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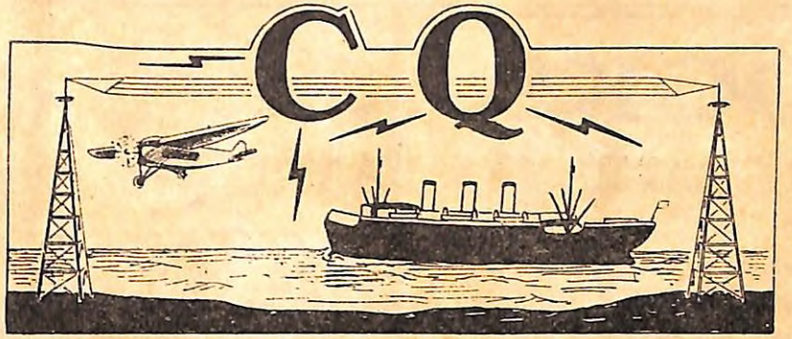

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JAMES J. DELANEY, Editor L. D. McGEADY, Bus. Mgr.

VOL. II **FEBRUARY, 1933** **NO. 6**

Mr. Reader:

From all over the world, it would seem the contents of this issue is gathered.

Dr. Lee de Forest writes his articles from Sunny California; Mr. A. Crew prepared his article from England; Mr. E. H. Rietzke sends in his material from Washington, from every point of the compass comes news items to you. New York furnishes a technical article or two.

But, another step is registered in mechanical make up. A fine two-color cover is added.

The box office of a theatre tells the story if a show is a success; our subscription receipts tell us if our readers like our book. Tell us what you want in the book. The Editor.

CONTENTS:

Editorial

As we look back over almost thirty years of commercial radio, for in truth, we note from Dr. de Forest's articles that we may consider it thirty years, we see many changes in radio. The condition of shipping today while in some quarters considered improving, is anything but satisfactory.

The traffic from ship to shore is large, but is the available personnel. We believed we had seen the last of the $60 a month ship radio operator years ago. Today we begin to think otherwise.

The wonderful circuits developed for the handling of trans-oceanic messages were a step to the front. The firms specializing in this field find the cables meet them point for point on rate. At one time it was thought that cables would be abandoned, but now we know that no such news is coming in the immediate future. As if the problem was not already great enough, the trans-oceanic telephony steps forward to cut down the traffic of both of the older forms. The traffic itself, however, does not keep abreast of the improvements. The speed of the flying word has far exceeded the proportionate speed of the present day means of water travel.

The automatic distress signal recorder on ships at first seemed an advance to the safety at sea. But, today as ever the radio personnel on a boat is the important thing for safety. Almost every day the newspapers carry some new report of shipping distress, and the radio operators must be reliable. They are the backbone of intelligence transmission by radio. Not a lower standard, but a higher and higher standard is the necessity of the hour.

* * *

Look over the list of broadcast station radio operators. Seven, eight, ten or more years is the time of the men in radio. They are the ones who are able to place and keep a station up to standard. And surely that standard today more than ever is an exacting one. Men caught in the spirit of radio show us that it is not only the monetary remuneration that is the prime incentive, but as truly as the mechanic of true form ages and ripens with time to the perfection, so too, does the radio man who loves his transmitting key and the refinements of the apparatus in back of it, even as the artist loves his brush and canvas. And, in the same proportion to the times is the radio man compelled to try for recognition, as is the artist with his brush.

* * *

Radio set designing, both receiving and transmitting, have claimed many of the old fraternity of radio men. Broadcast, airways, radio beacons and commerce have made inroads, but at heart the tantalizing draw to the key is always there. Phones clamped to ears give a greater thrill as time passes on. The dah-dah-dah singing from office to office, desk to desk of many of our commercial executives will more quickly and surely catch the ear than any known sound. What is it that takes a man from a hard trick at distress signal listening, to a key that is waiting for his touch? The same thing that brings the seaman from thousands of miles inland to hear the lapping of ocean waves.

* * *

A new radio tube, more sensitive than the last. Then another and another until the perfection of the first is slowly faded in the background. A transmitter that covers a range never known before, then a better, and again another that makes the original seem antiquated. A device that produces a finer recording, a more efficient range. Another that will receive and reproduce that which is produced. Always more to conquer. What art is this that moves so rapidly, yet does not seem to get so far? It is the art that carries men farther than the needs appear to require. Not the perfection of the old, but the production of the new.

* * *

How fast? How true? No it is not enough. It must be faster. It must be more true. Who shall do it? No, what shall do it? But, who will make what shall do it? The human element of radio. Faster, finer, better, the art ahead of its time. Those who linger may be repaid, but those who fly shall be ahead. Sound, time, space, the conquest of what is before for those who have started at the beginning.

DO YOU KNOW THAT?---

Radio Meteorographs

The newest devices for bringing down to earth information on atmospheric conditions high above the clouds are radio meteorographs. Several of these instruments have been calibrated and sent to Alaska by the Weather Bureau to be used in obtaining facts for the second international polar year which started last August 1st. These novel instruments consist of automatic temperature and pressure recording devices and compact radio sending apparatus. Attached to a weather balloon such an instrument can be released at any desired point. As it rises the changes in barometric pressure and in temperature cause a metal finger to move across various contact points, thus transmitting radio signals. The observer on the ground picks up these signals on a receiving set. From previous calibrations of the instrument he can determine the corresponding temperatures and heights.

To Chart Pacific

Robert Johnson, Chicago geologist, is organizing an expedition to chart or map the floor of the Pacific Ocean. The latest supersonic equipment for making soundings in the ocean will be used. Very little of the floor of the Pacific, the biggest ocean, has been charted. Information about the ups and downs in the be of inestimable value in making possible the floor of this great pond, scientists believe, will charting of the earth's geologic future.

Submarine Float Signal

While we hear little about it the search for apparatus to improve submarines and to make escape from such craft when crippled more certain goes merrily on. The latest device to aid the crews of sunken submarines has been perfected by F. Kaspar, a Czechoslovakian engineer. It is a long float arrangement containing 64 rockets. This float is fastened to the outside deck of the sub. In case of an accident and the craft cannot come to the surface the float can be released from the inside of the boat. Upon being released it rises to the surface where it remains attached to the submarine by means of a steel cable which contains a telephone connection. Once it reaches the surface this new life-saver float fires one of its rockets automatically every 30 minutes over a period of 32 hours.

Midget Radio

Officials of the Department of Commerce report favorably on experiments conducted with a new and extremely lightweight, portable, high frequency radio transmitter and receiver. The tiny, but efficient, midget radio set weighs only eight pounds without batteries and twenty pounds with batteries. Thus it can readily be carried by the operator. It operates on 56,000 kilocycles or five meters.

Tubeless Radio

We wonder what became of Ernest Patrick, the boy inventor from the Kentucky mountains, who startled radio circles the past year when he announced his invention of a tubeless radio. His sensational invention, so he claimed, is an all electric, alternating current set that operates without a single vacuum tube. Frequently called "the Boy Edison," young Patrick claimed his is the "first tubeless radio." And here's what he claimed for his novel set; lower initial and operation costs, less static, smoother, mellower and more vibrant tones, and that it will last a lifetime.

Fathometer for Ships

Dr. Herbert Grove of the Survey Bureau of our coast and geodetic survey has perfected a new "fathometer" or automatic depth finder for ships that takes soundings at the rate of four per second while the vessel proceeds at full speed. Thus skippers are being constantly advised of the depth of water and can avoid hidden shoals. Tests show it will be of great value in preventing grounding of ships in fogs.

Automatic SOS Signals

German shipping circles are said to be all agog over a new automatic radio apparatus for sending SOS signals. According to the report made public by the department of commerce the new apparatus not only sends out the SOS signals but gives the position and name of the ship as well, all without the aid of a wireless operator. It was designed especially for craft not equipped with wireless, and the current is supplied by a hand driven dynamo.

Acoustic Meter

The rate at which sound dies out in a room or its rate of decay, is most important in measuring the sound absorption of materials designed to correct acoustical defects in auditoriums, theatres and other places of assembly or entertainment. The Bureau of Standards has developed a new automatic reverberation meter for measuring such sound absorption. During the past several years four different electrical recording methods for measuring the rate of decay of sound have been used at the bureau. The latest and most effective of these methods are almost entirely automatic.

Messages by Television

In demonstrations of a new method of transmitting messages by television before the British Association of Scientists at York, England, Marconi research engineers caused messages to appear on a large screen at the rate of 129 words a minute. They said their apparatus was capable of sending messages a distance of more than 11,000 miles. The invention is the outcome of two years of experimenting under the supervision of Marconi. They used a transmitter similar to those used on teleprinters. Messages on a tape were passed through a television apparatus and were instantly readable on a number of receiving screens.

Sea Full of Germs

Don't let this discourage you from a seagoing career, but, according to the annual report of the committee on submarine configuration and oceanic circulation of the National Research Council, the sea is literally alive with invisible organisms, bacteria, germs or whatyoucallthem, and tests made of the coast of Massachusetts, of all places, showed a maximum of 500,000 organisms to the cubic centimeter (.061 cubic inch) of water while the minimum was 60,000. The mud at the bottom of the sea was found to contain some 470,000 bacteria per cubic centimeter. Similar studies made on the Pacific coast and reported by the University of California give practically the same results.

New Invention

A mirror for ship staterooms that gives a healthy sunburned appearance to the most pallid complexion has been put on the market recently.

Wonder Who Paid

The country's major radio systems collected at the rate of $16,000 an hour from political speechmakers for the use of nationwide hookups during the recent presidential campaign.

A LOW-POWER BROADCAST TRANSMITTER

By A. W. KISHPAUGH

Bell Laboratories

At the beginning of the third decade of this century, radio broadcasting stations were not only few and far between, they were of comparatively small power as well. They represented but the initial efforts of a youthful industry. To compensate for what the broadcasting stations lacked in power, the enthusiastic and rapidly increasing army of radio listeners were constantly seeking higher power receivers to enable them to pick up stations at greater and greater distances from their immediate vicinities. Now, some half score or dozen of years later, when stations rated from five to fifty kilowatts are commonplace, there is a natural tendency to underrate the effectiveness of the smaller stations. When fully considered, however, these smaller stations are found to be capable of rendering very substantial service in the fields for which they are adapted. Many programs have only a local or community interest and are well served by a low-power and thus less expensive transmitter. In addition to this field for them, however, low-power transmitters, connected by Long Lines networks, may be used advantageously to broadcast to a group of small areas scattered over the country. Nearly half of the broadcast stations of the present time, a fact perhaps not generally realized, fall within the low-power class—usually defined as one kilowatt or less. There is no fundamental reason why those listening to the programs from this large group of small stations should not be entitled to receive the same high quality of transmission that is secured from the larger stations.

To make it possible for these small-power stations to broadcast programs of high quality without the burden of very expensive equipment, the Laboratories has recently developed a broadcast transmitter that covers the power range from 100 to 1,000 watts. It consists of a basic 100 watt transmitter unit and an amplifier unit of the same physical size, which may be employed to increase the output to 250, 500, or 1,000 watts. Each of these units is three feet wide, about two feet deep, and stands six and a half feet high. The enclosures are of steel, with doors that open to give access to the apparatus, and the back and sides may be easily removed if necessary. All controls are brought to the outside of the cabinet—either to a narrow transverse panel or to a vertical panel between the two upper doors—and the meters are mounted above the doors on the front.

One of the distinguishing features of these new units is that they require no batteries or rotating equipment. All power is taken directly from alternating current circuits. This arrangement attains for transmitters the many advantages in simplicity of operation secured for receivers a few years ago when they were changed from battery operation to operation entirely on alternating current.

The interiors of both units are divided into upper and lower compartments—the power supply apparatus being located in the lower, and the high frequency, in the upper. The arrangement of equipment in the 100 watt basic unit is shown in Figure 1. A quartz-controlled oscillator provides frequency stability well within the present fifty-cycle requirement with practically no maintenance. Neither thermostat nor

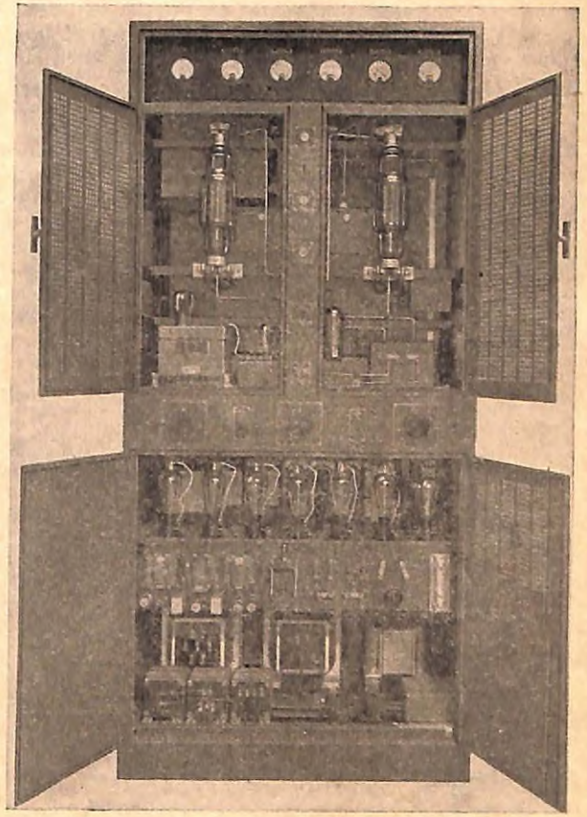


Fig. 1—Opening the doors of the 100 watt unit reveals a power supply compartment below, and a high-frequency compartment above

circuit adjustment is required of the operator, and since the crystal is not handled after calibration, the frequency control is truly automatic; the hazards of careless handling or maintenance are practically eliminated. The entire oscillator circuit is housed and calibrated as a unit, and may readily be removed from the transmitter as shown in the photograph on the title page of this issue. Current for the heater circuit, employed for maintaining the crystal at constant temperature, is obtained from a three-element gas filled tube controlled by a thermostat in its grid circuit. This method eliminates the usual relay, and reduces the current carried by the thermostat contact to a negligible amount.

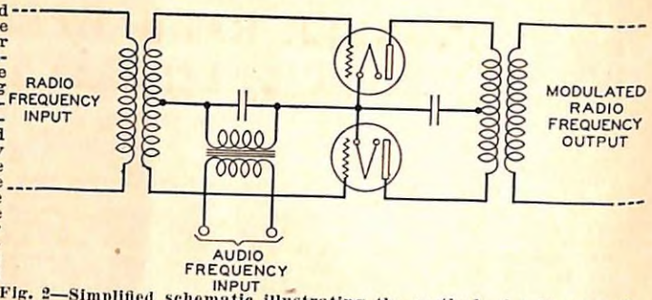


Fig. 2—Simplified schematic illustrating the method of grid-current modulation

The amplifier stage immediately following the oscillator, to which it is resistance coupled, employs the same type tube as the oscillator, and is mounted just to the right of it in the cabinet. Grid bias, obtained from a potentiometer, is always sufficient to insure that no grid current will be drawn. This potentiometer is used to adjust the output of the transmitter, which may be varied smoothly from nothing to full output by the operation of a control on the front of the panel. This stage is transformer coupled to the second stage, at the lower left corner of the upper right hand part of the cabinet, which in turn is transformer coupled to the power amplifier, consisting of two tubes arranged in a push-pull circuit.

