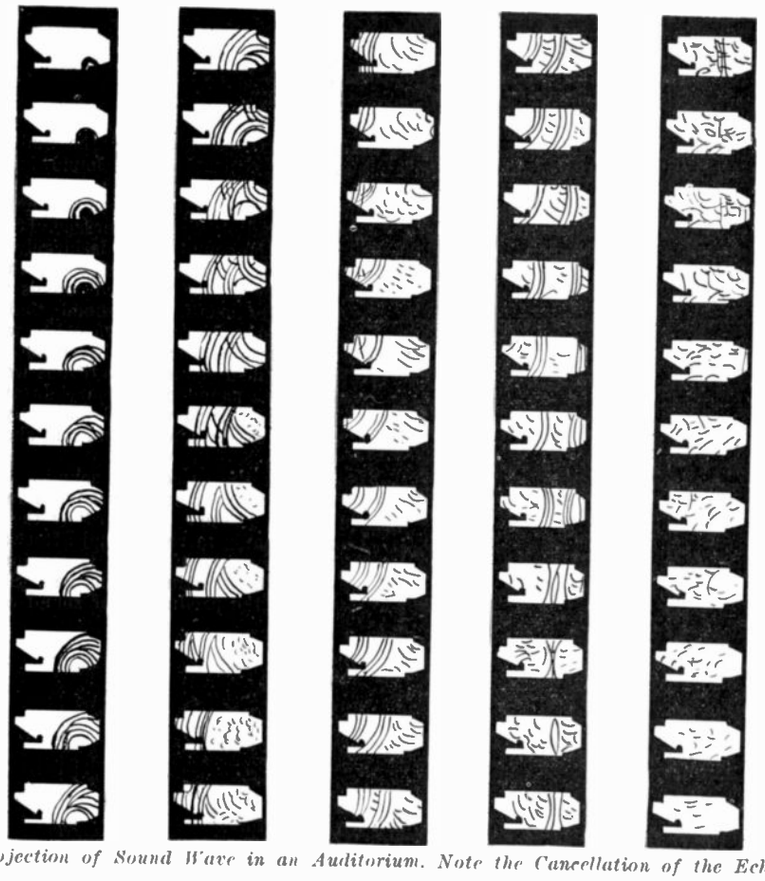
I started for the switchboard. I could not see anything. I could hardly breathe. I remember feeling to see if any connections were loose, because I thought the heat might have melted the solder. I found a wire loose and shaped it around a lug, and the generator started again.

I remember that I was staggering around, but I finally found the radio table. At the time . . . I didn't know. I remember sitting down in the chair. My feet were burning up. I put them up on the chair rung. I fell over the table and landed on the radio key and that brought me to. I remember sending, "Can't hold out much longer." There was an explosion in the generating set then and the sender stopped for good.

I remember I lay there across the table * * * and said to myself * * * if I am supposed to be dying it doesn't hurt very much. * * * I'm just getting sleepy.

Alagna shook me and said, "The whole place is on fire." I remember telling him to go back to the bridge and see if there is anything else. Pretty soon he told me he went back to the bridge and asked the acting captain to give him orders to get the chief operator out of the radio room because he is practically dead now. He shook me and said, "The mate (Acting Captain Warms) says we are to abandon ship; so let's get out right away." He dragged me to the door and I fell out and hurt my leg. I lay on the deck a few moments and then got hold of the starboard bridge rail and pulled myself up and looked back. It was like a sea of fire.

(Continued on Page 19)



Projection of Sound Wave in an Auditorium. Note the Cancellation of the Echo

waves will still be received, thus maintaining the sound. If the acoustics are defective, the sound may then be reflected hundreds of times before dying out, the time taking, perhaps, three or four seconds. Reflections of sound waves are clearly shown in Figures 1 and 2.

If vibrations are being continually emitted by the loudspeaker, other sounds of speech will by now have continued to be projected throughout the auditorium at the rate of about three syllables per second with a pause of about 1-5th second between syllables, so that now the auditorium is filled with from 15 to 20 separate sounds the auditor by now finds it impossible to distinguish the separate words and does not understand what is being said. It is clear, then, from tho foregoing, that the time required for a sound to die out in a room or auditorium must be so short that there shall be no considerable amount of overlapping of sounds. The time required for proper absorption in an auditorium is called the "reverberation time." What control may be exercised over the reverberation time will be explained later.

Analysis of Echoes

The progression of a sound wave causing an echo is shown in Figure 1. By following line "a" the arrows show the course of the traversed sound wave. This echo "b" (shown in photo 'd') has been produced by the reflection of sound from a smooth wall, just as a mirror may reflect a beam of light without scattering it. If the mirror surface be roughened the reflected light will be diffused in many directions; so, then, if the walls and ceilings of an auditorium or room be irregular and broken up on a sufficiently large scale, the definite character of the echo is destroyed. The lapse of time before an echo is heard is due to the fact that the reflected sound has travelled a longer path than the sound which comes directly from the source. This longer path is shown by "b" in Figure 1, and also in the formulative series of pictures in Figure 3. This difference of path may be such as to cause much annoyance. The reflected sound of a spoken syllable or note may arise in the air at the same moment as a later syllable or note which has travelled the direct path, and so cause hopeless confusion. Generally, auditoriums and rooms are less likely to have troublesome echoes and reverberations when their outlines are rectangular. Smooth hard walls, as the usual plaster types, are excellent reflectors of sound and will produce echoes and reverberations.

The phenomenon called "echo" has been not only photographically illustrated but may be further proved by referring to Figure 4. In this Figure is seen a wall MR and also points S and P. The solid line in the diagram represents the path of a sound wave going out from S and reflected toward G. The angle SFN is called the angle of incidence, denoted by the letter i, FN be normal to the wall. The angle NFG is called the angle of reflection, and is denoted by the letter s. Since MR bisects SP perpendicularly, and since FN is parallel to SP it follows that

$$\angle ESF = \angle EPF$$

and

$$\angle ESF = \angle SFN$$

also

$$\angle EPF = \angle NFG$$

therefore

$$\angle SNF = \angle NFG$$

or $\angle i = \angle s$

This is the law of reflection. It applies to ALL waves.

Sound Foci and Interference

Sound foci and dead spots are phenomena occurring as a consequence of echo producing conditions. By referring to Figure 2, photograph (c), will be seen what is known as a case of interference. At point sw the crests of the sound waves (analogous to ocean waves) coming from one source coincide with the troughs of the sound waves coming from another with the result that the air is at rest at this point. From this effect it will be learned that the energy of the wave motion is localized at certain points in the medium so that at certain places there is an excess of energy and at other places there is none. This phenomena is known as "interference"; that is, when the waves reinforce each other there is constructive interference (see point rw, (c)), but when they neutralize each other (point sw) they have destructive interference. It is this type of interference that causes dead spots.

When the sound is focused, that is, when a reflection of surface be concave toward a person, the sound will converge toward him with increased intensity. This intensity will be greater still if the surface is spherical and concentric with him. Such surfaces should be broken up so as to produce irregular distribution of reflected sound.

Another sound defect similar to interference is that of standing waves; such waves may be seen in Figure 1, photograph. (c). Where the marks c-1 and c-2 cross, indicates the position of a standing wave. The question, "What is a standing wave?" must now be explained. Now, by analogy, it can be demonstrated that when waves are reflected, as waves from a breakwater, there are a series of waves travelling in opposite directions. Hence, at certain places the crests meet, and the water alternately moves high up and deep down. At other places the oncoming wave is at the top when the reflected wave is at the bottom so that the water permanently remains at its mean level; this part of the wave formation is called a "node." The crests of the waves that rise and fall midway between the nodes are called "standing waves." As

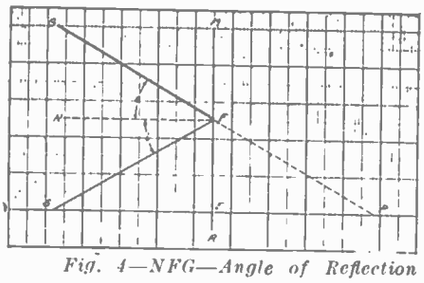


Fig. 4—NFG—Angle of Reflection

explained in the analogy, so with sound, hence, where these waves neutralize each other they are called nodes, and the intermediate points where they reinforce each other they are called "antinodes" or "standing waves." This phenomena is the cause of dead spots where the nodes occur, and conversely, where there are "antinodes" there is a reinforcement of sound, and at these spots the sound is louder and uncomfortable. Both types of phenomena lead to the case of distortion which can only be properly corrected by acoustic analysis of the room or auditor-

(Continued on Page 21)

How to Become a Commercial Radio Operator

By MATT SLOAN

OUR earliest radio operators, or as they were then known "wireless operators" date back to around 1899, when two American battleships, the "New York" and the "Porter" were equipped with radio apparatus.

Then it was all more or less experimental—Transmission equipment, reception, and other matters still a very uncertain matter.

The first International Radiotelegraphic Conference was held at Berlin August 4, 1903. On Jnauary 20, 1904, the first press message was transmitted across the Atlantic. The Second International Radiotelegraphic Convention was held in Berlin in 1906.

On April 15, 1912, the steamship Titanic, on her maiden voyage across the Atlantic struck an iceberg and sank. Wireless came into its first big field of mercy when more than 700 people were rescued from the Titanic. Before that it had often been used for distress work, but never was it called upon for such a big task of rescue, and unfortunate to relate the Chief Radio Operator Jack Phillips, who stuck to his key to send the distress call, went down with the vessel.