It is in this power stage that the voice-frequency currents modulate the carrier. The method employed is known as grid-bias modulation. Although a similar scheme has been very successfully used in commercial carrier-telephone systems for a number of years, it is believed to be the first time it has been employed in a broadcasting transmitter. It has the great advantage of contributing to the simplicity and economy of operation by a reduction in the number of vacuum tubes required.

The fundamental circuit for this method of modulation is shown in Figure 2, and a simplified schematic for the high-frequency circuit of the 100 watt transmitter, in Figure 3. The grids are biased to considerably below cut-off and the radio-frequency grid voltage is applied to the two grids out of phase, as in any push-pull amplifier. Audio frequency, or modulating, voltage is applied to the two grids in parallel, effectively in series with the grid-biasing voltage. Thus the effective grid bias voltage is varied in accordance with the audio-frequency voltage, which accounts for the name "grid-bias modulation." The tubes are operated so that the relation between input and output voltage is essentially linear. Complete modulation is obtained with a carrier output of 100 watts and a peak output at full modulation of 400 watts

No speech amplifier is contained in the transmitter. The input transformer connected to the grid of the modulating amplifier is fed directly from the speech input equipment. The speech level is considerably higher than is commonly required at the input of a radio transmitter but is one that any amplifier capable of operating a loud speaker can supply.

Effective suppression of radio-frequency harmonics is obtained in the coupling circuit through which the output of the power amplifier

(Continued on Page 31)

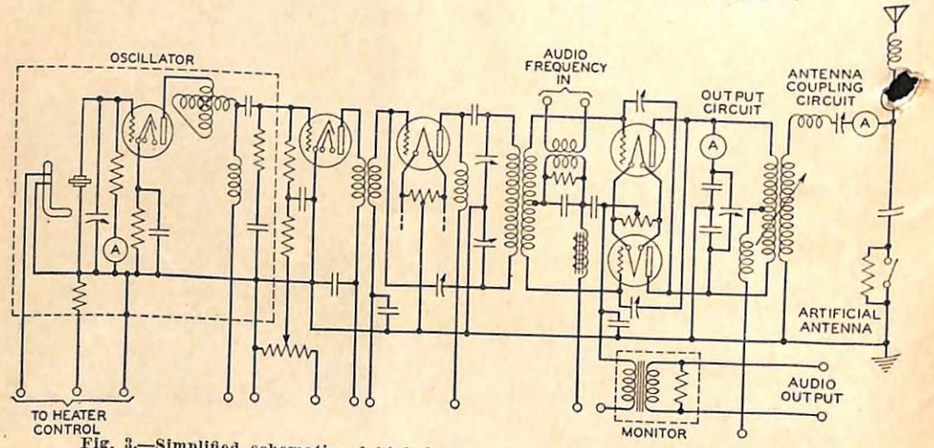


Fig. 3.—Simplified schematic of high-frequency circuit of 100 watt transmitter

PIONEER RADIO OPERATORS

By DR. LEE DE FOREST

On this second visit of inspection to Key West, in February, 1905, I pushed on further south. Crossing with Horton to Havana we first supervised the installation of the commercial wireless station at Vedado—along the northern shore west of the Malacon.

A Havana daily was desirous of selling its news service to the then almost isolated local paper at Key West, which could ill afford the press cable rates charged. Then too my company had made rapid progress in equipping coasters touching Havana, and these demanded contact. We found it no easy cinch to establish reliable communication across that ninety mile gulf. The static even in winter was frequently terrific, far worse than at Key West; and there at Havana I had the first real opportunity to test out my then newly designed "triple pancake tuner," for balancing out static. Two primary pancakes, wound of silk-insulated narrow flat ribbon, each with a separate condenser connected in phunt thereto, stood upright and opposite, in parallel planes, separated by a distance which could be varied from one to five inches. The secondary winding was of similar pancake form, its terminals connected to the detector circuit. A swinging arm, wiping over an arc on the outside face of each of the primary pancakes, permitted me to tune each primary winding separately. The antenna and earth were connected to both primary pancakes in parallel but in opposition, for "bucking out." I could thus tune each primary accurately to the desired signal, then spatially separate the two and carefully locate the secondary pancake midway between them until the signal completely disappeared. Then one of the primary contact arms was slightly moved, until the balance was very slightly upset for the slowly damped received wave train, while still remaining essentially equal for the strongly damped "jig" of the static impulse. I found this new fangled triple or balanced circuit, which my faithful assistant, C. D. Babcock, had just sent me from New York, remarkably effective for reading that high squeaky signal from Las Brisas at Key West, through static which completely swamped out all signals when the old two or three-coil slide tuner was employed. But of course the inevitable, preponderant "signal-noise" ratio intervened at times, to render all reception impossible.

Had I then properly shielded my tuner and detector, as I did later (in 1909 in the historic interference fights between United Wireless and my Radio Telephone Co. stations in New York and Philadelphia)—that Havana-Key West service, even lacking the later Audion detector and amplifier, would unquestionably have aroused world-wide comment. But, even as it was, that early balanced circuit idea was the first intelligent and practical step towards reducing static or close-up interference troubles; and was, I believe, the forerunner of all the legion of balanced or neutralizing "interference preventor" circuits which have since gummed up the archives of the patent office. And even today, with the addition of shielding, multi-stage amplification, and heterodyne reception to give the distinctive high pitched signal, I think one will find that "triple p. c." circuit a mighty neat and effective aid. However, pressing duties elsewhere prevented me from long experimenting with my "static eliminator" at Havana.

Frank Butler had gone some weeks previously from Pensacola to Guantanamo, Cuba, which the U. S. Navy had recently acquired as a Naval base and coaling station. There a lonely desolate inaccessible promontory jutting out into the giant harbor of Guantanamo was cleared of its tangled underbrush and mangrove, and there our second large wireless station was located. The site was five miles from the mouth of the Bay, for the officials wished their source of communication to remain unharmed by bombardment as long as possible. Instead of first considering its location from the point of its adaptability for wireless work, the sapient Navy officials selected it because that particular place was down on the blue-print from Washington as the spot, just as was every other building planned for the reservation. As a result a worse location could not have been chosen. The little peninsula upon which the station stood was wholly of coral formation, entirely dead as far as moisture or good ground facilities were concerned.

The weather, even at the commencement of the work, had been hot and dry, and the insects bothered the workmen to such a degree that work progressed slowly in the erection of the buildings and the installation of the apparatus. Frequently it was necessary to tie a towel around one's face, neck and head, leaving only opening to see and breathe. Wearing overalls and shirts saturated in kerosene was another expedient used to ward off the pestiferous insects.

The three 208 feet masts had been towed down from the States in sections. These masts were erected at each corner of a 300 foot equilateral triangle, with the station buildings in the center. Butler had directed that a stout cable be stretched between the tops of the three masts, and from each cable hung from individual insulators 45 stranded phosphor wires, tough and unruly as steel spring. The loose ends of these 135 wires were soldered together into a huge "rat-tail" at the centre, anchored to a timber frame, and led into the condenser room through a great porcelain mushroom insulator. Altogether the three fans held 45,000 feet of wire.

I had a tedious and painful journey across Cuba by rail, and by small steamer from Santiago to Boqueron, name of the decrepit dock and shacks serving as terminus to the narrow trail winding through the dank jungle of the wireless clearing. There Butler and his three good Navy assistants seemed overjoyed to see me; John Watts, chief electrician, from New York; Ford V. Greaves from Minneapolis, Roscoe Kent from St. Paul. In addition was a civilian electrician, McLean. All five of these lads were slated for worthwhile work in developing American wireless there and later on. One of them, Ford Greaves, is now assistant engineer for the Federal Telegraph Commission in Washington.

Notwithstanding all I had heard from my correspondence with Butler I had no conception of the horrible conditions under which these enlisted and civilian operators were pioneering in wireless in Southern Cuba. Here indeed was

a paradise for mosquitoes, fleas, horned toads, snakes, scorpions, centipedes, tarantulas, wildcats and all other kinds of tropical pests, flying and crawling. Testy Admiral Rogers, comfortably in white flannels aboard the old monitor "Amphritite" away out on Guantanamo Bay, was in command, and devil a lot did he, or his aides, give a damn for the comfort of those poor devils over in the jungle. Mosquito meshing had been requisitioned months before; and all in good time it should some day be received and finally delivered at the station. As there was no fresh water supply on account of the dead ground formation it was necessary to build a cement cistern to hold drinking water, supplied only too seldom by a Navy tug. When a wild-cat fell into this cistern and drowned it proved necessary for Butler to cable the Secretary of the Navy at Washington to secure belated action on the part of "Blinkey" Rogers' courteous and efficient staff to get the cistern pumped out, cleaned, and refilled with catless water. A cursory examination through their volumes of Navy regulations, for peace or war, had disclosed no reference whatever to govern procedure in case a wild-cat should drown in inland waters. Moreover the Naval base possessed no feline pulmotor. So, obviously, there was nothing whatever which could be done under such regrettable circumstances. Not until Secretary Taft, in Washington, instructed them. A short time afterwards a case of yellow fever broke out in the nearby laborers' camp, and Butler's three Navy companions were ordered to vacate the station and go aboard ship until the disease subsided. This inhuman action left Butler helpless and alone at the station with deadly danger imminent. Again he sought succor from the Navy Department, with instant and satisfactory results.

These latter episodes transpired after my visit to that hell-hole of wireless, March, 1905, when the weather was fine and relatively cool. But even then static was fierce, and scorpions more so. I was mighty glad to sling my hammock from the engine room rafters, using the twelve inch belt as a step-up, where only mosquitoes, gnats, and blue-bottle flies could reach me.

I had brought a set of larger triple pancakes, fine wire wound in spiral form upon three sheets of glass, to tune in the long wave signals from Key West, Porto Rico and Colon. My men there went eagerly to work with these devices whenever they were not immersed in oil and grief from the great transmitter condensers, transformers, or generator. Occasionally, for good measure, lightning would strike, and burst an entire room full of condensers—just finished after two weeks of hard work—throwing oil and plate-glass all over the room and into the walls. Then "a small cyclone; another entire span of 15,000 feet antenna wire blew down." "Touched off station again and blower-motor (for spark gap) blew up." "Herd of horses from workmen's camp broke corral at night and demolished the guy wires on the entire aerial spans, twisting wires badly." "Earthquake at 4:43 p. m." "Lightning again struck the station at 4:15 p. m., blowing up one set of condensers."

These are brief excerpts from Butler's interesting diary of those infernal days through the endless summer and autumn of 1905. "October 17, finished new ground today." "November 7, Secretary of Navy Taft visited us today." And not until November 17 do we read: "Heard Ke[y] West and Pensacola first time." "Decemb[er] 10, Key West heard us first time. Blew up blower motor." "December 15, big two-ton transformer blew up." And thus was waged the plucky battle in the face of endless delays, set-backs, discouragements, but never relenting, never quitting, through to triumph and final Navy acceptance of the station in the following March. Through such accidents as those here recounted we learned how to protect our apparatus from destructive high-frequency surges, how to design effective choke-coils, sufficient condenser capacity and strength; and the makers of our transformers and generators how to properly insulate their windings to stand up under the terrific transient voltages to which our high-power wireless transmitters subjected them.

Above the door of that Guantanamo shack was printed, even when I visited it, this legend: "Abandon hope, all ye who enter here, for verily this is hell." And in my scrapbook I find an artistically printed postcard: "GUANTANAMO BAY CUBA, (128 in the shade) is bounded on the north by 'DESPAIR'; on the east by 'MONOTONY,' on the south by 'SOLITUDE,' on the west by 'MISERY'—completely surrounded and infested by mosquitoes, sand flies, fleas, scorpions, centipedes and snakes—the place where Dante got his impression of 'hades'—no place like it on this earth.

"VIVA CUBA" (RATS)
(Signed) 73, FRA[N]

CLASS "B" AUDIO AMPLIFICATION

By E. H. RIETZKE

President, Capitol Radio Engineering Institute, Member, the Institute of Radio Engineers

Simple Definition

For simplicity we may define a Class B amplifier as one in which the tube operates under such conditions that with no signal voltage the plate current is essentially zero. This condition is reached by either of two methods; first, by using a sufficiently high negative bias voltage or second, by designing a tube in which the plate current is essentially zero at zero grid bias voltage. Either of these methods can be employed but for several reasons the latter is preferable.

Characteristic Curves of Above Operating Methods

The grid voltage plate current characteristics of two typical tubes as mentioned above are shown in Diagram 1.

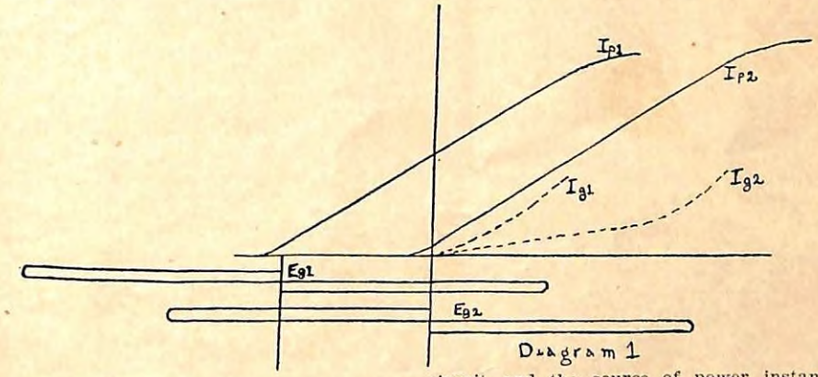


Diagram 1

Class "A" Operation

In the past it has always been customary to operate audio amplifiers as Class A or as nearly Class A as possible. When operated as Class A the tube is so biased that the signal or excitation voltage is applied in the middle of the straight portion of the E_gI_p characteristic. When working Class A we have always been told that the grid must not be permitted to swing positive or so far negative that it swings into the bend of the E_gI_p curve. (A Class A characteristic E_gI_p curve is shown in Diagram 2.) In Diagram 2 curve 1 shows the conditions as required for undistorted output—curve 2 shows the result of excessive input signal voltage in which the output curve is flattened on the bottom. We know that in a Class A amplifier condition 2 would be indicated by an increase of plate current on the peaks and, if a grid current milliammeter is used, by a flow of grid current. Both a fluctuation of plate current on the peaks in a Class A amplifier and a grid current flow indicate the introduction of distortion.

Class A and B Amplification in Broadcast Transmitters

We have seen in the development of broadcast transmitters that audio amplifier and modulator tubes have been operated Class A with signal voltages kept below the point where appreciable grid current would flow on the modulation peaks. In the same transmitter the final R. F. power amplifier will be operated as Class B with high values of peak excitation. Just what is the difference?

Class B—R.F. Flywheel Effect

In the first place the Class B R.F. amplifier delivers its power into a comparatively low resistance tuned circuit in which a "fly wheel" effect is obtained. That is, if a single pulsation of energy is transferred into the tuned circuit and the source of power instantly removed, the current in the tuned circuit will go through a number of complete cycles due to the charging and discharging of the condenser and the building up and collapsing of the inductive (magnetic) field around the coil. While the current will decrease in amplitude with each succeeding cycle, due to the circuit resistance, in the first cycle the amplitude of the second alternation will be practically equal to the amplitude of the first alternation. If the tube now delivers the power in pulses, one pulsation each cycle from the tube, as from a Class B amplifier biased to the cut-off point, the current amplitudes in the tuned circuit will be essentially the same as if both alternations were supplied by the tube and no distortion will be introduced from this source. This flywheel effect is not present in the audio amplifier because the power is not delivered into a tuned low loss circuit.

In R.F. Class B Amplifier Intelligence Contained in Modulation Envelope

In the Class B R.F. amplifier the intelligence

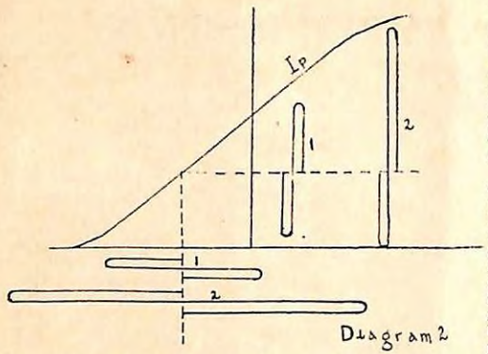


Diagram 2

is contained entirely in the modulation envelope. While the R.F. component of plate current falls to zero during each cycle the audio component on low audio amplitudes varies around a comparatively high value of plate current and does not swing into the curved portion of the characteristic except at very high values of modulation percentage. However when 100 per cent modulation is approached the AUDIO component swings into the curved portion of the characteristic and distortion is introduced. This distortion manifests itself in the form of harmonics, the strongest harmonic being the second or double the audio frequency. It will be seen that very little distortion will be introduced by the curvature of the E_gI_p characteristic until the percentage of modulation becomes high. With high percentage modulation it is desirable to employ a push-pull power stage (sometimes called "push-push") when operating Class B because in such an amplifier the second and all even harmonics are suppressed.

No R.F. Carrier or Flywheel Effect in Audio Class B Amplifier: Two Tubes Needed

In a Class B audio amplifier the flywheel effect is not present to supply the second alternation in the output for the initial and following cycles of signal input voltage. Also there is no R.F. carrier to place the modulation envelope up into the straight portion of the E_gI_p characteristic. Thus with a Class B audio amplifier the normal signal voltages take place around the lower portion of the E_gI_p curve and, even if the tube design and operating conditions can keep the characteristic straight on all positive excitation values beyond the operating point, the current through the winding of the output transformer can only follow the input voltage on the positive half of each cycle, the negative alternation being very greatly distorted in the load circuit, usually a reproducer voice coil.

For that reason when operating Class B at audio frequencies it is necessary to employ two tubes in a push pull (push push if you prefer that term) circuit, each alternation of the input load cycle being supplied to the load by the output of one tube. Diagram 3 shows the combined characteristic curves for such a circuit, (a) being the curve for the tubes operating with a high cut-off bias, (b) illustrating the use of tubes which operate as Class B with zero grid bias.

Difference in Operating Conditions

As far as the actual A. C. components of voltage and current are concerned 3(a) and 3(b) represent identical operating conditions. However in 3(a) each tube operates near cut-off by means of a high negative bias; 3(b) operates near cut-off without a bias. From the standpoint of simplicity the arrangement of 3(b) is much to be preferred. There are other advantages for this method of operation more important than that of simplicity as we shall see.

At this time we should also note that as long as the tube characteristics are identical and the curved portions near cut-off follow the square law, the mean plate current will be in the form of a straight line even through the curved portions of the characteristics, the even harmonics generated in each tube being exactly cancelled in the output. If the tube characteristics and operating conditions are not symmetrical the even harmonic distortion will not be completely cancelled out and some will be present in the output load or reproducer. It can thus be seen that it is essential that the tubes be well matched for this work.

Why Is Grid Current Such a Distortion Factor.

Referring back to the Class A amplifier we find that one of the most important points to observe in the adjustment for minimum distortion is to keep the excitation amplitudes below the value where appreciable grid current will flow. Just what is the effect of grid current flow on the distortion factor—why is this point so strongly stressed? A grid current flow can cause distortion in an amplifier in several ways. First, if the excitation voltage is too high the

(Continued on Page 29)

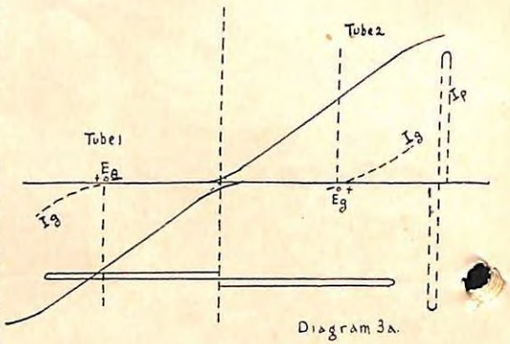


Diagram 3a.

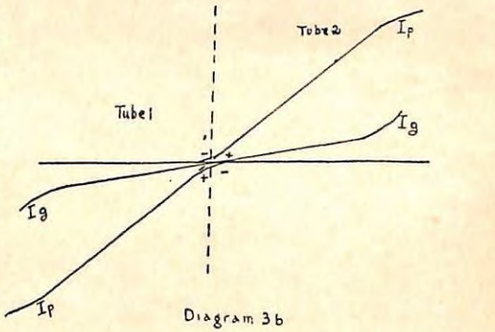


Diagram 3b

SOME INTERESTING CHARACTERISTICS OF ULTRA SHORT WAVES

By B. TREVOR* and P. S. CARTER*

The radio waves which are used at the present time, especially for long distance communication, are generally propagated by reflection or refraction from the Heaviside layer. Wavelengths below 10 meters however, generally penetrate the Heaviside layer and do not return to earth. Consequently, at distances much beyond optical vision, the attenuation is very high, tending to limit these waves to short distances for direct transmission.

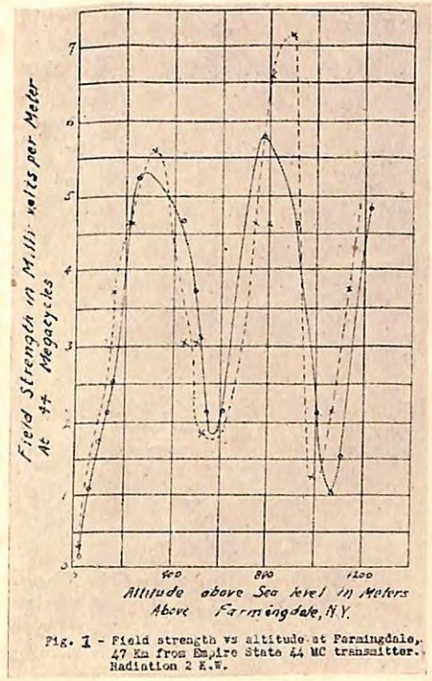


Fig. 1 - Field strength vs altitude at Farmingdale, 47 Km from Empire State 44 MC transmitter. Radiation 2 K.W.

The behavior of ultra short waves is very similar to that of light waves. They are reflected from ground and other conducting and non-conducting surfaces. When reflection takes place the angle of incidence is equal to the angle of reflection, corresponding to the well known law of optics. The current set up in a receiving antenna is the result of two rays, one following the direct path and the second, an indirect path, the indirect ray being reflected from ground. At small angles to the horizon the polarity of a wave is reversed upon reflection so that the reflected ray tends to cancel the direct ray and results in a low field strength at the receiver. By increasing the height of the receiving antenna the difference in the length of paths of the direct and reflected rays is increased. This results in sufficient phase difference to cause a reinforcement of the received field strength. The signal becomes a maximum when the difference in the two paths becomes equal to a half wave length. Further increase in altitude of the receiving antenna gives a further change in the phase of the reflected ray and cancellation occurs again when the length of path of the reflected ray differs from the path of the direct ray by a full wave length. This phenomenon of cancellation and reinforcement continues as the altitude is increased.

A large number of observations of field intensity have been made. The range of wave lengths from 10 meters down to 60 centimeters has been studied. Very high and very low antennas, oriented both horizontally and vertically, as well as antennas of moderate heights were used. Measurements in an automobile and in an airplane were made over Long Island. Measurements were also made both in a boat and in an airplane over salt water.

Figure 1 shows the variation in field strength with height taken over Farmingdale, Long Island, from a transmitter located at the top of the tower of the Empire State Building. This

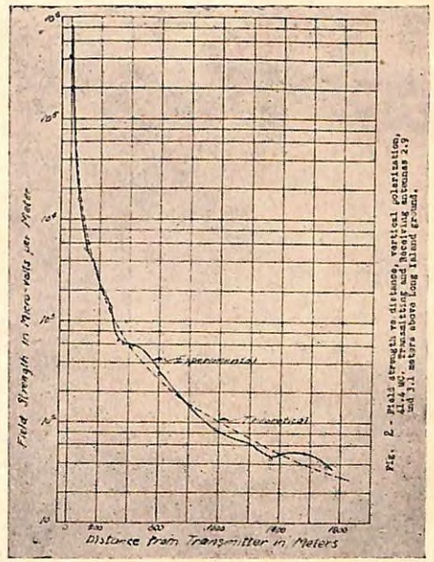


Fig. 2 - Field strength vs distance, vertical polarization, 44 Mc transmitting and receiving antennas 2.9 and 31 meters above local ground.

*R. C. A. Communications, Inc.

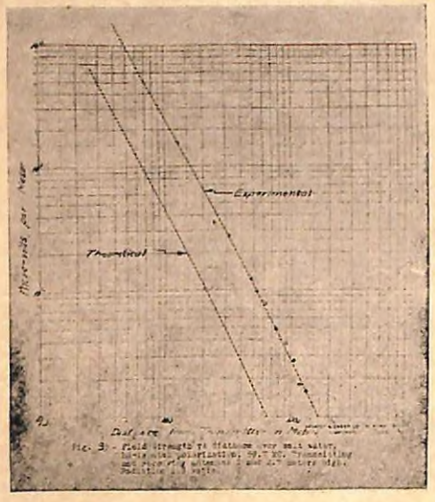
antenna radiated a vertically polarized wave at 44 megacycles. This curve shows very well the regular succession of maximums and minimums in the field strength. Theoretical calculations have shown that these measured maximums and minimums occur when the differences in the lengths of paths between the direct and reflected rays, as computed for this particular distance from the Empire State Building, are multiples of a half wave length. This curve plainly shows the advantage gained by having the receiving antenna located as high as possible. This is generally the case with ultra short wave reception.

Both theory and measurement show the field strength for ordinary heights of receiving antenna to fall off as the inverse square of the distance. Figure 2 is a curve showing the variation of signal strength with distance over Long Island soil for a frequency of 41.4 megacycles. In these tests the height of both receiving and transmitting antennas was 3 meters and they were oriented vertically. The dotted curve shows the theoretical square law relation. Curves taken for horizontal antennas are very similar. The signal strength from a vertical antenna is superior to that from a horizontal one when the height is not great.

The observations over salt water show a striking difference between vertically and horizontally polarized waves with low antennas. Figure 3 shows the way in which the field strength falls off with distance for horizontal polarization while Figure 4 is a similar curve for vertical polarization. The great difference in the signal strength at equal distances will be noted. At 1 kilometer the ratio is about 200 to 1 in favor of vertical polarization. The efficiency of reflection for horizontal polarization is extremely high from salt water. This results in almost perfect cancellation at low reflection angles. For vertical polarization the reflection is somewhat poorer, giving less perfect cancellation, which results in a very much higher field strength. Other measurements over salt water confirm the superiority of the vertically polarized waves.

The large number of measurements made with various wave lengths show the waves around 5 meters to be very much inferior to those around 10 for short distance point to point signaling. Trees, buildings, brush and other obstacles cause very much more absorption of waves in the vicinity of 5 meters than of waves in the vicinity of 10. For this reason the amateur 10 meter band will be found to give results on phone, as well as CW, superior to the 5 meter band. Also, existing tubes will deliver more power on the longer wave lengths and the difficulties of manipulation are greatly reduced.

Low power transmitters radiating from highly directive beam antennas have been used for observations on a wave length of 66 CM to determine propagation characteristics of these extremely short waves. The most striking phenomenon observed was the tendency of this radiation to more closely approach the characteristics of light. No signals could be heard behind hills or with large obstructions in the immediate vicinity of the receiver. However, reception in an airplane was accomplished up to 110 KM.



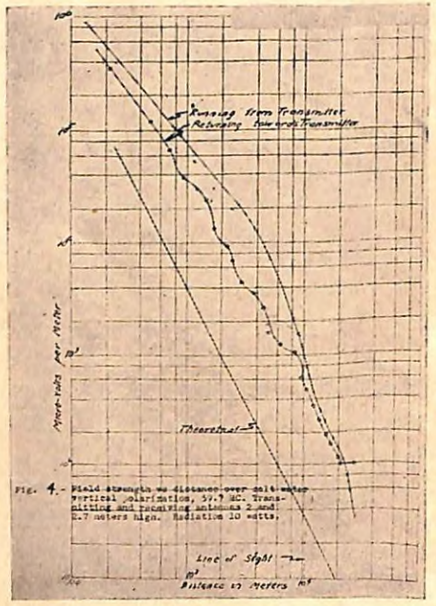


Fig. 4.- Field strength vs distance over salt water vertical polarization, 57.7 MC. Transmitting and receiving antennas 2 and 2.7 meters high. Radiation 10 watts.

Sidney Miller, three years at WWNC, the champ stamp collector and ladies killer, would like to enter into the new spirit of barter and swap either one of his collections for some other operator's collections. He wants new stamps though, for old ladies as he thinks their values are reversed by time.

R. W. Mathewson, who used to handle the Edison Company's portable transmitter WTAT, is chief engineer now at WEEI.

W6XS, the Don Lee television station at Los Angeles, is now on the air every evening between 6:00 and 7:00, the first regular schedule of television for the West. Good luck, W6XS.

Tales of the Old Timer

MUTINY

By WILLARD BLISS

"And then there's mutiny," said the Old Timer, as he dallied over his cup of coffee and another cigarette of the Young Romantic, who sat across the table from him.

"This also happened on that little packet I was telling you about. Boy, there was more trouble happening on that little ballyhoo in a few minutes, than you will ever see happen on a proud trans-Atlantic liner in a year.