On August 13, 1912, an act was passed by the United States Government, licensing radio operators, and transmitting stations, along the lines of the International Radiotelegraphic Conference which opened in London, June 4, 1912, and the agreement arrived at there was signed July 5th.

On May 12, 1915, in Battery Park, New York City, the Mayor unveiled the monument in memory of wireless operators who had lost their lives at sea, the memorial being perpetual through efforts of the Veteran Wireless Operators Association, which each year holds services there.

Trans-Pacific wireless service was inaugurated between the United States and Japan on November 5, 1916, by an interchange of messages between the Mikado and President Wilson.

By June 30, 1919, there were 2,312 ship stations of the United States, probably an all time peak due to the great number of vessels built during the war.

In 1923, the International Commission for Aerial Navigation agreed as a general principle that all aircraft engaged in public transport must carry radio apparatus.

From 1912 to 1927, all licensing of radio operators was handled through the Department of Commerce, as was also all licensing of radio transmitting stations.

In 1921, broadcasting of entertainment as we know it today, began. A commercial radio operator's license for the operation of the station at all times when "on the air" was required then as it is today. During 1922, and for the next five years, broadcast stations increased until there were seven hundred and fifty broadcasting stations in the United States. It is no secret now to say that they were in many cases busy trying to blanket each other in the air. Things got from bad to worse, working under the old law of 1912, and finally in 1927, the year of the International Radio Telegraph Conference in Washington, Congress passed the Radio Act of 1927, establishing the Federal Radio Commission. With this act, full control of all licensing, either of individual radio operators, or transmitting stations of any character was transferred from the Department of Commerce to the newly established Federal Radio Commission, with full power to either continue licenses of any type or to terminate them at any time.

This satisfied for a while, but this year (1934) by a sweeping act of legislation, Congress passed a bill creating the Federal Communications Commission, putting all control of radio, telephone, and telegraph, under one department, the Federal Communications Commission.

WHERE commercial radio operating 15 or 20 years ago was often only a matter of how "fast you can put it on the air", or how fast you can copy and get an accurate reproduction of what is coming over, it is today a matter of much difference.

Many old timers prized themselves on their sending hand, in fact there are today men in high responsible positions, (former ship radio operators), who no longer are required to go near a receiver or a key, who believe the old timer could show up the new man at the transmitter.

Be that as it may, commercial radio operating today has branched out into many fields. Key and receiver work are absolutely essential in ship work, a great deal of ground work on the point to point station, and for interdepartmental work in many broadcast stations, airways, and in fact wherever any type of transmission work is employed the operators soon find the advantage of either a wired system, or an other system for communicating with each other, during working hours even though they are employed where code work is not actually in use.

For the developement of code after the student has mastered the code, the amateur transmitting station is as it has always been the best school for improvement of ones self.

For a better understanding of details in this field for the man intending to enter commercial radio operating as a means of living there is another way of first familiarizing himself with the field. That is writing to the ever so many schools for their catalogue. Many schools offer only a resident course, others offer a correspondence home study course, and others offer a personal interest home study course where the student is guided by correspondence, his faults pointed out to him as he goes along. The correspondence a student gets from these schools in reply to his letter of inquiry is all helping him to a better understanding of what he must do to follow his course of making a living in radio.

More positions are today being filled by men with commercial radio operating licenses than ever before. Perhaps this assertion should be qualified. It includes those who have climbed to executive positions, those in broadcast, airways, police radio transmitting stations, point-to-point telegraph work, experimental work, ship work, and of course allowance must be made for the general business conditions of today.

New spots are being opened each year. But always with the same results, that when first the new field is opened the exactness is not great, but rapidly the improvement makes itself obvious, and it then becomes up to the operating personnel to either step up, or step out. This process has been witnessed in ship radio operating, the airway field, and even now is being well pronounced in police radio transmission work. To make a living in this field as in every other is strictly a matter of serious work. The rewards for the young man entering the business world are strictly up to himself. Many have succeeded by entering one branch and sticking everlastingly at it right in that branch of the work. Others have also succeeded by entering one branch of work, and gradually moving into the particular branch that best seemed to their suiting.

The chances of failure in commercial radio operating are just as great, if not greater in this field, as in any other worth while endeavor. The young man who enters the field to just get by, and who once getting into the field continues on that basis is licked before starting.

Developments are too fast for the slow. It is a life for the studious primarily. Probably in no branch of commercial business life today is the pace of improvement so rapid.

With these facts in mind, the young

Radio District	Address of the Inspector in charge	States	Counties
17	410 Federal Building, Kansas City, Mo.	Nebraska	All counties.
		Kansas	Do.
		Missouri	Do.
18	2022 Engineering Building, Chicago, Ill.	Iowa	All except district 18.
		Indiana	All counties.
		Illinois	Do.
		Iowa	Allamakee, Buchanan, Cedar, Clayton, Clinton, Delaware, Des Moines, Dubuque, Fayette, Henry, Jackson, Johnson, Jones, Lee, Linn, Louisa, Muscatine, Scott, Washington, and Winneshiek.
		Wisconsin	Columbia, Crawford, Dane, Dodge, Grant, Green, Iowa, Jefferson, Kenosho, Lafayette, Milwaukee, Ozaukee, Racine, Richland, Rock, Sauk, Walworth, Washington, and Waukesha.
19	2909 David Stott Building, Detroit, Mich.	Michigan	All except district 16.
		Ohio	All counties.
		Kentucky	Do.
		West Virginia	Do.
20	514 Federal Building, Buffalo, N. Y.	New York	All except district 2.
		Pennsylvania	All except district 3.

Boise, Idaho
Butte, Montana
Jacksonville, Florida
Little Rock, Arkansas
Phoenix, Arizona
Salt Lake City, Utah
Spokane, Washington

It is a good method to not reach too high at the beginning, as once having failed in an examination the student has an opportunity to again take the examination, but a period of a few months must elapse before he will be allowed to take another examination. This is a rule of the Commission. Once having passed an examination, of whatever class, providing the applicant has the other requirements, he may apply at once for a higher class of license. Some of these form of licenses are issued by endorsement of his original license as shown in the following:

When the holder of a radiotelegraph class license has qualified for a radiotelephone class license, the radiotelegraph license shall be endorsed as follows:

(1) Radiotelephone First Class

"The holder of this license has also qualified for the radiotelephone first class license and the additional privileges authorized under this class license are hereby granted.

Date .....

Examining Officer"

(2) Radiotelephone Second Class

"The holder of this license has also qualified for the radiotelephone second class license and the additional privileges authorized under this class license are hereby granted.

Date .....

Examining Officer"

(3) Radiotelephone Third Class

"The holder of this license has also qualified for the radiotelephone 3d class license and the additional privileges authorized under this class license are hereby granted.

Date .....

Examining Officer"

Where the holder of a radiotelephone license subsequently qualifies for a radiotelegraph license, the radiotelephone license shall be cancelled and a radiotelegraph license issued endorsed for the proper class of radiotelephone license.

435. It is not mandatory for the holder of a radiotelegraph second class license to have his license endorsed by the Commission to authorize him to act as chief operator on a vessel of the second class; the service record on the reverse side of the license, when attesting to six months or more satisfactory service on board a ship and certified by the operator's employer, will suffice.

However, upon renewal it becomes desirable for the renewal license to indicate in some manner that the holder is entitled to act as chief operator on a vessel of the second class (if he is so entitled because of service gained under his previous license), since this information would not otherwise be readily available. Therefore, such renewal radiotelegraph second class licenses shall have inserted in the space provided on the license form after "Special Endorsement," the following endorsement:

"Authority is granted the holder of this license to act as chief operator in a ship station of the second class.

Date .....

Examining Officer"

The holder of a radiotelephone third class license engaged in operating aircraft radio equipment may, upon passing a code test in transmission and reception at a speed of not less than 15 words per minute in the Continental Morse Code, plain language (5 characters to the word)), be granted the following code proficiency endorsement:

"The holder of this license has passed a code test at the required speed of fifteen words per minute and is also authorized to operate licensed aircraft radiotelegraph stations.

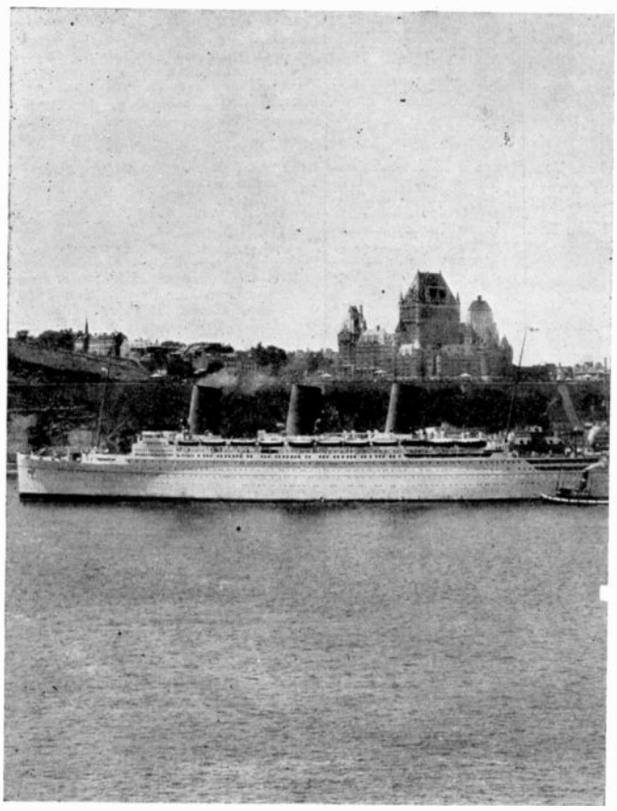
Date .....