"This skipper of ours—as I may have mentioned—was a peppery-tempered, little cuss. Well . . . one night as we were rolling and pitching about, we who were off watch were in the captain's room as usual, keeping ourselves dry and having a smoke. This night we had had something warm to eat after days of cold canned grub. We were sitting contentedly on the deck, not saying much of anything, just content to be alive and resting after one of our usual strenuous days and possibly another strenuous night ahead of us. The skipper, he wasn't with us, as he had the watch on the bridge. You see we only carried the captain and two mates, so that meant that the captain had to stand his own watch, which in this case was the four to eight a. m. and p. m.

"It was the same way in the engine room where we carried the chief engineer and two assistants, so that meant the chief had to stand a watch the same as the captain did. We had just a bare crew to work the little ship. She only needed a small crew anyhow, but we were at the minimum. Let me see . . . besides them I have named, there was myself, a donkey-man, who worked at anything, a supercargo, and yes, even a passenger. These were the white men on board. The rest of the crew was Chinese. We had Chinese below in the engine room, Chinese on deck and Chinese in the galley. I forget now, just how many Chinese we did have in the crew, but I do remember that they outnumbered us by at least two to one.

"The Chinese were bunked forward in a fo'c's'le that was a sweet-smelling place. It was a regular Chinese flop-house. Besides the smells of unwashed men living together in close quarters, there was the sweet-sickening smell of opium. As I may have mentioned, this ship was run rather freely and go-as-you-please, so that the Chinese were allowed to have their little habits, the same as anyone else on board. They made full use of this **laissez-faire,** instead of the usual strict ship discipline, and the opium-pipe seemed to be in use by one or another of the Chinese most of the time.

"Whenever a Chinese was off watch—at a good guess—it could be said that he was below in the fo'c's'le hitting the pipe. And who were we to say them nay, in their pleasant habit. For life was damn hard on that rip-snorting, pitching, rolling ballyhoo of a packet, and if the Chinese could find any consolation and release in the pipe, well . . . that was their privilege. Sometimes in the cabin we would get a whiff of the cloying, sickish smell of opium, burning in a pipe. I guess there were some of us—during the hard times aboard that ship—who sort of wished we could go hit the pipe ourselves and forget all about our hardships. Well . . . we had our own release at that, for it was opium with the Chinese and it was hard liquor with the whites.

"And this night was a night when one wanted solace and relief from the driving hardship of the sea. Outside the wind was driving snow and rain at us. One of those miserable North Atlantic nights when the cold seemed to creep into the room itself and grip hold of a man. As you walked along the deck, you sheltered your face behind an upflung arm to ward off the stinging hail, that the wind threw at you. When a man came inside from the stinging wet, you could see that his face was all red. Partly because of the cold, of course, but mostly so because of the whipping his face had taken from the bitterly driven sleet.

"The captain was on the bridge, trying to keep a watch in this smother of snow, hail and rain. He had a China boy at the wheel, with another boy at lookout. Usually on a bad night of this kind, the captain would have had the boy on the bridge with him to keep lookout. This night with the weather as thick as it was, the captain had ordered the boy to keep watch on the fo'c's'le head. Kind of hard for the Chinese—I know—but the skipper, worried as he was, could not stop to think of a man's comfort. The captain himself was exposed to the weather the same as the Chinese was. Instead of taking refuge in the wheel-house from the weather, the captain was standing in the wing of the bridge; peering vainly through the smother; trying to see the lights of any oncoming ships.

"As you may or may not know—it is the custom at sea for the forward lookout to ring the bell on the fo'c's'le head, in response to the bridge bells, at half-hourly intervals and to report that the lights of the ship are burning or are not burning. This is not only a check on the green and red running lights, and the masthead lights, but also a check on the man himself to see if he is awake and keeping a good watch.

"Well . . . it seems that a half-hour bell period had passed and the captain had not heard the lookout strike the bells or call back to the bridge. The captain thought that perhaps the sound of the bell or the man's shout had been lost in the wind, so he let it pass at that time. But as the half hour passed along, it continued to worry him more and more. We were taking seas aboard as usual and though the seas were coming aboard abaft the fo'c's'le and the captain could not remember a sea washing over the fo'c's'le head, yet it was in his thoughts, that the man might have been washed overboard. The captain knew that a man overboard in this kind of weather stood never a chance of being found on a night like this, and yet an attempt would have to be made. The ship would have to try and turn around in the high-running seas, which maneuver would play hell with us.

"So as the half hour went along the skipper's nerves became tense and he damned himself

for not immediately finding out whether or not his man was still on the fo'c's'le head. Impatiently he waited for the next striking of the bells. He went inside of the wheel-house to check on the time and found it lacked only a minute of the half hour. He dashed outside on the wing of the bridge again. He turned his head and listened intently for the answer from the fo'c's'le head as the man inside at the wheel struck the half-hour bells. Vainly he listened—for there was no answer from forward.

"The captain ran into the wheel-house and pulled the man away from the wheel. He shouted to the Chinese to go forward and see if the lookout was all right. The man left the wheel-house and scurried forward. Halfway up the deck the captain lost sight of him in the smother of snow. Left alone on the ship's bridge, the captain tried to steer the ship, to keep her on the course. This was difficult to do with the ship thrown about as she was.

"He struggled with the wheel and the ship and his temper. For now the minutes were passing and the man he had sent forward had not returned. The captain knew that this man was safe, for the ship had not taken a big sea while he was going forward. And yet, no word from the damned Chinese. Where the hell is he? What the hell's the matter with these men? Do I have to go forward and see for myself what's up?

"His temper rising rapidly, the captain was now ready to hit out in his anger at someone, at something. His rage got the better of his good sense. He lashed the wheel in beckets, left the wheel-house and ran forward. He threw open the door to the crew's fo'c's'le; let it slam to and fro behind him; plunged down the steps. He stumbled on the last few steps and fell to the fo'c's'le deck. He bounded to his feet and took in the scene around him. In the murky light cast by the single oil lamp overhead he saw the Chinese lying in their bunks, looking at him with mild curiosity. In angry astonishment the captain saw the two men, who were supposed to be keeping watch with him. The man, who was supposed to be on the fo'c's'le head keeping lookout, was in his bunk drawing on an opium pipe, while the man supposed to be at the wheel was tending the pill.

"The captain plunged toward the two men, grasped each of them by the slack of their blue, coolie blouses. He heaved them both to their feet. Crazily angry he struck at them. Kicked and punched them. The other Chinese in the fo'c's'le rolled out of their bunks and joined in the fight. The captain was having a desperate time of it now. He fought savagely back in defense, trying to keep his feet. Not to go down beneath these maddened men. To go down was death and well he knew it. Biting and tearing, kicking and hitting, he strove to keep his feet. He fought himself free and grasping his whistle, blew shrilly, desperately on it.

"It was the sound of the whistle that summoned us. That, with the noise of the desperate fight which had drifted back to us. Discomfited by the heavy rolling of the unguided ship, which had swung off her course and was now in the trough of the sea, we had sprung to our feet, troubled. The noise of the fight and then that whistle calling us, galvanized us into action. Snatching revolvers from a chest, we ran forward.

"The iron door of the fo'c's'le was clanging back and forth as the ship rolled. Not stopping to fasten the door, we ran down the steps into the fo'c's'le. We plunged into the fighting group. We laid about us with fist and gun. Mercilessly, we hammered the Chinese into submission. They took refuge behind bunks, rolled under bunks, tried to get anywhere, anywhere away from these savagely fighting white men.

"With some sort of order restored, we took stock of our captain. That little pint of dynamite stood there swaying on his feet, breathing heavily, clothing torn but otherwise apparently unhurt. We gathered around him, questioned him as to what this fracas was all about. He told us of the men and what they had done. We were properly angry at the men's wrongdoing and were starting to punish them further, when he called us back. 'No, let them alone,' said the Captain, 'but do bring out that man who bit me. I'm sure it was the man on wheel.'

"The captain showed us his hand from which the blood was dripping. One finger of this hand had been gnawed by sharp teeth, the flesh stripped away from the bone. We hauled the man, who was supposed to be at the wheel, from beneath a bunk where he had taken refuge. We stood him up in front of the captain. 'Yeah, that's him. That's the boy who bit me.'

"'Me, Cappy?' said the Chinese. 'Me bite captain? Oh! no, me no bite the captain.' In hurt astonishment at such injustice the Chinese went on to explain. 'Me no bite, no, no bite. The captain he run here, he pull me and other man from bunk. He hit me, me. He hit other men. He hit lot other men. He hit everybody. Everybody try run away from captain. I try to run away. I have my mouth open. Try to tell captain stop. Captain he push his finger in my mouth. Me excited. I close my mouth. Captain he pull his finger out. Oh! no, I no bite captain.'

"We laughed at this explanation. Good humor restored, we trooped out of the fo'c's'le, back to the cabin."

SOME LATE NEWS

Don C. Wallace who won the 1932 Hoover Cup, is publishing a short wave manual. Best of luck, Don, we hope the book sells well and will tell any reader where to get it if we hear from them.

The Candler System Co. have a complete time schedule worked out for practice work. The complete schedule with time, station and frequency they send to students who want actual practice on the air for reception.

William Evans Rush has been transferred to Radio Central, Washington, D. C., from the U. S. S. Nakomis.

J. L. Gallagher, formerly of U.S.S. S-13 has been transferred to NAA, Arlington.

Harry D. Roberts is on the U.S.S. Thrush at Pearl Harbor, T. H. He formerly was on the U.S.S. Medusa.

O. L. Bramlett, formerly of U.S.S. Wyoming, is now at Radio Central, Washington, D. C.

Sun Oil Co. owns 15 vessels, 8 are equipped with RCA type ET-3626-C transmitters, 7 with ET-3628 type. All have IP-501-A receivers with exception of one. They still pay $100 a month to ship operators with no present indication of a cut, with no extra duties for the men. Pure Oil Co. pays $105 a month now.

R. G. Martin, manager of KUP, promises us something good in the way of editorial material on his station. O. K. . . . R. G., send it along and be sure it is good.

Keith Singer, Box 23, Cresson, Pa., says "Would like to hear from operator on the Munami which came to assistance of the tanker 'S. C. T. Todd' and the 'San Juan' in 1929." Keith is in the Airway service now.

The British Association and the International Federation

By A. CRISP
Editor of the Official Organ, "The Signal"

During the late summer I had the pleasure of a personal call from your Mr. K. Baarslag when he asked me if, in order to assist our American colleagues, I would write for publication in "CQ," a brief history of the British Association (A. W. C. T.) and the International Federation (I. F. R.) their activities, how they function, and the means they adopt to maintain standards. To be very brief then the British Association (A. W. C. T.) was formed in 1912, the pioneers taking a small office in Liverpool (one of our chief seaports) whence they appealed to all British Marine wireless operators pointing out the great necessity for a properly established organization in order to protect their collective interests—the task of getting all British Marine wireless operators into the organization was a very formidable one but the pioneers directed by our executive committee composed exclusively of men on the job, pursued their course with determination and gradually they were able to establish offices at all the chief seaports in the United Kingdom, eventually transferring their headquarters to London (the capital).

Once organized, the next task of the British Marine wireless operators was to secure "recognition" as a properly constituted medium of negotiation on behalf of all British Marine wireless operators—they approached first the wireless companies, then the shipping companies and finally the interested government departments—the post office, who issue the certificates, and the board of trade, and in each case they were ultimately successful in their representations in securing official "recognition."

This "recognition" is jealously guarded and efforts to at all times maintain a very high standard of representation—the A. W. C. T. is ever striving for a solid one hundred per cent membership—is the constant concern of those directing the activities of the British Association. Needless to say our task in this direction is much heavier in times of economic depression, nevertheless, the British Association pursues its course undaunted firmly believing that the best means of protecting the interests of all British Marine wireless operators is collective bargaining and complete unity of purpose, as represented by a one hundred per cent membership.

It would create a false impression amongst our American colleagues were I to fail to record that during its twenty years of existence the maintenance of the British organization has not been solely due to the patience, tact and diplomacy of its executive and officials—tact and diplomacy are very essential in maintaining an organization, but in our experience there have been on several occasions times when the adamant attitude of those with whom we seek to co-operate—the employers—has been such as to ignore our tact and diplomacy and to wear away our patience. As a result we have been compelled, in order to maintain our dignity and independence, to advise our members to withhold their services. The effect of such of these actions as we have been forced into—not being of our seeking—has usually been salutary; yet the prevailing economic, industrial and political circumstances have had their influence upon the results achieved for our members.

Nevertheless, the British Association, whilst striving for the betterment of the pay and conditions of service for its members, retains its patience and will at all times uphold its independence.

The present executive committee of the British Association is composed of not more than 12 sea-going wireless operators, who control, absolutely, the policy pursued by the association leaving the routine work to officials at headquarters and at the various branches.

It should be known by our American colleagues that British shipping and Marine wireless are strictly governed by acts of Parliament and so far as the routine work of the British Association is concerned it is the duty of the officials of the association to be ever watchful and to see to it that those acts of Parliament are properly observed. Where this is not the case, it is our experience that an official intimation from this organization to the government department concerned is sufficient to put the matter right. Then, of course, we have a specific agreement with the employers concerned and it is also the duty of the officials of this organization to secure a strict observance of all the clauses of that agreement.

The foregoing will I hope be sufficient to convey, very briefly, the establishment and activities of the British Association, of its functions and the means we adopt to maintain standards—a very onerous task in these hard times of deep depression in the world's trade and its consequent repercussions upon the shipping industry in particular.

And now we come to the international organization, the International Federation of Radiotelegraphists ("I. F. R.").

The British Association has ever been alive to the fact that the protection of the interests of its members could not be exclusively dealt with within the boundaries of the British Isles for it must be perfectly plain to the least intelligent, that if employers in other countries were in a position to impose upon their Marine wireless operators' pay and conditions of service which were in comparison lower than those enjoyed by our members, then such a position must inevitably react to their detriment and undermine the efforts and activities of the British Association. Therefore, in 1921 the British Association made overtures to the various Marine wireless operators' organizations in other countries in order to discover whether or not a common ground of collective activity could be found. The response to these overtures was indeed very encouraging and the International Federation of Radiotelegraphists was officially established in June, 1922. The purpose of the I. F. R. is to secure by international agreement the highest degree of efficiency in Marine wireless the world over in order, so far as is humanly possible, to safeguard life and property

(Continued on Page 32)

CORRESPONDENCE SECTION

LETTERS TO THE EDITOR

Editor, CQ:

Where is Television today? We have all been hearing of it for several years. Is it practical?

Will you enlighten me on this subject? It is possible that others of your readers may be interested also in this subject.

Respectfully yours,

F. B. H.

Dear F. B. H.:

Your first inquiry, "Where Is Television Today?" is a good starter. Some say the Federal Radio Commission have it down in their offices and won't let it come out.

There may be grounds for this point, . . . we do not know. One thing is certain, and that is if in 1916 Lee de Forest had to apply for a license the report would have read something like this:

"Lee de Forest is a citizen of the United States, and a resident of New York City. He is an experimenter and has been engaged in wireless experimental work for about 15 years. His income appears to be from his own testimony about $2,000 a year. His net worth appears to be about $500 and a lot of spare parts. He is a member of the XYZ Radio Club, but not a member of the National Guard. He has a good reputation among his friends, but it is also shown that everyone is not his friend. The evidence indicates he has had no experience in broadcasting, (for that matter no one else has)."

Conclusions

1. If this license was issued only a few young experimenters will be able to hear the election returns, or the phonograph music to be broadcast.

2. The station will not be self supporting as there is little advertising in prospect, never having been tried.

3. It is necessary to wear headphones when listening and therefore very uncomfortable. Few people are likely to try. The Wright Brothers should never have been allowed to endanger their lives in trying to fly, the developments of Thos. A. Edison should be curtailed, and the fact that Robert Fulton had little paid traffic on his first trip proves the folly of it.

Order

That the application be denied as it does not appear that public interest, convenience, or necessity would be served by granting of the application. There is not enough clear channels anyway, to wit:

Zone 1 State	Total Due	Assign	Quota Due +Units	+%
N. Y.	22.0Q	21.0Z	—0.0Y	—W.0
N. J.	1Q.GU	1P.IA	+1.03	+0.2
Mass.	17.T1	17.P1	—0.11	—L.5
Conn.				
R. I.	(Senator from R. I. not in lately.)			
Pa.	5.13	2.06	+3.07	+ .9
Total	W.0W	00.P0	U.HH	U.MM

But to get back to our story, if you were to make a trip to Washington in the interests of a television broadcasting transmitter it is very certain that you would be informed down there that it is not practical. Some of the radio commissioners have made public addresses saying so. Many small fry have tried to get a license, promising to stay within a certain frequency, but it has not worked. The large fry are not interested to a great extent in making it practical until they can see how they will be paid for it. The large fry are carefully guarding what they may have in the laboratories, and the small fry is forced to guard what he has as he cannot demonstrate anyway. It is nothing unusual for corporations to keep a development in their files until it is "commercially wise" to release it. Few things are brought to perfection until actually put into general use. So draw your own conclusions.

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"The Strangest Things Do Happen"

(Last month we published an article by Ray D. Owe which was an indictment on HOME STUDY schools in general. We are proud to say that Mr. Rietzke's school is one that lives up to all its claims and makes no rash promises of lucrative positions after graduation. Mr. Rietzke should know, however, that the article would not be construed as a criticism of his institution as we have repeatedly rendered it loud acclaim as being unique in its class.)

"Of course to anyone who follows school advertising there is no question as to the school referred to," says E. H. Rietzke, president of the Capitol Radio Institute, in a letter to the editor. "At the same time we must protest emphatically against any editorial policy that hits all schools indiscriminately."

AIRWAY NEWS

Aircraft companies' names and addresses can be had from the U. S. Department of Commerce, Aeronautics Bulletin No. 3. The U. S. Government Printing Office, Washington, D. C. furnish this bulletin free. Ask for Aeronautics Trade Directory.

Henry Hollinger, who gave us the good story in Nov.-Dec. issue entitled the U. S. Air Service, thinks we should have more news from the airways. We agree with you, Henry, so if the boys will write in we'll do our part.

James E. Doran is now at Northwest Airways Radio Station, Pembina, No. Dak., which is an international airport of entry from Canada. What about it, Jim, any smuggling going on lately?

WSM, Nashville, Tenn., now claims the tallest radio tower in America. It is 878 feet high. J. H. DeWitt, Jr., is chief engineer at WSM.

Too bad something can't be done about the men that keep threatening to quit the marine game. Guess they need a short stay on the beach . . . and then wouldn't they be glad to get a deck under their feet again!

Radio-Keith-Orpheum Corporation Feels the Depression

Left to right: Arthur Woods, President of Rockefeller Center, Inc., David Sarnoff, of Radio Corporation, Hiram Brown, and Merlin H. Aylesworth shown signing contracts for space for their respective firms in Rockefeller Center.

In January the Radio-Keith-Orpheum Corporation was forced to go into receivership. This happened when the corporation was under attack as being mismanaged. Proceedings were started in Baltimore, Md. by two stockholders who complained of the exchange of stock plan with the Radio Corporation.

It follows many setbacks which the Radio-Keith Corporation has had since the entry into the field and stock interest of the Radio Corporation. In 1927 the Radio Corporation of America acquired a substantial interest in FBO Pictures Corporation, a producer of motion picture films.

Early in 1928 the R. C. A. Photophone, Inc., was organized jointly by the Radio Corporation of America, The General Electric Company, and the Westinghouse Electric & Manufacturing Company.

In the same year the Radio Corporation acquired what was termed a substantial interest in the Radio-Keith-Orpheum Corporation and in this deal the interest held in FBO Pictures was transferred by Radio Corporation to Radio-Keith-Orpheum. This was not a controlling interest, but at a later date the Radio Corporation secured a controlling interest in the Corporation, holding 58% of the stock.

On June 11, 1932, charges of a bitter nature were made against the method by which the Radio Corporation secured the controlling interest in the Radio-Keith-Orpheum Corporation before the U. S. Senate Banking and Currency Committee, at which time it was termed "the most drastic squeeze-out in history," referring to the way in which stock was acquired by Radio Corporation

On November 5, 1931, the directors of the RKO voted to assess shareholders $5 a share and in the event they did not pay the Radio Corporation would take up their option. It was claimed that the Radio Corporation obtained a $67,000,000 interest in RKO for about $11,500,000. RKO stock sold on the New York Stock Exchange April 24, 1931, for $50 a share. By October 21 it had dropped to $9 a share. On November 30 it was at a low of 1⅝ and by December 29 it was ¾, or 75c a share. The following day the stock was taken off the list by the Exchange. The drop in RKO was said to be greater than the drop in any stock of record up to that time since the establishment of the first stock market in Amsterdam in 1630 with the exception of two firms that went into receivership.

The foundation for RKO was made long ago, mainly at that time a vaudeville organization, by such men as B. F. Keith, E. F. Albee, and Marcus Keiman. In 1927 it was estimated that between 15,000 and 16,000 entertainers made their living on the vaudeville stage. The assets of the Keith-Albee-Orpheum as the dominant organization was known then were listed as $65,518,138.73.

On November 30, 1928, the Radio-Keith-Orpheum Corporation having already been organized from the assets of the Keith-Albee-Orpheum Corporation had issued to the old stockholders of the previous concern 1,186,292 shares of Class A stock, and in consideration of the F. B. O. Productions, Inc., which the Radio Corporation had turned over to it, issued 500,000 shares of Class B stock, which under certain conditions had the privilege of being turned into 100,000 shares of Class A stock. Mr. David Sarnoff accepted the position of chairman of the Board of Directors. On February 5, 1929, the Corporation found itself in need of cash and offered to stockholders Class A stock at $30 a share, saying that the Radio Corporation would put into the firm $2,000,000 for its share and get 79,050 shares.

The March 4, 1930, balance sheet of the RKO showed assets of $91,163,087.91, claiming a profit of $723,309.65 had been earned in January of 1930. Mr. Hiram S. Brown had been made president in place of E. F. Albee sometime before this date. It was claimed that 6,500 stockholders of a year previous had increased to 15,000 after the stock had been in the New York Stock Exchange. By December 31, 1930, the balance sheet showed assets of $117,796,076.44.

In the statement issued to stockholders dated March 6, 1931, signed by David Sarnoff, Chairman of the Board of Directors, and Hiram S. Brown, President, the closing paragraph reads: "Your corporation begins the year 1931 well organized to continue its policy of development and expansion as conditions may warrant."

But by November 10 of the same year a distress call was sounded when stockholders received a letter saying:

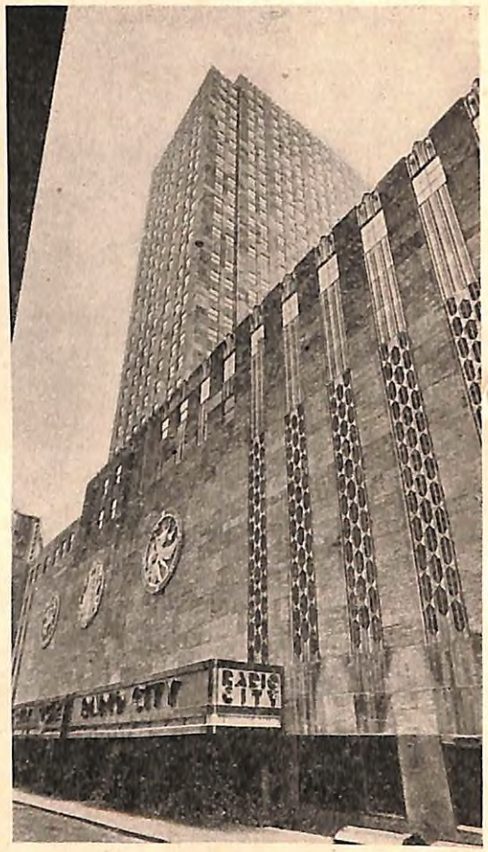
"Radio-Keith-Orpheum Corporation finds itself faced with an emergency which requires prompt action by stockholders if a receivership is to be avoided."

The assets of the Company were then listed as $127,414,981.14. A proposition was offered then which was the basis of complaint before the Senate Committee by which the Radio Corporation would secure control of the Corporation, and a voting majority.

By December 22, 1932, the assets of the RKO had dropped to $76,421,060.

Before this time the venture known in New York as Rockefeller Center had been started by which $250,000,000 was to be spent. J. D. Rockefeller, Jr., was to handle the financing of the venture. It was claimed the united efforts of Owen D. Young, David Sarnoff, "Roxy," and Merlin H. Aylesworth induced Mr. Rockefeller to undertake the amusement center. December 1932 it was announced that Mr. Rockefeller would accept a block of Radio Corporation of America stock for the surrender of the major part of the leases agreed to from the group when they induced him to construct the center.

Two theatres were built in Rockefeller Center, one known as Radio City Theatre which was intended as a moving picture theatre, and another even larger known as the RKO Roxy Theatre with seating capacity of 6,000, intended for music and stage productions. Within a short ten days after opening the RKO Roxy Theatre was converted to a moving picture house.



One of the two Theatres in Rockefeller Center, the smaller unit known as Radio City Theatre.

The Radio Corporation of America at the time of the Radio-Keith-Orpheum receivership held the majority of the Corporation's stock.

The Radio-Keith-Orpheum Corporation, starting with one unit, developed into many under various names such as R-K-O Radio Pictures, Inc., R-K-O Distributing Corporation, R-K-O Export Corp., R-K-O Studios, Inc., and R-K-O Distributing Corp. of Canada, Radio-Keith-Orpheum Midwest Corporation, and Radio-Keith-Orpheum-Proctor Corporation.

During the process of getting control of this great unit of entertainment, the Radio-Keith-Orpheum Corporation, the assets of the Radio Corporation have just about been the same as the listed asseted assets of the Corporation of which it had secured control. The stockholders' interests as represented by the common stockholders have shown over a period of years a gradual lessened market value as was the case in all entertainment ventures during the same period.

A RESCUE STORY

DELAWARE SUN RESCUES DORIS KELLOGG

By JOHN R. McMURRAY

While enroute from Smith Bluff, Tex., to Marcus Hook, Pa., on December 29, 1932 the SS Delaware Sun (KDWQ) noon position was 160 miles south of Diamond Shoal Light Vessel. The SS Doris Kellogg (KDIQ), a converted tanker of the Kellogg Steamship Company of New York, was also making a similar trip from Atreco (near Port Arthur, Tex.,) to Point Breeze, Philadelphia, and was under charter for the Atlantic Refining Company. The Kellogg had cleared Sabine Bar about 15 minutes in advance of the Delaware Sun, and as both ships were of the same speed, they were in sight of each other almost continuously. Occasionally one ship would be slightly ahead of the other, but only for a few miles, and then the positions would be reversed. Thus both ships seemed to be unconsciously in a race and after 5 days at sea, the positions remained unchanged.

At about 1:45 p. m. on December 29, heavy smoke was sighted coming from the after section of the Kellogg, who was then a few miles off the starboard bow of the Delaware Sun. The second mate, Mr. Edwin Morris, notified Captain Rogers, who requested that communication be established by radio with the Kellogg to ascertain if they needed help, he also changed course and headed for the stricken vessel.

Captain Rogers was notified that KDIQ failed to answer any calls of KDWQ. By this time it was noticed that the Kellogg was flying distress signals and that her after holds were afire. The lifeboats were being lowered and the burning ship abandoned. Assistance was requested by KDWQ from the nearest Coast Guard vessel, which happened to be the NSCG Cutter Yamacraw NRCY, whose position was about 70 miles from the scene.

About half an hour after the fire was sighted, the lifeboats began to come alongside the Delaware Sun, who was now heaved to, a safe distance away from the burning ship. The first boat carried 13 men while the remainder of the crew were in two other boats. The boat which held the captain hovered close to the burning ship, which now was blazing from midship to stern with burning oil spreading over the water around the stern.

When it appeared that the vessel was doomed, Captain Chapman, who commanded the Kellogg, ordered his lifeboat alongside the Delaware Sun and once aboard started a checkup of his officers and crew. All were safe on board.

During this time NRCY was in constant communication and reports of the rescue and other information was being transmitted to them, including test signals in order that they might determine our exact position by radio direction finder.

After all members of the Kellogg were aboard and the lifeboats hoisted up, word was sent to NRCY who then requested that we stand by the scene until the cutter arrived. This request was granted and the Yamacraw arrived about 8 p. m. and a short time after the Delaware Sun was under way, proceeding to Marcus Hook, with a tired but happy gang aboard.

It became known to us at this time that the radio operator, Robert McCarrick, of Norfolk, Va., had attempted to send an SOS over the air, but was unable to complete the call, due to the failure of the power lines. McCarrick stated that he had started the SOS but after sending the signal twice, the power failed before he was able to sign his call. It was just a few seconds later that he heard KDWQ calling him, and feeling sure that KDWQ had recognized the SOS as his, reported to Captain Chapman that his power had failed but that KDWQ was coming to the rescue. He was then ordered into the lifeboats which were then being launched.

It seemed that there had been a sudden explosion, followed by another, in the after cargo tanks, and then the fire broke out and enveloped the entire stern. The cause of the explosions was of undetermined origin. No one was seriously injured, although several suffered minor cuts and burns.

Although proceeding again on our course, we were still in touch with NRCY who was informing us of the condition of KDIQ. This contact was maintained almost continuously, until the Delaware Sun had passed Overfalls Light Vessel and was going up the Delaware River, when word was received that the Doris Kellogg had finally exploded and sank at 10:29 a. m. on December 31.

A short time prior to our arrival at Marcus Hook, the rescued officers signed and presented a testimonial of thanks for their timely rescue and courteous treatment while aboard the Delaware Sun and presented it to Captain Rogers. On arrival at Marcus Hook, the usual gathering of newspapermen and photographers were on hand to get the inside story of the disaster from eye witnesses. The men of the Kellogg were placed in a bus and transported to the Seamans Institute, from where they were later taken to New York.