Examining Officer"

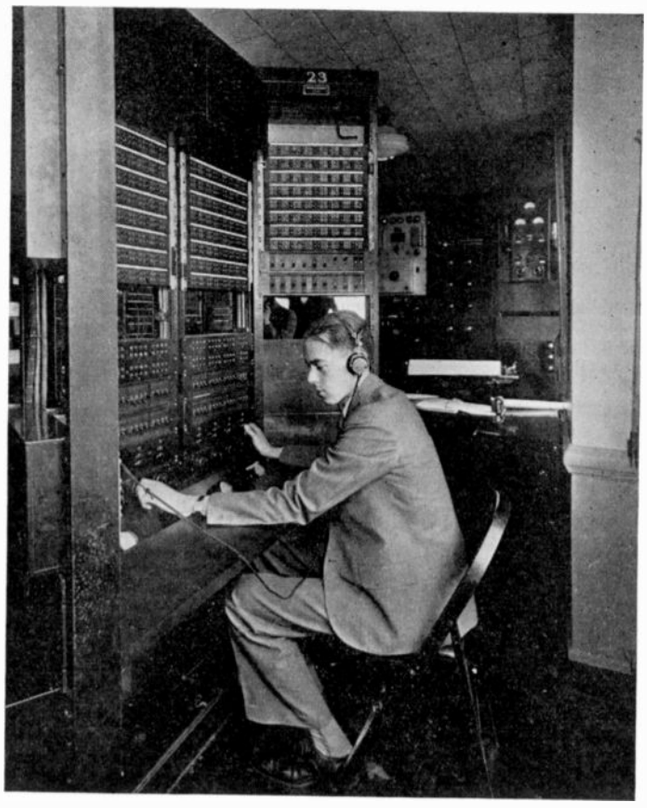
When licenses are endorsed for an additional class of license, both classes shall expire three years after the date of issuance of the main document on which the endorsement is entered. Therefore, both the main license and the class shown in the endorsement will run concurrently and expire at the same time without regard to the date of the endorsement.

If an applicant should qualify for additional privileges within six months of the expiration of the license sought to be endorsed, the old license shall be cancelled and a new license issued for both classes so as to expire three years from the date of issuance of said joint license; provided, however, if the old license sought to be endorsed has more than sixty days to run before expiration and does not fulfill the service requirements of Rule 439 (service requirements suspended until January 1, 1935) the applicant shall elect as to whether he desires

(Continued on Page 20)



Ship Radio Operators Enjoy Travel



Master Control Room WABC. Radio Operators Work Here

THE DIRECTION OF ARRIVAL OF RADIO WAVES

(Continued from Page 6)

tive heights will depend on the position of the phase changer. As this is moved the relative heights vary because of the relationship between phase shift and angle of reception already discussed. When one of the deflections disappears, indicating that the output of the two component receivers are in phase opposition, the angle of arrival of that particular echo may be determined from the position of the phase changer. Ambiguity due to the several null angles may be avoided by using various antenna spacings.

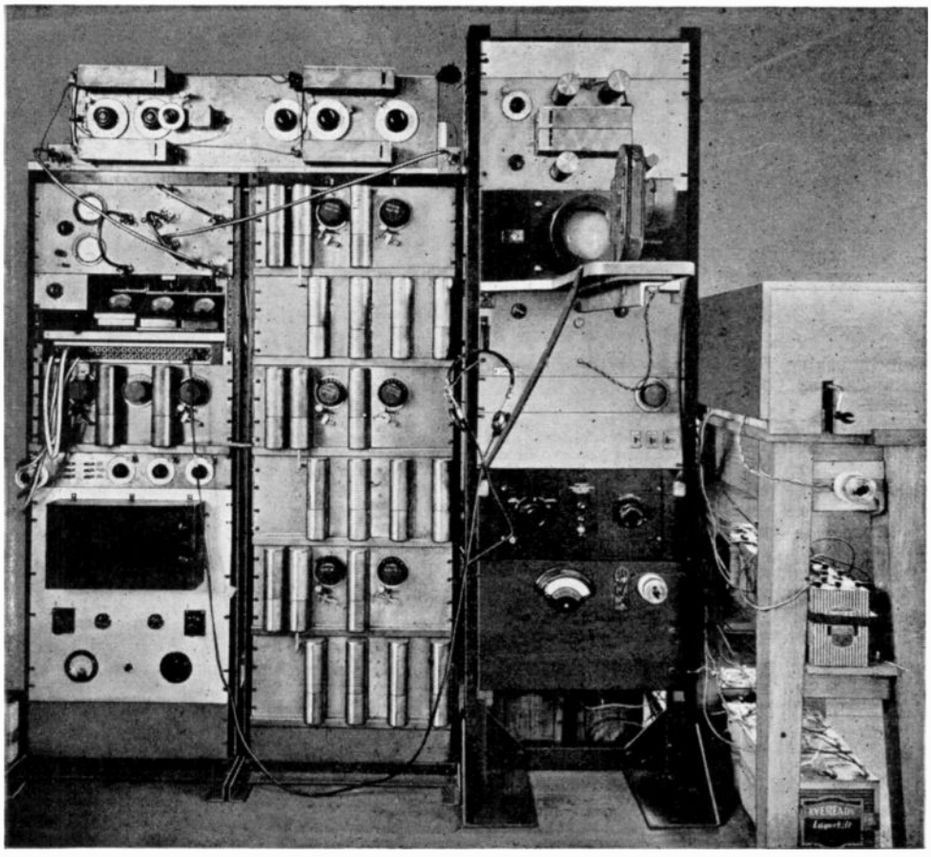


Fig. 7—Set-up of apparatus for determining angle of arrival of radio waves

The motor controlling the sweep circuit also drives a commutator that alternately connects the two receivers to the oscillograph. Since there are fifty pulses per second, each receiver traces its curve on the oscillograph 25 times per second, which, because of the persistence of vision, appears as a stationary trace. Any motion is due to a phase shift between the power systems of England and the United States, and is corrected by rotating the frame of the synchronous motor by the crank provided. The traces on the oscillograph are photographed on a sixteen-millimeter motion picture film.

The method of determining the angle of the various paths is indicated by Figure 6, which shows three sections of film each for a different position of the phase changer. In the upper frame of film 4 is the trace of a 1000 cycle wave used for timing purposes. In the other frames of this film can be seen the traces of the envelopes of three groups of received pulses; the upper trace in each frame being that from the single antenna and the lower, from the two associated antennas. In this film the earliest or left hand pulse is practically obliterated on the lower trace, thus indicating that the phase changer has brought the outposts of the two antennas into phase opposition and that the angle of arrival for that particular pulse is determined. Films 5 and 6 indicate similar conditions for two other positions of the phase changer. In film 5 the middle pulse is brought to essentially a zero indication, and in film 6, the right hand pulse.

The effect of moving the phase changer is to shift the receiving pattern of Figure 4 along the axis of angles and thus to change the angle of reception which will give a null indication. This is illustrated in Figure 5. The three positions of the receiving pattern indicated here correspond to films 4, 5, and 6. The angles of reception of the three groups of echoes are indicated at the top of each diagram, and the patterns have been shifted by the phase changer so as to make phase opposition apply to each successively.

This particular method of determining the angle of reception is known as the rejection method, since one of the paths after another is rejected. Other methods are employed to meet different conditions. Angles ranging from a few degrees to about 40 degrees with the horizontal have been observed. The average relation between difference in angle and difference in delay is about 7 degrees per millisecond. All of the waves have been found to arrive substantially within the great circle plane—departure of more than two degrees being uncommon.

A REAL MORRO CASTLE DISASTER

(Continued from Page 6)

I got to the bridge and I remember wondering if there was anybody in the pilot house. The ship appeared to be anchored. I went into the pilot house. It was completely afire. I went over toward the gyro compass and I could see down the officers' hallway and it was all aflame. I got back to the starboard wing of the bridge, where there was a companionway leading down onto A deck, where all the boat-hoisting mechanisms were. I started down when Alagna called up to me: "This way, chief."

When we got to the bottom I looked along A deck and all you could see was a tremendous sea of fire. I saw two or three fellows who had hold of something dark and were trying to throw it overboard.

Alagna called me again. He was on the overhang of the forward part of the housing which has iron ladder rungs outside leading down to the bow and the forepeak of the forecastle. We couldn't find where they started. The fire was burning inside the housing on B deck below and you could hear the porthole glasses popping.

We shook hands at that time and I

(Continued on Page 22)

How to Become a Commercial Radio Operator

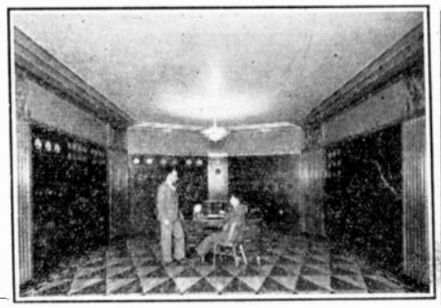
(Continued from Page 17)

(1) the old license endorsed, in which case both the old and the new classes will remain valid only for the duration of the old license.

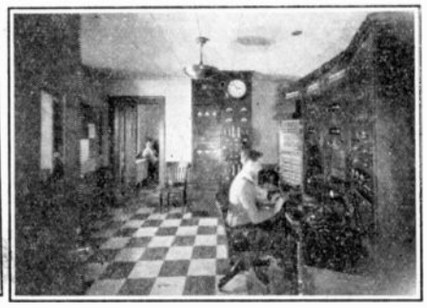
(2) to have the old license cancelled and a new license document issued for the full three year term for the new class only, or

(3) to take the examination for the old class license as a substitute for the required service.

Too much stress cannot be made on the point of renewal. An easy way for a licensed commercial radio operator to get in bad with his inspector is to wait



Main Transmitter Room WEAF. All Licensed Radio Operators Work Here



Transmitter Control Room WABC—Another Place Where Licensed Operators Are Required

beyond the date limit in asking for his renewal. The Communications Commission has made it very easy for a licensed commercial man to renew his license, but it is a continual cause of irritation to the inspectors to be offered a license for renewal either a day or two before the expiration period, or sometimes even a day or two late. There is no decent reason for this. The Commission has made it as easy as possible for renewal, and if the operator finds himself faced with a new examination in order to hold his license on account of applying too late, he can blame no one but himself.

He will find everything that is necessary for renewal incorporated in the following rules:

439. The following rules governing the renewal of operator licenses are hereby suspended until January 1, 1935, in so far as service, employment, or examination is a condition precedent to obtaining renewal of an expiring license.

(1) Commercial Operator Extra First Class: These licenses may be renewed without examination provided the service record shows 12 months' satisfactory service at licensed radio stations, at least six months of which must have been during the 12 month period prior to the date the application for renewal of license is due to be filed.

Provided further that the holders of these licenses employed as radio inspectors, radio instructors, or in similar occupations requiring exceptional qualifications where the duties require the testing, or demonstrating or otherwise using the commercial radio apparatus and the telegraph codes, may be issued renewals of their licenses without examination, provided such employment has covered a period of two years out of the three-year license period. Where the applicant has not regularly used the telegraph codes, he will be given the code examination as for an original license, and if he has used only one code, he will be examined in the code not used.

(2) Other licenses, except amateur, may be renewed without examination, provided

(a) the applicant has had ninety days satisfactory service during the six month period prior to the date the application for renewal of license is due to be filed, namely, sixty days prior to the expiration date, or

(b) the applicant has had at least twelve months satisfactory service during the license term prior to the date the application for renewal of license is due to be filed.

(3) No credit will be allowed for service unless it appears that such service was obtained under conditions that required the employment of a licensed operator.

(4) Holders of radiotelegraph licenses endorsed for operation of radiotelephone stations whose service has been wholly at radiotelephone stations will be required to pass the code test for the class of license held and failing this, will be issued a radiotelephone operator's license of the class corresponding to the endorsement on the license sought to be renewed. In cases where it is impossible for the applicant to appear for the code examination when making application for renewal, he will be issued a radiotelephone operator's license as above. However in such cases the applicant may appear for code examination within six months after the date of the issuance of the radiotelephone license and be issued a license of the class formerly held, provided he passes the code examination. Failing to appear or failing to pass the code test during the six month period, the applicant forfeits this privilege.

(5) Renewals may be issued at any time within six months of the date of expiration of the license sought to be renewed, but shall bear the exact date of issue. In any event, the application for renewal of license shall be filed not later than sixty days prior to the expiration of the license sought to be renewed.

(6) If, because of circumstances over which the applicant has no control, an operator is unable to apply for renewal of license on or prior to the date of expiration, an affidavit may be submitted attesting to the facts. After consideration by the Commission a decision will be made in regard to the issuance of a renewal of the license.

(7) Service records must be completed and signed only by masters, employers, or the duly authorized agents of either.

Operators who have operated at more than three stations in the aviation service and who apply for renewal of licenses may indicate service on the reverse of their licenses by giving the name of the aviation chain or company where employed in lieu of listing the call letters of all stations. When this is done, the employer shall sign the license opposite the service entry, indicating whether or not the service performed is considered satisfactory.

When the service has been at three or less stations in the aviation service, it will be necessary that the call letters as well as the station locations and signatures of employers be obtained.

Any improper alteration of the service record or the forgery of the master's or employer's signatures, or any attempt to obtain a license by fraudulent means, or by attempting to impersonate another, or copying or divulging questions used in examinations will constitute a violation of the regulations for which the operator may suffer suspension of license or debarment from further examination for a period not exceeding two years at the discretion of the licensing authority.

Duplicate licenses.—Any operator applying for a duplicate license to replace an original which has been lost, mutilated, or destroyed, will be required to submit an affidavit to the Commission attesting to the facts regarding the manner in which the original was lost. The Commission will consider the facts in the case and render a decision in regard to the issuance of a duplicate license. Duplicates will be issued upon the condition that if and when the original license is recovered, it or the duplicate license will be returned for cancellation. Duplicates, when authorized, shall bear the same serial number and date as the original and will be marked "duplicate" in red on the face of the license.

Reexamination.—No applicant who fails to qualify for an operator's license will be reexamined within ninety days from date of the previous examination. However, when an applicant for an amateur or radiotelegraph class license fails in the code examination, he may be reexamined the same day for any other class of license desired.

The class of license required for the different types of work in the radio field may be seen from the list following, and it shows what the requirements are for the different type of work by matching the class of license with the class of requirement.

Radio operator licenses are valid for the operation of radio stations except amateur, as follows: (See also Rules 444 to 447.)

(1) Commercial Extra First Class.—Any station.

(2) Radiotelegraph Operator First Class.—Any station except as follows:

(a) Broadcast stations.

(b) The position of chief operator at stations (not including mobile and fixed stations in the international service) using type A-3 emission with licensed power in excess of fifty watts.

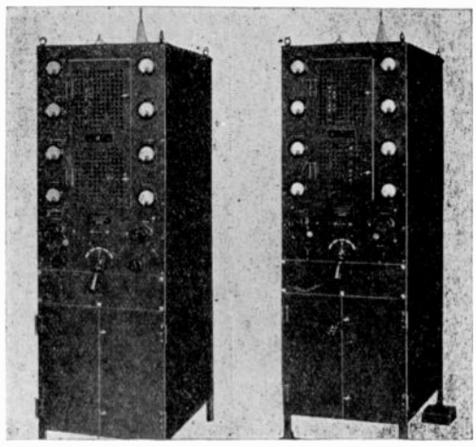
(3) Radiotelegraph Operator Second Class. Any station except as follows:

(a) Broadcast stations.

(b) The position of chief operator in mobile stations of the first and second classes open to the international service of public correspondence.

(c) The position of chief operator at stations (not including mobile and fixed stations in the international service) using type A-3 emission with licensed power in excess of fifty watts.

Operators of this class are eligible to act as chief operator at ship stations of the second class after the service record has been



High Power Mackay Radio Telegraph transmitters. Left—Intermediate Frequency Transmitter. Right—Low Frequency Transmitter as Used on S. S. Geo. Washington.

endorsed, certifying to six months service as a radiotelegraph operator on board a ship. (See Rule 435.)

(4) Radiotelegraph Operator Third Class.—Any station except as follows:

(a) Broadcast stations.

(b) Mobile stations open to the international service of public correspondence.

(c) The position of chief operator at stations using type A-3 emission with licensed power in excess of fifty watts.

(5) Radiotelephone Operator First Class.—Any station using type A-3 emission.

(6) Radiotelephone Operator Second Class—And station using type A-3 emission except broadcast stations.

(7) Radiotelephone Operator Third Class. Any station except broadcast, using type A-3 emission, which is licensed to use a maximum power of fifty watts; provided, however, this class of license shall also be valid to operate stations using type A-3 emission (except broadcast stations), which are licensed to use power in excess of fifty watts if the chief operator regularly employed at such stations holds a radiotelephone second class license or higher, and that at least one operator holding a radiotelephone second class license or higher is available immediately on call in case of emergency. When this class of license is endorsed showing proficiency in the Continental code at a speed of fifteen words per minute such license will also be valid for the operation of aircraft stations using Type A-1, A-2, or A-3 emission.

444. In all cases where not specifically provided otherwise, operator licenses permit employment as chief operators.

445. Any person holding a valid operator license of any class may operate any station in the experimental service licensed for and operating on frequencies above 31,000 kilocycles. (See Rules 302 to 324 inclusive, which govern the experimental service.)

446. Upon passing the required examination (Rules 426 to 428),a radiotelegraph class license may be issued to include a radiotelephone class endorsement in which case the license will be valid for radiotelegraph privileges and radiotelephone privileges for the two classes indicated.

447. The following classes of licenses are no longer issued but are valid until expiration and may be renewed if the service requirements of Rule 439 are fulfilled (service requirements suspended until January 1, 1935), in accordance with the following:

(1) Commercial First Class.—Shall be considered as the equivalent of the radiotelegraph first class with radiotelephone first class endorsement.

(2) Commercial Second Class.—Shall be considered as the equivalent of the radiotelegraph second class with radiotelephone first class endorsement.

(3) Commercial Third Class.—Shall be considered as the equivalent of the radiotelephone third class.

(4) Broadcast Class and Broadcast Limited Class.—Shall be considered as the equivalent of the radiotelephone first class.

(5) Radiotelephone Class.—Shall be considered as the equivalent of the radiotelephone third class.