I wish to take this means of expressing my thanks to the operators at WSV Savannah and to those on NRCY for the efficient manner in which they handled the brunt of traffic between these stations and KDWQ, and also to thank the several ships, who were in the vicinity, and who had offered their assistance if needed.

John Henderson at WBT is 6½ feet high in his stockings. He is seldom caught with his boots off, and finds that he gets best results from announcers by just frowning down at them when they go too far.

Ralph D. LeMert, at W6XAH, Bakersfield, Cal., is trying out his new voice channel on the television station there.

Polk Perdue, formerly at WAPI, Birmingham, is now doing time with WHAS, Louisville, Ky.

Tom Callahan, chief control operator at WBT, Charlotte, N. C., is still knocking them out with his looks as well as his mechanical ability. They say he has black eyes, but was born with them that way.

Jean Williams is making a hit at the controls of WBT. Says it is just so much of this, and so much of that as he plugs here and there. Don't slip, Jean, or it will be too much of too little.

Time Schedule of Tropical Radio Telegraph Co.

MARINE SCHEDULES

New Orleans, La. "WNU"

Maintains continuous watch on 500 and 143 kc. Answrs calls on 500 kc ICW, but will change to CW or 448 kc CW (or ICW) upon request. Short wave schedules 18 to 30 minutes past each hour; daytime frequencies, calling 11040 kc, working 11235 kc; night frequencies, calling 6210 kc, working 6300 kc. Special short wave schedules arranged on request. Relays to all points.

New Orleans broadcasts the weather forecast for the Gulf of Mexico, Caribbean Sea and Windward Passage, followed by a complete broadcast of traffic on hand at 10:30 a. m. and 10:30 p. m. 90th meridian time on 90 kc and short wave simultaneously.

Miami, Florida "WAX"

Maintains continuous watch on 500 kc and 143 kc, answers calls on 500 kc or 145 kc. Short-wave schedules from 48 minutes past to the hour; day-time frequencies, calling 11040 kc, working 11250 kc; night frequencies, calling 8280 kc, working 8490 kc. Miami calls traffic list on 80.5 kc at 9:15 a. m. and 8:15 p. m. 75th meridian time. Special short wave schedules arranged on request. Relays to all points.

Mobile, Ala. "WNN"

Maintains watch on 500 and 143 kc between 8:00 a. m. and 5:15 p. m. only, 90th meridian time, working on 442 kc. Short wave schedules 3 to 15 minutes past the hour (8:03 a. m to 5:15 p. m.). Calls on 11040 and 6210 kc; works on 11265 and 6280 kc. Special short wave schedules arranged upon request. Relays to all points.

Boston, Mass. "WBF"

Maintains continuous watch on 500 and 143 kc; calls and answers on 500 or 147 kc. Short wave schedules 33 to 45 minutes past each hour. Daytime frequencies, calling on 12420 kc, working on 12525 kc; night frequencies, calling on 8280 kc, working on 8480 kc. Short wave schedules arranged upon request. Relays to all points.

NOTE: It will be seen from the "round the clock" short wave schedules that communication can be established with one of these four stations on high frequency at any time of the day.

Almirante, Panama "RXA"

Maintains marine schedules on 500 kc at 7:10 a. m., 9:10 a. m., 10:10 a. m., 12:10 p. m., 1:10 p. m., 2:10 p. m., 3:10 p. m. and 4:10 p. m. 90th meridian time. Works on 488 and 403 kc, CW and ICW. Handles local traffic and relay traffic to all points outside of Panama.

Puerto Castilla, Honduras "HRA"

Marine schedules from 6:30 a. m. to 11:00 a. m. 11:45 a. m. to 5:00 p. m., 5:55 p. m. to 7:30 p. m. and 8:30 p. m. to 9:00 p. m 90th meridian time; calls on 500 kc; works on 125 kc. Relays to all points.

Limon, Costa Rica "TIM"

Marine schedules on 500 kc at 7:05 a. m., 9:05 a. m., 10:05 a. m., 1:05 p. m., 2:05 p. m. and 3:10 p. m.; also on 6250 kc at 7:00 a. m., 1:00 p. m. and 3:40 p. m. Relays to all points.

(Coast station rate at tropical stations 12c per word on traffic to Central America and Colombia; 10c per word to other places.)

RADIO BEACON SERVICE

Automatically operated radio beacons are installed at the following points, working on the schedules indicated and using signals following designation of station:

Tela — . — .

(C) 5 to 15 minutes past the hour, 8:05 p. m. to 9:15 a. m. 90th meridian time; 310 kc, 968 meters. Geographic position, latitude N 150° 43' —longitude W 87° 20'.

Castilla . —

(A) 48 to 58 minutes past the hour, 7:48 p. m. to 6:58 a. m. 90th meridian time; 305 kc, 98[illegible] meters Geographic position, latitude N 16° 00' —longitude W 85° 00'.

Sta. Marta . — —

(W) 35 to 45 minutes past the hour, 12:35 a. m. to 7:45 a. m. 90th meridian time; 300 kc, 1000 meters. Geographic position, latitude N 11° 15' —longitude W 74° 15'.

Pto. Cortes . . —

(U) 28 to 38 minutes past the hour, 9:28 p. m. to 6:38 a. m. 90th meridian time; 295 kc, 1018 meters. Geographic position, latitude N 15° 49' —longitude W 87° 57'.

Limon — —

(M) 18 to 28 minutes past the hour, 12:18 a. m. to 7:28 a. m. 90th meridian time, Saturday morning only; 290 kc, 1034 meters. Geographic position, latitude N 10° 00'—longitude W 83° 01'.

WAGE SCALES FOR SHIP RADIO OPERATORS PREVAILING AT THE PRESENT TIME

Eastern Steamship Company—
Chief, $90.00
Junior, $72.00
Old Dominion Line—
Chief, $81.00
Junior, $63.00
Grace Line—
Passenger ships
Chief, $94.50
Junior, $62.50
(Chief operator receives $20.00 per trip and the junior $10.00 extra each trip for press reports Thirty-five day trips.)
Dollar Line—
Passenger ships
Chief, $90.00
Junior, $81.00
Munson Line—
Freight ships
Operator, $60.00
(Asked to take a wheel watch in addition.)
United States Lines—
Leviathan
Chief, $115.00
Juniors, $90.00
Manhattan
Chief, $100.00
Juniors, $85.00

Veteran Wireless Operators Association News

OFFICERS AND BOARD OF DIRECTORS

Fred Muller, president, T. R. T. Co., Pier 3 North River, N. Y. C.
C. D. Guthrie, vice president, 118 Fenimore St., Brooklyn, N. Y.
Wm. J. McGonigle, secretary, 140 Vanderbilt Ave., Brooklyn, N. Y.
V. H. C. Eberlin, treasurer, T. R. T. Co., Pier 3 North River, N. Y. C.

Board of Directors

A. F. Wallis, T. R. T. Co., Pier 3 North River, N. Y. C.
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V. Ford Greaves, 319 Woodley Park Towers, Washington, D. C.
W. S. Fitzpatrick, 374 Eastern Parkway, Brooklyn, N. Y.
Lee L. Manley, care of RCA Victor Company, Camden, N. J.
E. H. I. Lee, U. S. Supervisor of Radio, Detroit, Mich.
Frank Orth, care of Columbia Broadcasting System, 485 Madison Ave., N. Y. C.
Wm. C. Simon, T. R. T. Co., Pier 3 North River, N. Y. C.

* * *

To the Membership

BELIEVE IT OR NOT! We begin our eighth year of organization, fully optimistic for the future, especially as concerns the social and economic welfare of our membership. We have accordingly, through our arrangements committee, made plans for our ANNUAL SOCIAL REUNION, which, considering the times, should prove a panacea, even in these days of technocracy.

Many, perhaps all of our members, have someone near and dear to them who would be delighted to participate with us in this affair. Therefore, you will note our EIGHTH ANNUAL CRUISE provides for a "DINNER AND DANCE" supplemented with entertainment by well known radio favorites. This deviation from previous annual affairs should merit your hearty approval and support.

HERE'S THE LINE-UP. For the occasion we have chartered the banquet facilities of the Hotel Taft, 7th Ave. and 50th St., in New York City on the evening of February 11, 1933. The facilities include a reception lounge and the CRYSTAL AND LOUIS XVI BALLROOMS.

A dinner of unsurpassed excellence will be served, followed by dancing in the Crystal Ballroom. Awards to wireless operators who have distinguished themselves in the performance of their duty during the past year, and entertainment features will be presented during dance intermissions. The LOUIS XVI ROOM will be reserved for those who desire the fraternal indulgences (Teutonically speaking, as Don Jorge Clark would say) which have been so very popular at our other happy affairs.

MAKE YOUR ARRANGEMENTS FOR THIS BIG EVENT—NOW! ! !

Date: Saturday evening, February 11, 1933.
Time: Eight p. m.
Place: Hotel Taft, 7th Ave. at 50th St., New York City.
Tickets: Ladies $2.00; gentlemen $3.00.
BRING YOUR FRIENDS; they too, will enjoy themselves and their presence will help make the AFFAIR A BIG SUCCESS.

NOTE: SEND REMITTANCES TO P. K. TRAUTWEIN, CHAIRMAN TICKET COMMITTEE, 58 WEST 25th STREET, NEW YORK CITY.

"WHD" SCHEDULES

New York Times Radio

Service	Time G. M. T.	Frequency
Stocks	**05:48	8,360 Kcs.
Press	*06:00	8,360 Kcs.
Press	**19:00	11,355 Kcs.

Note: *Daily. **Daily except Sunday and holidays.

NEW KUP SCHEDULES

RADIO STATION KUP

San Francisco Examiner Radio

The following schedules effective at present

SKED	SERVICE	TIME (GMT—PST)		FREQ. (KCS)
A—1***	Financial Survey	0030	4:30PM	16700
B—1*	Press	0300	7PM	6440
C—1**	Weather	0400	8PM	6440
D—2*	Press (Navy)	0518	9:18PM	6440
E—3*	Press and Stocks	0900	1AM	6440
F—4*	Press	1500	7AM	6440
G—2**	Weather	1648	8:48AM	6440
H—5*	Press	2100	1PM	16700

NOTE: *Daily except Sundays and Holidays.
**Daily including Sundays and Holidays.
***Daily except Saturdays, Sundays and Holidays.

The staff at KUP stand watches between 7 a. m. to 3 p. m. PST on 18 and 27 meters, and between 6:30 p. m. to 2:30 a. m. on 36 to 48 meters for calls for requests for Press, Stocks, Weather or any other available information. Also a watch on 500 kc distress signals.

Sig.: R. G. Martin, Manager Radio KUP.

INFORMATION WANTED

Will any reader who has first hand information of any American ships over 1600 gross tons and not equipped with radiotelegraphy being in distress at any time during the past ten years or of any American ship 1600 tons or over not carrying an operator which passed near to or was in the vicinity of any ship in distress; communicate the facts to the secretary, A. R. T. A.? It is imperative that all details can be verified and substantiated. This is of importance to the association. Information is also wanted on any sea-going women operators on American ships at any time in the past other than the Misses Packer, Duval and Michelson. Dates and facts are essential.

American Radio Telegraphists Association News

Authorized representatives of the American Radio Telegraphists Association, Inc., 20 Irving Place, New York City, are as follows:

Boston, Richard J. Golden; Charles W. Marsh.
Baltimore, Christopher Kelley, 650 West Fayette Street
Miami, D. W. Scott, P. O. Box 2254
New Orleans, Forrest H. Flanders, Y. M. C. A., Box 314, 936 St. Charles at Lee Circle
Great Lakes, Arthur H. Freitag
Port Arthur, (Gulf representative), Hoyt S. Haddock
Baytown, Texas, Ralph E. Knudsen
Beaumont, Clyde B. Trevey
Seattle, Rollie B. Weiss.
San Francisco, Oliver Treadway.
Los Angeles, M. L. Schaefer.

At a recent meeting, hours were set for association business. The secretary-treasurer will be on duty, henceforth, from 9 a. m. to 5 p. m. Monday to Friday, inclusive, and from 9 a. m. to 1 p. m. Saturdays.

The static-room, however, is usually open until a late hour in the evenings and operators are cordially welcomed to make use of it.

* * *

A by-law which went into effect in January: "The rules contained in Roberts' Rules of Order, revised, shall govern the organization in all cases to which they are applicable and in which they are not inconsistent with the constitution and by-laws."

* * *

Members should know that whether it is possible for them to attend meetings or not, it is entirely in order that they present a motion by mail. Motions or suggestions thus received will be taken up at the next regular meeting.

* * *

The Neptune Association has instituted a program to amalgamate all organizations of officers of the American Merchant Marine. Several conferences have been held among the mates, engineers and radio operators with a view to finding a common ground on which to unite in one great brotherhood. Developments will be noted in CQ.

* * *

Effective January 10, the salary of the secretary-treasurer was reduced to $100 per month.

* * *

Ballots have been sent out for the election of president and one vice president, also for ratification of the constitution. The returns as noted at the first meeting after April 1, 1933, will be considered final. Another ballot for the election of secretary-treasurer and for general counsel will be sent out in May to be counted in August. Nominations may be sent by mail and the name of each nominee, if he be eligible, will be placed on the ballot.

* * *

Members should note that practically all the principal seaports are now covered by A. R. T. A. representatives. During the past month or so we have secured the services of reliable, energetic delegates in Seattle, San Francisco and Los Angeles.

A non-member who deserves especial commendation for his services to the organization is Mr. Maurice Schatt of New York who, in conjunction with his work for the Capitol Radio Engineering Institute of Washington, has succeeded in making many students and others association conscious.

HEARD HERE AND THERE

Among the recent pay-cuts are the Dollar Line with a reduction on the 535's to $90 for chief and $81 for the junior. All Dollar liners have carried but one junior for some time.

New York Notes

After returning to New York after the recent foundering of the Sea Thrush off Astoria, Ore., Bill Kirchhoff took out another of the Company's ships, this time the Wind Rush.

Duncan Curry was assigned to the Olean of the Standard of New York.

Joseph P. de la Hunt went out in the Elizabeth Kellogg.

Joseph Bergman writes from Rose City, Ark., that his health is improving and that he expects to be fit for work in March.

Christopher Kelley interrupted a long stay on the beach with an assignment to the Cerro Ebano of the Standard Shipping.

Roy H. Roberson was assigned to the Evansville of the M. and J. Tracy company, hauling coke out of the Gulf.

Anyone knowing the whereabouts of Joseph B Milkiewitz, an operator formerly employed by the Mackay Company, kindly communicate with the secretary or with Mr. Frank Milkiewitz, 230 Cotes Lane, Bay Terrace, Staten Island, N. Y. This operator has been missing for over a year.

William Ziegler writes that he is now with the Western Air Express at Pueblo, Colo.

George De Mude is now serving in the Cities Service, Ohio.