(6) Aeronautical Class.—Shall be considered as the equivalent of the radiotelephone second class.

(7) Radiotelephone Second Class (valid only for Telephone Operation of Stations in the Aviation Service).—This class of license is valid until expiration for the operation of any station, except as follows:

(a) Broadcast station.

(b) The position of chief operator at stations using type A-3 emission with licensed power in excess of fifty watts and not licensed in the aviation service.

(c) Stations using other than type A-3 emission.

Licenses of this class, or any other license bearing this class of endorsement, may be renewed without examination provided the service requirements of Rule 439 are fulfilled, as a radiotelephone second class license, or a license bearing a radiotelephone second class endorsement, as the case may be.

The Dayton Police Transmitter

(Continued from Page 12)

Well, I guess this about covers the rig from stem to stern so if I've missed anything any of us will be glad to answer letters or show any of the fellows around that stop by.

J. R. BAKER, 1st relief opr.
ROBERT MUMMA, 2d relief opr.
ROBERT B. MOON, 3d relief opr.
MORSE WEIMER, relief

SHIP NOTES

Fred L. Ulrich, who wrote a nice article in our September issue, has dropped his job at WNYC for a while to answer the lure of the sea. What is it, Fred, temporary or permanent?

R. T. Huntington is on the SS Pastores.

H. F. Morrisette is now in the SS Beatrice. He was formerly on the Isabel.

A. R. Moore is on the SS Taloa. He formerly shipped on the Calamares.

C. J. Basen took a boat on the Great Lakes with the D. and C. He is a former army man, having been with the 26th Attack Squadron, Wheeler Field, Hawaii. C. J. is an old friend of ours and we are glad to see him in the commercial field.

M. F. Davis is chief on the SS Surinome. He was formerly on the Peten.

W. A. Walker, former RMCA Lakes Region manager, is now with the Duluth, Minn. police radio station.

T. A. Znotin is on the SS Yomachichi. He was formerly on the SS Exochorda.

Fred Muller, formerly Tropical Radio Superintendent, is now operating his own business at 39 Cortland St., New York City.

The large English vessel built under the designation "534" and known as the world's greatest liner, was recently christened by Queen Mary of England as the Victoria. She will soon make her maiden voyage to America and Captain R. B. Irvin, formerly in command of the Aquitania, is expected to be her first captain.

The International Telecommunication Convention at Madrid, 1932, and General Radio Regulations annexed thereto may be purchased for thirty cents by writing the Superintendent of Documents, Government Printing Office, Washington, D. C. A copy is required in every ship transmitting room.

AT CROWN POINT

By FRED HALL

Was over to visit WMEC, the Mackay Radio FX outfit the other day. Their transmitter is located at St. Johns, Ind. While their receiver is at Merrillville,Ind. Their operating is done in Chicago. J. Turner, Jr., M. K. Moon and operator Dodman keep their three 1½ kw transmitters going, while Coe, Wilson and Wagner keep the receiver tuned.

Both the receiver and transmitter operators are in touch with Chicago via LL. They use 13030, 8970 and 7760 kcs. They work NY, SF and N Orleans and are contemplating another installation at Kansas City.

Commission Wants Information

In a sweeping movement, the Federal Communications Commission ordered all broadcast stations, broadcast pickup stations, experimental broadcast stations, experimental visual broadcast stations, experimental relay broadcast stations, on general or special experimental stations engaged exclusively in research concerning the developement of apparatus for any of aforementioned classes of stations, to file with it by Sept. 15, 1934, a statement as to whether the licensee is a corporation, a list of stockholders as of July 15th, together with their addresses, whether the stock is voted other than the person named as holder of record, a list of officers and directors, and any other arrangement or agreement which might control the conduct of the station. If a partnership, association, organization or company other than a corporation, a list of the partnership, and a list of officers and directors and their addresses.

A Study of Acoustics

(Continued from Page 14)

ium structure. Remedial measures taken to eliminate standing waves are well known to acoustic engineers and their services should be solicited.

Summing up: Sound travels through the air as waves of alternate compressions and rarefactions. If the reflected sound waves are retarded by the proper amount, it may happen that the compressions and rarefactions of the reflected sound arrive at the ear at the same time, neutralizing each other's effects, and so produce a diminution in intensity. If the reflected sound is retarded a little more, it may happen that two compressions coincide, producing an unusually loud sound. The most usual case of sound foci is found where a curved wall or ceiling concentrates the sound to a focus, just like light is concentrated to a focus in a reflector type of mirror-arc lamp. Since dead spots and sound foci together with interference arise from the same cause as echo, their removal may be brought about by almost the same acoustic remedial measures.

Reverberation

Another phase in the study of acoustics and the analysis of phenomena is that of reverberation. This is nothing more than sound waves being reflected back and forth from walls, floor and ceiling, a portion of which is being absorbed at each reflection until the intensity of sound is so reduced that it becomes inaudible. The photographic figures accompanying this paper plainly illustrate sound waves overlapping and reflecting back and forth. Under ordinary conditions there are many such reflections in the cause of a single second in a room or auditorium of practically any size. The greater the dimensions of the room or auditorium the more prolonged will be the reverberations. The time of reverberation has been determined by investigators to be inversely proportional to the sound co-efficient of the materials in the room or auditorium. Therefore, by suitably selecting the materials, fixtures, and appurtenances the time of reverberation may be adjusted so as to give the optimum acoustic effect.

Bibliography

Watson, F. R., "A Survey of Modern Acoustics" Rev. Sci. Inst. 4, 268-270 (1933)

Olson, H. F., "Applied Acoustics" (1934) Blakiston Son & Co., Phila., Penna.

Davis, A., "Acoustics of Buildings" Bell and Sons (1927)

Hanley, A. G., "High-Fidelity Receivers" Radio Engineering, 2 pts. March, April 1934

LaPorte, E. A., "High-Fidelity Transmitter Performance" ELECTRONICS May 1934

Editors, "The Prospects of High-Fidelity Transmission" ELECTRONICS July 1934

Editors, "High-Fidelity—Economics and Technique" ELECTRONICS April 1934

A REAL MORRO CASTLE DISASTER

(Continued from Page 19)

said we might see each other again. Alagna said he was going to jump to the bow. It was about twenty feet. He said he would probably break a leg. I said I was going to hang by my hands to shorten the drop. When the ship rolled we saw the ladder rungs. Then the wind shifted back and we missed them. Finally we got them and climbed down to the forepeak.

There were fifteen or twenty there, including Acting Captain Warms, First Officer Freeman, Second Officer Hackney and a couple of sailors and watchmen and some of the stewards' department, and also an elderly couple of passengers. I understood they were a doctor. The woman was bearing up quite well.

There was quite a lot of rain falling. I remember seeing lights on the port and starboard sides about a quarter or half mile away. They were only lying there and didn't show any activity.

Acting Captain Warms stuck a flashlight in my hand. He said there was a ship in the offing and pointed at one that looked at first like a tanker, the way her lights were set and the way she was riding. He said: "See if you can raise her." I started blinking on the flashlight and the blinker on the ship answered: "Do you need assistance?"

Captain Warms said to send: "Yes, immediately, 540 passengers."

They answered: "Will send a boat."

Mr. Warms said: "Okay."

I also told Mr. Warms I had sent the S O S and told him the message I had sent, and he said: "That's fine; that's fine." He went over to the port side and started looking ashore.

We started picking lights of another ship coming on fast. I blinked: "Pick off the passengers aft first." She blinked back: "Okay."

We could see the City of Savannah next through the false dawn. I blinked the same thing to them and got their "Okay." She stood in and at one time was about four or five hundred feet away and she started lowering boats.

Then the big Furness boat came out of the mist and crossed our bow. I remember it. It was being handled with magnificent seamanship. She came so close that she almost touched our anchor chain. She came around on the starboard side and I remember Warms cupped his hands and shouted:

"Take off the people aft, we're okay here." And the man on the pilot house waved his hand and I remember seeing the propellers and reading the sign, "Quadruple screws, keep clear," as he slid past. He shot all the way around and looked us over, crossing our bows again and stopping on the starboard side. I would say he wasn't more than 200 feet from us.

The Furness boat (Monarch of Bermuda) immediately started lowering boats. There didn't seem to be any panic on them. These boats were a sort of pilot boat, and I could see the officer who had the tiller in each one was doing his job 100 percent. Warms shouted "Take them off aft; we don't want to go." Two boats went aft, but one came forward and Warms said, "We have two passengers you can have." The officer in the boat said, "Lower them away."

We had a Jacob's ladder overhanging the bow but the woman was afraid to go. She insisted that her husband go first. We put a restraining line around his waist and he climbed down and finally got into the boat. The woman followed next. There was a Furness stewardess in the boat who took charge of her. Then the boat went back picking up survivors.

Out of a porthole on the port side, maybe about 100 feet away from the forward housing, there was a woman sticking her head and shoulder out shouting, "Save me." She was practically naked. She had pulled herself as far as she could and her hips apparently stuck. Finally she gave a heave and came all the way out and fell into the water. It was about twenty-five feet and she landed on her stomach and of course she lay there floating with her arms stretched out and her face in the water.

A Real Misfortune Takes Place

Chief Operator Rogers was reluctant to say anything more about Alagna, who had saved his life, but he was pressed by Dickerson N. Hoover, chairman of the Investigating Board of Steamboat Inspectors. He hesitated and called for his lawyer, who could not be found. After sitting in reflection on the witness stand five minutes, he said, suddenly, "I'll answer."