William J. Littlefield has the assignment to the Black Tern.

Wendell A. Walker is taking a review course at the school at 75 Varick.

Earl M. Ponton is with the SS Argon of Socony.

Charles W. Thumm has the SS Mundolphin.

Thomas J. Findlay is in the SS Larry Doheny.

Dean D. Knox has the SS Liebre of Socony.

William Bahls was assigned to the SS Bohemian Club, out of Philadelphia.

Harold B. Chace is serving in the SS Nevada of the Texas Company. Carroll Avitable has the Pennsylvania of the same company.

Will the gentleman who sends in the anonymous letters from Aransas Pass, Tex., and who sometimes postdates them as from New York, please send in his name if he wishes a reply to his latest communication? We are sorry that it is not within the scope of our policy to publish his latest contribution

Arthur Cohen, ex-Yacht Camargo, relieved Martin J. Fuller in the Robert E. Lee.

Three new acquaintances from the Sun Oil Company are John C. Borsos of the Chester Sun, Mathew M. L. Burrell of the Pacific Sun, and Charles Feinman of the Western Sun.

Add Believe-it-or-Nots: WSE with his 20 KW reprimanding a poor ship's operator for not using minimum power. Dah dah dit dit dah dah!

American Radio Telegraphists Association News

R. W. Bradley has been with the Nishmaha for some time.

Several operators in this vicinity complain that coastal stations are breaking up the NAH, NAM and NAD hydros, especially after the 15 to 18 silent period. Give the boys a break, fellows.

George Fitzsimmons suggests, now that the F. R. C. has discontinued publication of the U. S. Call Book and the Monthly Service Bulletins, that we request the commission to forward the information to CQ in order that the frequent changes and additions to the call list and other valuable information may reach the operators.

Dennis F. O'Brien was assigned to the SS Illinois of the Texas Company.

Fred A. Gritzner returned from a season in The Salvor working over the wreck of the Merida off the Virginia Capes. At present he is a resident of the Lynmore but expects to make the long promised trip to see his people in Rochester very soon.

West Coast Notes

Larry Lawton is sticking fast by the President Taft. Larry has had a bad attack of 'flu lately so our representative couldn't get to him. He hopes to make him a member on the next voyage.

Walter Tease took the old Latouche for a couple of trips after leaving the Alaska. He'll have to part with part of that bankroll for a ticket in the A. R. T. A. when he returns.

We would like to hear from Mr. Porterfield who recently took out the Lake Frances. We understand that he is a scribe of worth. A little dope for CQ would not come amiss.

Ray Myrick is now chief of the General Sherman.

R. Welbon is chief of the General Pershing.

Everett Henry will sail as chief of the General Lee when she sails the latter part of the month.

F. Lueke is with the San Vincente.
L. Bradley is in the San Felipe.
C. P. Burt has the San Rafael.
J. Mead is on the Peter Kerr.
Karl K. Steiner is on the Wisconsin.
C. Anderson is on the Texas of the States Steamship Company.
J. Livingston is on the California—States Steamship Company.
J. Walker is serving in the Oregon.
R. Bean is on the New York (States SS Co.).
T. Toppi is on the Illinois (States SS Co.).

Chief operator for the States Steamship Company is W. E. Clyne with headquarters at Portland, Ore.

Frank Taylor, formerly prominent in the Alaska cannery services, is now on the beach at Portland.

Elmer Anderson, who used to pound brass on the old motorship Oregon, and at the cannery station at Quadra, Alaska, is working an airmail station at Carlsbad, N. Mex. He is thinking of quitting the job if he can get three months in at an Alaska cannery next season.

Our ambitious representative, Rollie B. Weiss, informs us that although he has found many hold-outs among the operators in his district, he has the promise of many who intend to take out cards during the coming month.

We would appreciate news of the Los Angeles area from Max Schaeffer—and Oliver Treadway of San Francisco should let us know of the assignments and news of interest in his territory.

New Orleans Notes

Walter Barnes recently shipped out on the SS LIBERATOR (Tampa-Interocean) . . . thus ending a six months' stay on the beach. Barnes has long been a pleader for the cause of organization and was of inestimable aid to the ARTA representative at this port. The daily hike along the docks seems much longer without your company, Walt.

The Lykes Brothers—Ripley SS Company recently took the last two of the Dixie United Kingdom & Southern States Lines ships from the laid-up fleet and put them in dry dock, preparatory to sailing shortly for loading ports in the Gulf. These ships are the SS WABAN and the SS WEST EKONK. Together with the SS CITY OF JOLIET and the SS ELMSPORT, they are the third and fourth vessels to be taken out of the graveyard by this company within a two weeks' period. Ain't that sumpin' for these days? The names of the operators assigned to these ships have not been learned at this writing.

We regret to announce that Wilbur Boston, late of the SS POINT MONTERA, died at the Marine Hospital here on December 2nd. He was suffering from a heart ailment, which is believed to have been the ultimate cause of his death. Mr. Boston had all the skill and fine qualities that distinguished the typical old-time operator, and he will be greatly missed by many who had come in contact with him, and knew him through his dependable work.

The Standard Fruit has recently inaugurated a new fortnightly service between this port and Tampico. The SS TEGUCIGALPA will operate in this service after January 13th. That is going to give our friends, Newton and Gros, a change of scenery. This company took the steamships Kosmos, Sama and Wanks, out of its laid-up fleet a short time ago. The latter ship carries no radio equipment.

The radio shack on the SS MORAZON (Standard Fruit) is one of the neatest layouts we have visited in many moons. Operators Albert J. Bourgeois and Jacinto Caldwell apparently wield a wicked can of brass polish.

The USSB has opened bids for the purchase of 40 vessels to be scrapped by the board, we learn. Several of the ships to be sold are laid up at Nine Mile Point here. They are the steamships Braddock, Jadden, Cockaponset, Lavada, Evergreen City, Moselia, Salaam, West Hematite, West Jaffrey and the West Saginaw. Do those names recall any fond memories?

A visit aboard the SS COMMERCIAL ORLEAN revealed that Harry Larson is no longer operating and mate-ing on her. Whereabouts unknown.

At a recent meeting of the Propeller Club (of New Orleans) the resolution was made and

American Radio Telegraphists Association News

adopted that the senators and representatives from this state, in Washington, be requested to use their influence in seeking continuance of the government aid to our Merchant Marine through the award of foreign ocean mail contracts and granting of construction loans. A few more organizations such as this should be added to the popular list of "What This Country Needs."

We are informed that the operators in the service of the Standard Fruit Line have had a reduction in wages. The new wage scale seems to be governed by the size of the vessel . . . the maximum cut amounting to about $20 a month.

V. Madsen couldn't wait for this country to pass the beer bill so he has left for the land of the real thing . . . on the SS WEST EKONK.

The collector of customs recently reported a 44 per cent increase in collections at this port over the corresponding month of December, 1931. The increase marked the first time within eight months that collections exceeded those of a corresponding period of 1931. For the first six months of 1932 the receipts were found to be approximately 25 per cent less than in 1931 but only 7 per cent less than in 1930.

The operator on the SS MUNLOYAL (who didn't care to introduce himself) has apparently been pestered considerably by agents and salesmen of various sorts. He has a little speech that he delivers to all that seek him out on his vessel . . . and you mustn't break in until the recitation is finished.

Operators George Innis and Frank Wilson, of the SS CEFULU, (Standard Fruit) recently recounted, for your enquiring reporter, their very interesting experiences of December 22nd. We regret that space here will not permit the full story in detail. Briefly, the CEFULU picked up 58 persons from the Chilian SS NEGADA. The latter ship had been on Quitasueno Reef for nearly two weeks.

Charlie Reynolds on the SS TENNESSEE (Mississippi Valley Barge Line) and Jimmy Devenport on the SS EL ALMIRANTE (Southern Pacific) are two operators that we have found delving deep into the lessons of the Capitol Radio course. Both men are very enthusiastic about it all.

If Mrs. Winchell's little boy, Walter, were gathering news around this area he could write plenty of dirt about the activities of the local fraternity over New Year's Eve. The Music Box is said to have enjoyed a tremendous popularity, despite the absence of some of its staunchest supporters . . . such as Brother E. T. F., who is vacationing.

Gulf Notes

The Standard Shipping Company of New Jersey has announced that beginning this fall officers, engineers and radio operators will take a two weeks' vacation yearly, together with a thirty days' leave of absence. The leave of absence is without pay and is destined to give aid to the unemployed. In this company, the radio operator's salary is now $120.00 per month. This is quite a contrast to some of the salaries many of the steamship companies are paying today, and I believe the operators in this company need not be reminded of how fortunate they are.

We anxiously await the return of Stuart B. Collins, SS Dryden, from the far east to give us an official report on the Japanese New State.

McCullum, KOBX, celebrated Christmas at his old stamping grounds, WPA. We hope your new year will be as prosperous as your Christmas was merry, Mc.

When are you going to return to the Edward L. Shea, Selkirk? You'd save WPA a bit of trouble for we all have the tendency to make messages from the Samuel Q. Brown as if you were still on the KFSE instead of your present vessel.

J. H. French, SS Lightburne, anxiously awaits the installation of a tube set by the Texas Company aboard his vessel. In fact he is so enthused that he has decided not to trade KIVF, but will take an advanced radio course to shorten the long trips.

Let's give J. H. Schimbor, SS Gulfstate, a vote of thanks for his wonderful co-operation shown the A. R. T. A. If every member were to do as much as Schimbor does, operators would be one hundred per cent organized tomorrow. Thanks, OM.

Here's good luck to your budget, G. A. Higgins. You have the right idea, and we'd like to see the bug sting many of our brothers. A budget is **the thing** for the man who is eager to save for the rainy days ahead.

So far C. F. Barclay, Gulflight, seems unable to contact a Houston run. I suggest that you marry the girl, B. C., and bring her to P. A. to live.

We're glad to learn that the typewritten issues of licenses were only a temporary measure. The first of the new engraved forms to be seen in this section arrived very recently and is proudly claimed by Madison Monroe. It is quite fair to look at, we're told.

What is all this we hear of a heavy holiday celebration, Bezanson? And not a single invitation to a one of your brother operators! My, my, such spirits!

Boston Notes

Miss Prosperity may not be with us yet, but activity around Boston seems to indicate she is approaching, coyly and hesitatingly. Thirty-three of Boston's forty-seven radio-equipped trawlers are back in service and most of the collier fleets are running on steady schedules.

The new liner "Lurline," recently launched at Fore River Shipyard, Quincy, went out on a trial trip with an RCA ET 3674 combination short and intermediate wave job. Charlie Marsh, who was among the radio complement aboard, assures us the set worked to perfection and that Australia was reached with ease. Mackay ops please note.

The trawler "Flow," one of the three Boston fishing vessels equipped with experimental telephones, made a trip a short time ago with a Kelvin-White direction finder and two D. F. engineers. When the vessel returned to port the D. F. was promptly taken ashore. The Telephone Company is not having the easy time

(Continued on Page 32)

CLASS "B" AUDIO AMPLIFICATION

(Continued from Page 12)

grid current flow may be sufficient to actually cause a DECREASE of plate current, that is, cause the E_gI_p curve to flatten out on top. However, as long as the signal input voltage does not extend beyond the straight portion of the E_gI_p characteristic the introduction of distortion from this source is negligible.

Distortion Due to Grid Current Introduced Mostly in Input Circuit

Distortion due to grid current flow is mostly introduced in the input circuit. While the grid is negative and there is no grid current flow the input impedance of the tube is high and more or less constant for all signal voltage amplitudes. As soon as grid current flows the input impedance drops. Thus instead of having a fairly constant high value of impedance across the secondary of the input transformer we have an impedance which drops off sharply on the modulation peaks. This will introduce distortion in two ways. First, with the usual step-up type of input transformer, the secondary winding consisting of a large number of turns of fine wire, the ohmic resistance is high and the voltage drop caused by the flow of grid current will add to the bias, causing a fluctuating bias. This could, of course, be largely compensated for by the use of a low resistance winding.

The more important sources of distortion in the input circuit are due to the increased power required from the preceding tube when the power amplifiers take grid current and to the impedance mismatch. With Class A amplification the preceding tube operates into a transformer whose secondary is connected to a relatively high impedance, this exciter tube thus operating almost entirely as a voltage amplifier, little power output being required. However when the power amplifiers draw grid current and the input impedance drops there is a considerable expenditure of power in the grid circuit within the tube itself and in the transformer secondary windings. The exciter amplifier is now working as a power amplifier instead of simply as a voltage amplifier and the load conditions including the impedance into which the tube operates have been entirely changed. The power output requirements have increased and the load impedance decreased. Even though a sufficiently large tube is used in the driver stage to supply the necessary peak power, this drop in the load impedance will change the operating characteristics and result in a certain amount of flattening of the modulation peaks with the consequent introduction of distortion.

As long as the driver tube must operate partly as a voltage amplifier and partly as a power amplifier it is practically impossible to keep the distortion factor to a satisfactory minimum. Thus in the development of a satisfactory Class B audio amplifier it has been found necessary to operate the driver tube as a power amplifier and to minimize the variation of the load impedance. This latter has been accomplished by the development of tubes such as the type '46 having a low value of input impedance, this impedance being fairly constant over wide variations in signal voltage amplitude. Such a tube should operate with a zero grid bias and the E_gI_g curve should be straight within the operating input signal voltage limits, that is from zero to peak voltages. This design of tube calls for a new design of input transformer.

Transformer Design for Class B Audio Input

We know that for maximum power transfer and a flat amplifier frequency response curve the load impedance must be matched to the tube impedance and the load impedance must be assumed as the low impedance ranges occurring at the peak signal voltages where the input impedance is low. If the load impedance is assumed as somewhat less than the low impedances actually reached on the peaks, the impedance across the secondary of the input transformer will never be less than the calculated value. Such a circuit requires that the input transformer have a step-down ratio. Loy E. Barton of R. C. A. Victor states that with two type '46 power output tubes in a push pull Class B circuit driven by two type 245 tubes operated push pull Class A, the effective resistance in series with each grid should be about 100 ohms or less if minimum distortion is to be obtained. With the 245's operated with plate voltage of 225 volts and biased to plate current of 20 mils each the plate-filament impedance of the two tubes in series will be about 4,000 ohms. To match impedances of 4,000 ohms and 100 ohms, 40—1 ratio, the transformer turns ratio should be,

$$\text{Turn ratio} = \sqrt{\frac{40}{1}} = 6 +$$

Thus the step down input transformer for such a tube combination should have a turns ratio from the entire primary to **one-half** the secondary of 6 or 7 to 1.

Note That Only One-Half of Secondary of Input Transformer Working at Once

It must be noted that the driver stage, whether a single tube or two tubes in push pull, operates Class A and all of the primary winding of the input transformer is thus always active. At the same time in the Class B stage only one tube operates at a time, the load changing from one tube to the other each alternation, and thus only one-half the secondary of the input transformer is active at a time and the turn ratios must be calculated accordingly.