Alagna Is Described As Trouble Maker

He said that Second Assistant Radio Operator Alagna has been a strike agitator and a trouble maker on the ship, and that Captain Robert Wilmott had decided to get rid of him. The chief operator told of a conversation about Alagna with the captain earlier in the voyage in which the captain told him of a final piece of insubordination.

Mr. Rogers said the captain ordered him as chief operator not only to get rid of Alagna as soon as they reached New York, but also to ask the Radiomarine Corporation of America to make sure that he would find it impossible to find another post anywhere in the American merchant marine.

The ship never reached New York and Captain Wilmott died suddenly on the way, and for that reason, the chief operator did not want to tell things that were sure to be misinterpreted. Mr. Hoover pressed him.

He said the captain had warned him to watch Alagna on the way to New York because he feared some act of sabotage. The captain had already ordered the radio compass on the bridge to be kept locked and he instructed the chief radio operator to check every piece of his apparatus daily.

"I don't trust Alagna," the dead captain was quoted by the chief operator. "He is vengeful. In Havana before we left, it has been reported to me that he declared there were ways of getting even with the ship."

The glaring headlines the newspapers carried that day. The blunder was made. Too late for retraction, first the sensational newspapers caught it and blared it out to a waiting public, the more conservative newspapers, forced to follow, picked their little less glaring headlines and followed suit.

The public left with a queer picture. A blundering Federal Officer allowing a photographer to take a picture of Second Radio Operator Alagna—without a doubt as much a hero in his line of duty as any man on board that boat—handcuffed to an officer of the law. Yes, there were apologies later that the man should never have been handcuffed, and that he was not actually under arrest, merely held temporarily as a material witness, but where was the good name of George I. Alagna, who twice fought the flames between the radio shack and the bridge to finally force the words from the Commanding Officer, "Send the SOS," and who then burst back through the flames to carry the message to his Chief waiting at the key with only a moment to spare before sending the distress message that brought aid to the more than 400 survivors, before the emergency transmitter went completely out of gear. Not content with his already heroic actions in the line of duty, he then performed another and greater heroic action, not called for in the line of duty, and practically carried his already prostrate Chief to the open air to gain his senses, and put him in condition to render more service and bring him back a survivor of the ill-fated Morro Castle.

Not one word of testimony from Chief Radio Operator Rogers would leave even the most obtuse in doubt as to the heroic action of Second Radio Operator George I. Alagna. In fact with just a little imagination, we can see that here was a man worthy, fitting, and gloriously carrying forward the tradition of the sea as known to every ship radio man.

A real Morro Castle DISASTER was in the series of distressing after events, as unfortunate as ever faced a radio operator, that so outrageously dragged the good name of George I. Alagna so close to the mire, when it should have been blazened on every headline as a hero of the day.

The department announces that in about eighteen months sectional maps covering the entire United States showing beacon lights, airports, and radio stations, will be ready. This will consist of 87 separate units, which will be drawn to scale of eighteen miles to an inch. They will be about 40 x 20 inches each. They will when finished be the first complete offering of the kind.

ASSIGNMENTS

RADIOMARINE CORP., BALTIMORE

Radio Officer — Vessel

J. H. Egan—ss Masaya
Goldback—Capulin
Hall—D. J. Moran
Coyle—Losmar
Beater—Walter D. Munson
S. R. Price—C. A. Canfield
Bogut—Yankee Arrow
J. F. Bell—Bethore
Stelwagon—Chilbar
Hewit—Calmor
Davis—Marore
D. M. Daley—Wm. A. McKenny
Brady—E. J. Nicklos
J. F. Bell—Chatham
Seibert—Maine
Taylor—Firmore
Hess—Royal Arrow
D. M. Daley—Masaya
Gannett—Wm. A. McKenny
Simon—Malay
Karos—E. J. Nicklos
C. E. Cook—City of Newport News
H. H. O'Day—City of Norfolk
J. H. Bloomenthal—City of Norfolk

GREAT LAKES

H. Wallase—Goodyear
J. Halbert—Tremaine
A. Smith—Harry Yates
R. Guthrie—Cornelius
F. Smith—Wickwire
W. Hurlburt—U. S. Gypsum
A. A. Jentoft—J. F. Schoellkopf Jr.
L. S. Ax—Dow Chemical
H. Schueler—Ingalls
H. Pilzecker—Diamond Alkali
R. Karkau—Thunderbay Quarries
W. Hope—Hope
R. Jacobson—Consumers Power

UNITED FRUIT CO., NEW ORLEANS

M. Dobbs—Zapaca (CH)
V. J. Cornelius—Zapaca (2nd)
L. D. Preret—Zapaca (3rd)
N. Buras—Metapan (CH)
E. Clesi—Metapan (2nd)
J. F. Lawrence—Santa Marta (2nd)
W. E. Barnes—Santa Marta (3rd)
H. G. Ende—San Blas
F. N. Gros—Sixaola (3rd)

TROPICAL RADIO TEL. CO.

NEW ORLEANS

A. L. Meggers—HJW Santa Marta, Colombia
F. Hendricks—RXA Almirante, Panama
J. Vishak—TIM Port Limon, Costa Rica
W. Dittmore—RXC Panama City, Panama

RADIOMARINE CORP.,

NEW ORLEANS

D. A. Bradshaw—Nashaba
P. E. Rabalais—Ontario
R. K. McCarrick—Englantine
E. A. Beaver—Tegucigalpa (2nd)
R. I. Warren—Dryden
L. A. Simms—Tripp
M. L. Walk—Chester Valley
E. D. Calhoun—Point Reyes
C. J. Connolly—Effingham
M. F. Canion—Sapinero

MACKAY RADIO, NEW ORLEANS

F. Heyd—Amolco
V. Ray—Clearwater
P. Fruge—Delmore (CH)
I. G. Owen—Delmundo (2nd)
Gilliam—City of Fairbury

RADIOMARINE CORP., GALVESTON

J. Bethel—Birkenhead
S. Hakan—Whipple
C. Dela Garza—Point Montara
D. B. Fontaine—Wm. Boyce Thompson
J. H. Wasson—Trimountain
E. D. Aber—Pueblo
R. M. Warriner—Worden
C. E. Welch—Stella Lykes

STATES STEAMSHIP CO.

PORTLAND—SEATTLE

R. Welbon—General Pershing
J. McMahon—General Pershing
E. Henry—General Sherman
K. Steiner—General Sherman
R. Myrick—General Lee
H. Schoolfield—General Lee
R. Whittington—Washington
H. McMahon—Pennsylvania
W. Mee—Wisconsin
C. Anderson—California
T. Toppi—Michigan
J. Crouse—Illinois
R. S. Bean—Iowa
S. Ferguson—New York
J. Walker—Texas
R. Dernback—Jefferson Myers
G. Peck—Peter Kerr
J. Robinson—San Pedro
E. Betts—San Julian
E. Garrick—San Anselmo
R. Darby—San Felipe
D. Hughes—San Bernardino
C. P. Burt—San Raphael
D. E. Youngberg—San Clemente
H. Oliver—San Simeon
L. K. Bradley—San Lucas
F. Peterson—San Domingo
F. Caldwell—San Angelo
F. G. Luecke—San Vincente
J. Dinsdale—San Gabriel

RADIOMARINE CORP.,

SAN FRANCISCO

P. J. Johnson—West Cactus
S. K. Balcom—West Mahwah
J. R. Irwin—Forbes Hauptman
L. E. Jorquera—Forbes Hauptman
L. C. Bertin—Lena Luckenbach
L. R. Kaplan—Santa Monica (CH)
N. O. Leavitt—Santa Monica (2nd)
W. S. LaMoe—Point Palmas
H. K. Peckham—Coya
J. Seymour—Condor
L. M. Malarin—Texas Shipper
A. H. Pepple—Sidney Hauptman
W. P. Paschal—Santa Lucia (2nd)
W. E. Chadwick—Lurline (3rd)
A. H. Pepple—West Nilus
F. A. Stubbe—Alladin
A. G. Weeks—Point Clear
B. H. Duncan—Lake Francis
J. A. Wiehr—Dorothy Wintermote
E. J. Banker—F. J. Luckenbach
P. Schmidt—West Camargo
C. Griffing—El Dorado
Warren—Mariposa
G. Estep—M. O. Chandler
G. H. Miller—Malolo (3rd)
F. J. Harris—Maui (2nd)

MACKAY RADIO, NEW YORK

A. Jorda—A. L. Kent
W. A. Lintz—H. R. Mallory
R. Verenocke—Mohawk (CH)
F. Black—Seminole (2nd)
E. McKee—Washington (3rd)
R. Williams—Seminole—(2nd)
J. F. Kennedy—Excambion (2nd)
H. Weinstein—H. R. Mallory

RADIOMARINE CORP., NEW YORK

W. C. K. Pound—Fred W. Weller
G. H. Hamilton—C. A. Canfield
W. J. Mullaney—Yacht Mascotte
J. R. Welch—Wm. Rockefeller
F. Mitch—F. Q. Barstow
D. A. Beck—Maurice Tracy
H. Blatt—Pres. Harding
J. L. Mulhern—Granada
R. M. Merrill—Borinquen
E. Perry—Argosy
R. H. Roberson—Dixie Arrow
F. Lambert—Halsey
H. Santella—Panuco
H. E. Dixon—Anniston City
C. W. Wightman—Levant Arrow
B. Bernstein—Mojave
H. Barnard—Atlantic
R. Rockland—Carabobo
H. Warner—Gatun
G. C. Ahrens—Tydol No. 2
P. T. Kroeger—Wichita
V. Madson—American Shipper
H. McGrath—Tachira
H. B. Thomas—City of St. Louis
F. H. Carlisle—Oritani
H. Redlin—Pres. Roosevelt
A. Marcus—S. M. Spaulding
M. Develez—Buenaventura
H. Wallin—Baldbutte
E. F. Ford—Granada
C. Porter—Geo. Washington
A. Pierce—Santa Rita
A. G. Lupien—Yorktown
M. J. McDonough—Chester O'Swain
H. S. Kuchta—Meton
W. Gordon—Dungannon
B. P. Sloane—Standard Arrow
C. C. Berger—Yacht Moana
G. H. Ellis—James McGee
S. J. Herald—Beaconstreet
J. Meighan—I. C. White
C. G. Landman—Birmingham City
F. P. Sehlin—Steel Engineer
V. W. Minzey—M. & J. Tracy
B. J. Zweig—Santa Rosa
L. R. Austin—American Importer
E. Halper Jr.—American Importer
W. M. Skilling—Tidewater
J. Evans—Commonwealth
R. J. Martin—John D. Archbold
M. D. Sanborn—Lancaster
E. B. DeTurk—Zarembo
H. Von Thun—Yacht Rene
H. Paulisen—Jacob Luckenbach
D. Cintron—Agwistar
Ehrensberger—Amapala
R. Foster—California (2nd)
R. Kay—California (3rd)
C. P. Annis—San Juan Hill (CH)
R. K. Stevens—Beaconhill
F. E. Shay—Baldbutte
B. Tempest—Chiloil
R. E. Sherwin—Exchange
G. H. Hamilton—E. M. Clark
O. Sands—Santa Elena
A. Locher—Christy Payne
R. D. Richardson—Santa Elena
R. J. Byrne—Santa Clara
R. L. Raysbrook—W. S. Farish
H. Wallin—Vacuum
V. C. Ellis—Empire Arrow
J. Agrillo—Axtell J. Byles
G. H. Geiger—C. J. Barkdull
G. Gerstman—Capillo
H. Weimerslage—F. W. Abrams
J. L. Horton—Chas. L. O'Connor
R. O. Woods—Virginia

(Continued on Page 24)

HIGHLIGHTS OF THE BROADCAST INDUSTRY HEARING

For Modification of the Radio Broadcasting Code, June 20-21, 1934
Prepared by J. V. FITZHUGH

MR. Thomas R. McLean, I.B.E.W. representative:"* * * Now the consequence was a company union was formed right after our agreements had been presented. That was in Cleveland and Chicago. * * * Now, I ask you, Mr. Administrator, does Section 7 (a) mean anything to us?"

Deputy Farnsworth, Deputy Administrator of Amusement Section of the NRA, and chairman of the hearing: "I think it does, Mr. McLean."

Mr. Thomas R. McLean: "It does not mean anything in those cases."

Chief Justice Hughes, quoted by Mr. Milton Handler, General Counsel for the National Labor Board, and read by Deputy Farnsworth: "It has long been recognized that employees are entitled to organize for the purpose of securing redress of grievances, and to promote agreements with employers relating to rates of pay and conditions of work."

Deputy Farnsworth: "It (referring to the Wagner Labor Bill, which was signed by President Roosevelt June 19, 1934) * * * affords due notice to the employer that Section 7 (a) of the Act is a live and vital law."

N.B.C. and C.B.S. Company Unions Oppose Reduction of 48-Hour Maximum

Mr. Philip I. Merryman, National Vice President of N.B.C. company union, reading from prepared statement: "The wage schedules for technicians in the National Broadcasting Company are predicated on the 48-hour week. We most firmly demand that there be no change in these hours as prescribed in the NRA Code of Fair Competition for the Radio Broadcasting Industry * * *."

Mr. Harry Spears, President of C.B.S. company union, reading from prepared statement: "The members of the Associated Broadcasting Technicians are very happy under this agreement, and are most insistent in their demands that the hours of labor be left in the code at the maximum of 48. * * * While 48 hours of labor might be deemed excessive in other industries, for Broadcast Technicians it is a reasonable amount of time."

From I.B.E.W. brief presented by Mr. Edward D. Bieretz of Newark, N. J., and prepared by Mr. M. H. Hedges, Research Director of I.B.E.W.: "The request is for a 35-hour week, with minimum rates of pay ranging from $22, $33, and $44 a week for respective station groups."

"The Code Authority for the Radio Broadcasting Industry points out that weekly payrolls increased from July 1, 1933 to December 16, 1933, 21.1%. It should be emphatically pointed out that these increases are being made at a time when radio station business was low in volume. In July, 1933, the two major chains were doing an advertising business of $1,816,000. By October this business had increased to $3,256,000; and by December, $3,697,000. Wage increases were started on a low market, and business picked up steadily. Prospects for a good year in 1934 are promising. The first four months of 1934 showed a decided increase in business, with a loss in the slack months of March and April decidedly below the seasonal average. Our point is this: if payrolls could be increased as much as they were from July, 1933 to December, 1933, with a low volume of business, they can well be increased 10 per cent in 1934."—Statistics quoted from "Survey of Current Business" in the I.B.E.W. brief read by Mr. Edward D. Bieretz of Newark, N. J., and prepared by Mr. M. H. Hedges, Research Director of the I.B.E.W.

Pres. Roosevelt Orders Revision of Codes Providing for Increased Salaries and Reduced Hours

In his address to all code authorities, assembled in Constitution Hall in Washington, D. C., March 5, 1934, the president made the following statements (quoted in the hearing by Mr. Edward N. Nockels, representing the Labor Advisory Board of the NRA):

"Never again will be permitted the terrible conditions which allow vast sections of our population to exist in an un-American way, which allows a maldistribution of wealth and power."

"It is the immediate task of industry to re-employ more people at purchasing wages, and to do it now."

"With millions still unemployed, their power to purchase and use the products of industry is still greatly curtailed. It can be increased and sustained only by driving for the lowest schedule of prices in which higher wages and increasing employment can be obtained."

"We must consider immediate cooperation, and secure increases in wages and shortening of hours. The government can not forever continue to absorb the whole burden of unemployment."

"Last fall at the public hearing, the representatives of the radio broadcast technicians urged the 40-hour week. This seems now, not only a practicability, but an inevitability. It should be accomplished at once, with the expectation that even the 36- or 30-hour week will arrive."—Statement of Mr. M. H. Hedges, Labor Advisor on the Radio Broadcasting Code Authority, and Research Director of the I.B.E.W.

"The very modest request of the International Brotherhood of Electrical Workers of 36 hours a week would reemploy * * * about 462 additional broadcast technicians * * * ."—I.B.E.W. brief.

"Exact figures can not be ascertained from the Federal Radio Commission, but varying estimates have been made by the authorities to show that from 4,000 to 8,000 men are licensed for the 2,006 jobs now available in the radio broadcasting field. These men are well enough equipped to win a license from the Federal Government. They are professional men, many of them carrying engineer and college degrees. Their problem is the problem of the industry. The industry must face the question of dividing jobs in part at least to these men."—I.B.E.W. brief.

"I have attempted to point out here previously that there is no unemployment of qualified radio broadcasting technicians. I mean by that, men who are qualified to come to the studios of the National Broadcasting Company and perform its duties."—Philip I. Merryman, National Vice President of N.B.C. company union.

Mr. C. A. Wood, member of the Labor Advisory Board of the NRA, referring to Mr. Merryman, N.B.C. company union representative:

"Mr. Deputy, may I call your attention to the fact that we are interrogating a witness who is a representative of a company union which has not any unemployed members—he told us that—and when they are unemployed, they no longer pay any attention to them; they become honorary, whatever that means."

Deputy Farnsworth (chairman of the hearing): "Is there any provision for an employment committee to seek employment?"

Mr. Harry Spears (President of C.B.S. company union): "There is none available at this time."

Assignments

(Continued from Page 23)

J. Aird—Dean Emery
C. VanOrstrand—Scanmail
R. D. Ely—Tiger
J. P. Hall—Scanmail
E. R. Fritz—Santa Cecilia
M. Perlman—Santa Cecilia
J. H. Mulhern—Santa Cecilia
H. Verbovsky—Vamar
I. Syverstad—Comet
T. J. McCarter—Oriskany
L. B. Markowitz—Steel Scientist
E. E. Harper—Executive
R. Green—Royal Arrow
H. P. Johnson—Coot
T. M. McCarthy—Coamo
C. W. Weir—West Irmo
F. Lambert—Santa Lucia
R. H. Cooke—Santa Maria
G. A. Magary—Western World
M. Borow—Western World
W. J. McEntee—Santa Maria
F. E. Chapman—Beacon
C. E. Schwab—C. Harrison Smith
T. J. Cerio—Pres. Harding (CH)
T. Licari—Madison (CH)
R. L. Raysbrook—Pan Bolivar
J. S. Belleza—Caracas
H. Ball—Worthington
C. A. Scambler—Cities Svc., Missouri
A. F. O'Connor—Santa Inez
T. L. Siglin Jr.—Geor. Washington
W. J. Gorbig—Paul H. Harwood
W. Gordon—Paul H. Harwood
S. Hidalgo—W. F. Farish

"WPEH"

(Continued from Page 8)

dio, is well known to the electrical fraternity of Boston. He holds a masters' license (electricians), state of Massachusetts.

Other relief operators who have served here are Robert Philbrook and Ralph Rice (deceased), old commercial operators from the Boston division of the Radiomarine; Richard Golden, delegate at Boston of the ARTA; Joseph Reegan, chief radioman USNR; Robert Pearce of the Massachusetts State Police; John F. Knight, commissioner, was the first chief engineer. Chief Thomas Damery of the Somerville police department, and Chief John McNally of the Somerville fire department are interested in installing "two way" communication. Commissioner J. J. Cuddihey and chief operator Harry R. Chetham will carry on these experiments in the near future.

CLASSIFIED ADS

Commercial Radio will accept classified advertising at the special rate of five cents per word.

Remittance in full must accompany copy, closing date for classified advertisements is the 15th of the month preceding publication date.

One new set Van Nostrand Mathematic books: Arithmetic, Algebra, Trigonometry, Calculus and Home Study. 4 vols. $3.50. List price $7.00 LD., care Commercial Radio, 7 W. 44th St., N. Y. City.

FOR SALE—Radio Model Vibroplex, heavy contacts, $10.50. Like new. Guaranteed. John Morgan, 54 Harding Drive, Glen Oaks, Rye, N. Y.

Work formerly handled by the Lighthouse Service Division, 10th District, Buffalo, N. Y., in connection with airways, was put under jurisdiction of The Manager, Aeronautics Branch, Municipal Airport, Newark, N. J.

The staff at the Bellefonte, Pa., U. S. Airway Radio Station are:

L. T. Newell, radio operator in charge, has been in this service since May, 1928. Formerly U. S. Navy on USS R-27, USS Wyoming, and at Radio Central, Navy Department, also Morgan Line, Barber Line, Bull Line, American West Africa Line, Prudential Oil of Baltimore, and Lloyd Mediterranean Line, and RCA Chicago at WQO.

G. J. Gosnell, senior radio operator, has been in this service since September, 1929. Formerly with Dollar Line, Coastwise Transportation, Savannah Line, Bay State Fishing Co., Ward Line, Vaccaro Brothers, Standard Oil Co., and Signal Corps.

H. P. Peterson, assistant radio operator, has been in this service since January, 1930. Formerly with Gulf Refining, afloat and ashore.

R. P. Westervelt, assistant radio operator, has been in this service since May, 1930. Formerly U. S. Navy on USS Billingsley and at naval radio station, New Orleans, La.

CORRESPONDENCE SECTION

Dear Editor:

The statistical report on the accompanying material proves that working conditions of radio broadcast operators in San Antonio, Texas, have been improved remarkably since the NRA Code of Fair Competition for the Radio Broadcasting Industry went into effect.

In this respect Mr. M. H. Hedges, head of the Research Department of the I.B.E.W. and Labor Representative on the Code Authority, is commended with highest praise for the results that his painstaking work has accomplished.

It was the firm belief of many operators in San Antonio that no such results as these could ever be obtained. That they actually were obtained at comparatively low expense and with surprisingly little friction, under the circumstances, should be an inspiration to other operators in this country who are not receiving their share of the benefit granted to them by the NRA Code.

The human side of this report is interesting. We found it to be very important to organize as nearly 100% as possible, and to keep our preliminary activities strictly secret. We then became familiar with Code violations at every station. Affidavits were taken, and we were fully prepared to report conditions to the Regional Labor Board when it met here for the first time on February 26, 1934. From the secretary of this board we learned, however, that the enforcement of the provisions of the National Industrial Recovery Act was divided into two sections, namely those matters concerning labor disputes and trouble over collective bargaining between employer and employee, and those matters dealing with code compliance. None of our men had been fired; therefore our complaints were limited to those of code compliance. The Board secretary advised us to arrange conferences with the managers of all stations that were violating the code, in the hope that such violations might be ironed out peacefully. We followed this procedure, and were surprised to learn that where we expected the most trouble, we got the least, as far as the conferences themselves were concerned. We found that by the use of diplomacy and common sense we gained nearly all our demands; but by any display of poor diplomacy or radicalism we gained nothing.

We were forced to file charges of code violations against only one of the five San Antonio stations. One station was complying fully with the letter and the spirit of the Code soon after the Code went into effect; and we are indebted to the manager of this station for having helped us actively in obtaining code compliance from the other stations. Another station had a slight variation from the salary and overtime provisions of the Code, but these were adjusted soon after the Code became effective, and further adjustments were made after we organized with the I.B.E.W. At one local station there was considerable debate as to whether one of the licensed operators was an apprentice or a full-fledged operator, according to the provisions of the Code. The union and the manager cooperated in sending a letter to the Code Authority asking for an interpretation of the matter. In this manner, and by further use of tact in dealing with this manager, this man finally was declared to be a full-fledged operator. His pay was raised accordingly, and his hours were adjusted, so that his working conditions are now in keeping with the Code requirements, and are entirely satisfactory to him. At one of the larger stations certain adjustments were made to conform with the Code requirements, but simultaneously the house rent of one operator was raised and the transportation allowance of another operator was cancelled, so that the net gain to these men was practically zero. The Code Authority had ruled that nothing could be done for us in these cases, because the Code was silent on the subjects of house rents and transportation allowances. Nevertheless we tactfully appealed to the pride of this manager, and asked him to adjust such matters on the basis of goodwill between employer and employee. He complied with our request; and we are pleased to report that there is a decidedly happier attitude in that station between employer and employee than before we joined the I.B.E.W.

In the case of the station against which we filed charges of code violations, our method was first to determine from the Code Authority whether our position was correct. We learned that it was, and in a friendly way we asked the manager of this station to make the required adjustments. Since this station was part of a regional network, he referred our requests to the central offices; but our pleas were refused there. We then telegraphed simultaneously to Mr. M. H. Hedges and the Code Authority that details of our complaint would be in their hands within a few days. Ten days later our brief was received. Within two days after receipt, certain changes in working conditions were already in effect. The settlement of back salaries was prolonged for several weeks, but that matter is now completely settled.

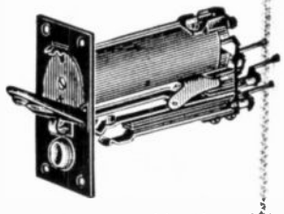
The statistics show that practically every operator in San Antonio received some wage increase, the amounts ranging from 10 to 100%. Hours of work were reduced, without reduction of pay from 16.7% to 55.6%. Back salaries amounting to $1,227.42 were paid in full (one additional claim of $139.68 still pending). Three new men were employed, one voluntarily quit.

L. J.

STATISTICAL REPORT OF WORKING CONDITIONS OF SAN ANTONIO RADIO BROADCAST OPERATORS UNDER THE N. R. A. CODE

STATION		BEFORE			AFTER			
Station	Operator	Hours	Pay-wk.	Days Off-wk.	Hrs.	Pay-wk.	Back Sal.	D. Off
WOAI	1. Trans.	†58	$35	1- ev. 2 wk.	*48	$40	$177.66	One
	2. Trans.	†58	$35	1- ev. 2 wk.	†48	$40	$161.75	One
50,000 w	TransCont-	48	$20	None	48	$40	$137.00	One
Clear ch.	1. Control	48	$20	None	48	$40	$137.00	One
Full time	2. Control	48	$20	None	48	$40	$137.00	One
N. B. C.		*House rent $10 per mo. †Transp'tn. all. $15 mo.			*House rent now $20 mo. †All transp'tn cancelled			
KTSAc	1. Trans	*72	$25.02	None	40	$25.40	$270.12	None
	*2. Trans.	†72	$25.02	None	48	$22.50	$206.89	None
1,000 w	†3. Trans.	....	.....	.....	36	$22.50	.....	None
Regional	‡4. Trans.	....	.....	.....	36	$22.50	.....	None
Full time	§5. Chief	(Executive			(Executive)			
C. B. S.	x6. Control	....	.....	.....	48	*$12.00	.....	None
	z7. Control	48	$16.75	None	....	.....	‡$139.68	.....
*Transferred to KNOW March 17th †New Employee ‡New Employee §Does control work xNew Employee zQuit voluntarily c Charges filed against this station.		*Formerly classified as "Chief Trans. Op." Did part control work. †Formerly classified as "Chief Control Op." Did part trans. work.			*Apprentice ‡Claim pending settlement			
KABC	1. Trans.	52	$31.50	None	40	$31.50	.....	One
100 w.	2. Trans.	52	$27.00	None	40	$27.50	.....	One
Local, Full Time	3. Trans.	20	*$15.00	None	36	*$22.00	.....	One
		*Part trade, voluntarily			*Part trade, voluntarily			
KONO	1. Trans.	48	*$25.00	None	45	*$35.00	.....	None
100 w		42	†$12.00	None	36	†$15.00	.....	None
Local sharing time	2. Trans.	*Part trade, required †Part trade, required			*$25.00 cash, balance trade. Amount trade variable. Required. †$7.50 cash; $7.50 trade. Required			
KMAC	1. Trans.	48	$20.00	None	42	$25.00	.....	*One
100 w. Local sharing time	2. Trans.	37	$15.00	None	37	$20.00	.....	*One
					*By mutual arrangement.			

Army & Navy Surplus



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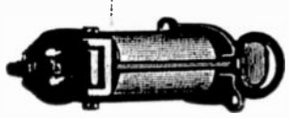

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