The same situation exists in the output transformer from the push pull Class B stage. When matching the voice coil of a reproducer with the output tubes in a Class A circuit the impedance of both tubes in series must be used. In the Class B amplifier the step down output transformer must be so designed that the turns ratio of one-half the primary to the secondary is correct. The condition is just the opposite to that existing in the input transformer.

High Amplification Factor Desirable In Class B Tube

For Class B operation a tube having a comparatively high amplification constant is desirable because it reduces the excitation voltage required. With Class A amplification where the input transformer has either a 1 to 1 or a step-up ratio and the preceding stage operates as a voltage amplifier no difficulty is encountered in obtaining sufficient excitation voltage to drive the output stage to maximum power output. However where the input transformer has a large step-down ratio the question of excitation voltage becomes serious and large volt-

age swings in the plate circuit of the preceding tube are required to produce the needed excitation voltage for the power amplifiers.

The type '46 tube is adaptable for use as both Class A driver and Class B power amplifier. When used as a Class A driver the screen grid and plate are connected together to form a tube having a comparatively low amplification factor and a low plate-filament impedance.

For Class B operation the screen grid and control grid are connected together to provide a tube having a relatively high amplification factor with the plate current essentially zero with zero grid bias, the requirements as determined above for Class B operation.

The Class B audio amplifier can be made to deliver several times the peak power obtainable with equivalent tubes operated as Class A. How can such output be obtained without overheating the plates? Because the actual peak amplitudes occur in speech and music during only a comparatively small percentage of the total time. It has been estimated that the average level of ordinary speech and music is not more than 20 per cent of the peak levels Thus for peak outputs of 10 watts the average power output of the tubes is only about 2 watts. In Class B operation full advantage is taken of the low signal levels for plate cooling.

Power Requirements

However the fluctuating power requirements, varying between such wide limits, necessitates an entirely different design of plate power supply than that used for Class A operation. In a Class A amplifier the plate power input is constant, regardless of signal level and a high resistance rectifier tube such as the 280 can be used, and the constant plate currents for the tubes can be used to supply grid biases; screen and plate voltages can be accurately adjusted, etc. If a Class B amplifier is operated from such a power supply all tube plate voltages will be high when the signal level is low and will fall off sharply with an increase of signal because the increased plate current of the Class B amplifier will cause an increased voltage drop in the rectifier tube and in the first filter choke. The use of a low resistance filter choke will correct the latter trouble. Only the use of a mercury-vapor rectifier tube can correct the principal fault of the rectifier and it was the combined development of the zero bias cut-off amplifier tube and the small mercury vapor rectifier tube that made Class B operation practical for light socket operated receivers. The mercury-vapor rectifier has an internal voltage drop of approximately 15 volts over its entire operating current range. The type '82 is the full wave mercury-vapor rectifier comparable with the conventional 280 rectifier tube.

By the use of the mercury vapor rectifier all plate voltages for Class A and Class B tubes may be taken from a single rectifier. The Class A tubes requiring negative bias can obtain this bias by means of individual bias resistors in the individual cathode circuits, these tube currents not being affected by the varying load of the power amplifier stage. Probably the most satisfactory filtering will be obtained by using a simple filter immediately following the rectifier tube ahead of the Class B amplifier and following this with another filter ahead of the other tube circuits. However, by the use of sufficiently large filter capacities a single filter may be used.

OPERATING EFFICIENCY— MATHEMATICAL ANALYSIS

Class A Amplifier

Power output = .707 E_{pm} x .707 I_{pm} = .5 $E_{pm}I_{pm}$

Power input = E_bI_b

$$\text{Efficiency} = \frac{.5E_{pm}I_{pm}}{E_bI_b}$$

E_{pm} and I_{pm} = maximum variation of E_p and I_p.
E_b and I_b = D. C. plate E and I.

As E_{pm} approaches E_b as a limit and as I_{pm} approaches I_b as a limit the maximum efficiency, if the output maintains a sinusoidal wave form, is 50 per cent. Since E_p and I_p cannot vary over such wide limits without the grid swinging positive or into the lower bend of the E_gI_p curve the usual maximum efficiency without distortion is approximately 30 per cent.

Class B Amplifier

Power input = .636 $I_{pm}E_b$

(Current input to 2 tubes resembles that of a full wave rectifier and total input current is .636I_{pm} assuming sinusoidal wave form.)

$$\text{Power output (1 tube)} = \frac{.707E_{pm}\ .707I_{pm}}{2}$$

$$= \frac{5.\ E_{pm}I_{pm}}{2}$$

Since load resistance $R_p = E_{pm}/I_{pm}$, and $E_{pm} = I_{pm}R_p$

then

$$\text{Power output} = \frac{I^2_{pm}R_p}{2}$$

Power input = .636 $I_{pm}E_b$

$$\text{Efficiency} = \frac{I^2_{pm}R_p}{1.272\ I_{pm}E_b}$$

$$\frac{I^2_{pm}R_p}{1.272\ I_{pm}E_p} = \frac{I^2_{pm}E_{pm}}{1.272\ I^2_{pm}E_b}$$

$$= \frac{1}{1.272} = 78.5 \text{ per cent.}$$

For a sinusoidal output as E_{pm} approaches E_p as a limit the efficiency becomes 78.5 per cent for a half wave output, that is, for one tube. For two tubes, everything else being unchanged, the efficiency will remain the same, the output being doubled.

A NEW SLANT

One of our contributors reports that the Southern Steamship Company, with headquarters in Philadelphia, are now signing on their radio operators as ordinary seamen. For their work as ordinary seamen they receive $35 per month. For radio operating they receive an additional $25 per month. An eight hour deck watch is stood. The radio work is done on "time off." The company operates the City of Houston, City of Fort Worth, City of Philadelphia and one or two other vessels.

A LOW-POWER BROADCAST TRANSMITTER

(Continued from Page 8)

is transferred to the antenna. This circuit is easy to adjust, and the harmonic radiation is kept well below .05 per cent of the fundamental, thus anticipating any requirements that may reasonably be expected. The antenna is tuned by adjusting the loading inductance for maximum current in the usual manner, and an artificial antenna resistance is provided to allow the transmitter to be energized without radiating a signal, should this be desired for test purposes.

Monitoring is provided by a transformer connected in the plate circuit of the final stage. This type of monitor is new, but has the advantage of no requiring a tube or other type of rectifier. Since the audio-frequency currents flowing in this circuit result from the modulation of the output of the amplifier, they give a faithful indication of the output.

As already mentioned, the entire power for the transmitter is obtained from an alternating current supply without the use of rotating machinery. Two rectifiers supply 3000 volts for the last stage, and lower voltages for plate and grid-bias circuits. Potentiometers, to provide stability of the desired voltage, are employed wherever voltage reduction is required. The circuits are simple, and relays are provided to introduce the necessary time delays in energizing the mercury-vapor rectifier tubes. The total power required for the operation of the transmitter is approximately 1500 watts single phase.

To extend the range of this transmitter to outputs of 250, 500, and 1000 watts, a separate amplifier unit is provided as already mentioned. The same cabinet, equipped with the proper tubes and circuit elements, is used for all three sizes of amplifier. The 1000 watt size is shown with doors open in Figure 4. The arrangement of equipment in two compartments is similar to that of the transmitter, and all circuit elements likely to radiate are completely shielded. A three-phase alternating current supply is required for its operation.

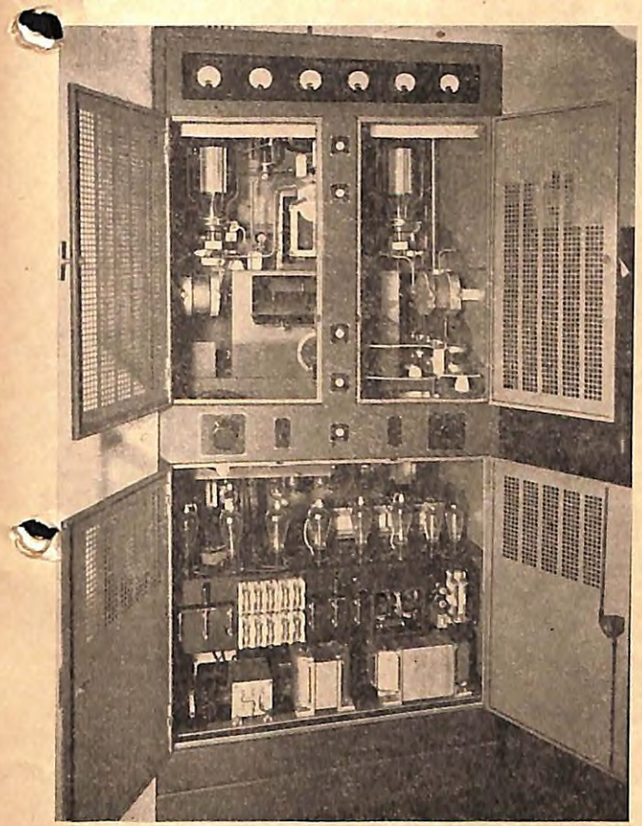


Fig. 4.—The amplifier cabinet is the same size as the transmitter and like it has an upper compartment for the high-frequency circuits and a lower, for the power supply

A simplified schematic of the high-frequency circuit of the power amplifier is shown in Figure 5. The circuit and equipment arrangement is alike for either 250, 500, or 1000 watts output, except for the differences necessary because of the three power capacities. The amplifier unit is connected across the terminals of the coupling condenser of the transmitter, and the circuit is similar to that of the final amplifier of the transmitter. The tubes are of the radiation-cooled type described elsewhere in this issue of the Record.

Biasing voltage is obtained from a full-wave single-phase rectifier employing mercury-vapor tubes, and the 3000 volt plate potential is obtained from a full-wave three-phase rectifier also employing mercury-vapor tubes. A thermal delay circuit provides the necessary time interval for the filaments to reach operating temperature before high voltage is applied. A photograph of the complete 1000 watt equipment is shown on front cover, with the transmitter at the left and the amplifier on the right.

The safety and control circuits of the two units are interlocked, so that opening any of the doors on either unit removes all high voltage from both units. Although switches are provided so that starting may be sectionalized if desired,

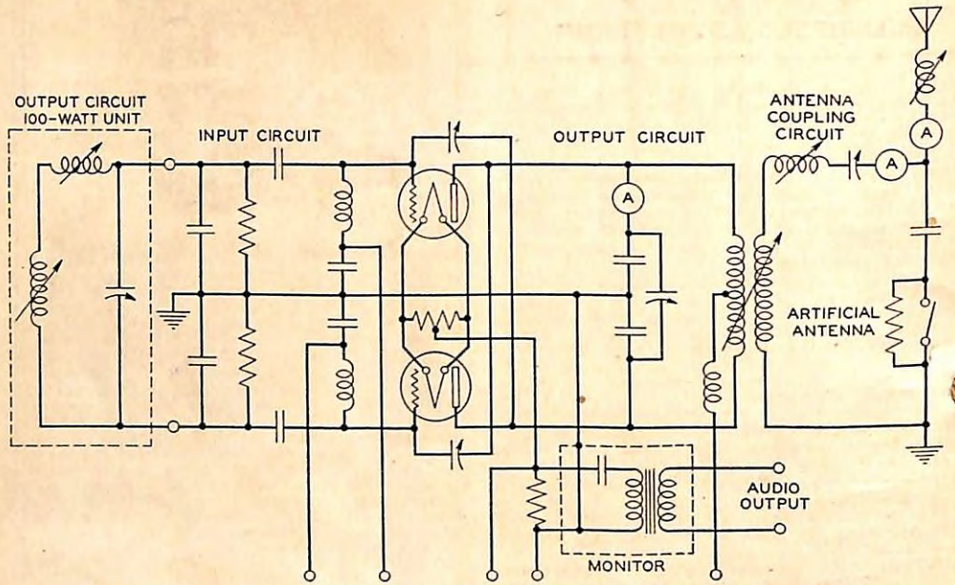


Fig. 5.—Simplified schematic of high-frequency circuit of power amplifier

the entire transmitter may be controlled by the master switch in the 100 watt unit. When this switch is operated all the various circuits are energized in the proper sequence, and the transmitter may be "put on the air" from a cold condition in less than a minute.

American Radio Telegraphists Association News

BOSTON NOTES

(Continued from Page 26)

it anticipated in replacing radiomen. The "Flow" has had a radio-telephone for several months now but the radio-telegraph operator on board seems to have no fear of losing his job.

Most of Boston's unemployed operators went out on relief trips during the Christmas and New Year's holidays. The RMCA static room was exceedingly peaceful and quiet during that period.

Carroll Saunders of the "Arcadia" is our first new member of the A. R. T. A. for the new year. Congratulations, Carroll. And Theron Copeland of the Collier "Plymouth" started the year off right and set an example which might well be followed by at least a few others by paying his association dues clear through the year, 1933.

According to reports from New London, six of the Portland Trawling Company's fleet of seventeen trawlers are back fishing. During the summer months Georges Bank might well have been on the Antarctic Ocean for all the activity out there, but evidently it is not so lonesome now. Not that the trans-Atlantic liner skippers are especially pleased, particularly in foggy weather.

Rumors around Boston that the M. E. B. A. and the Masters, Mates and Pilots Association are about to affiliate are without foundation, according to the local M. E. B. A. office.

THE BRITISH ASSO. AND I. F. R.

(Continued from Page 17)

at sea, and at the same time secure for the personnel of the world's Marine wireless proper and adequate conditions of service and compensation for their labors.

In order to secure these things, the closest possible co-operation between all national organizations of Marine wireless operators thruout the world is not only essential but, in view of the inherent and fundamental difficulties imperative. That is the work of the I. F. R. and it can be safely said that by having this central body, those organizations affiliated to the I. F. R. are kept advised of all movements and conditions affecting their colleagues in other countries.

Periodically, the controlling body of the I. F. R., upon which each national organization is represented, meets in order to discuss questions of moment and to decide upon what action or actions shall be taken. In this respect the activity of the I. F. R. at the recent International Radiotelegraph Conference at Madrid is an example.

In conclusion I have only to wish our American colleagues success in building up their national organization and to record the hope that the time is not far distant when they will become affiliated to the International Federation of Radiotelegraphists and so help in the common cause of all Marine wireless operators.

"CQ" CLASSIFIED ADVERTISING

CQ will accept classified advertising from licensed radio operators and persons employed in allied services at the special rate of five cents per word.

Remittance in full must accompany copy, closing date for classified advertisements is the first of the month preceding publication date. Provisions of paragraphs (1) and (2) apply to all advertising in this column, regardless of which rate may apply.

SENSATIONAL MICROPHONE VALUE—Universal Model "Y"—Experimenters single-button, watch model type. 200 ohms. Pure Gold Spot Center Diaphragm. Only $2.00, including valuable 1933 general catalog with diagrams. Universal Microphone Co., Ltd., Inglewood, California.

FOR SALE—Radio Model Vibroplex, heavy contacts, $10.50. Like new. Guaranteed. L. D., care CQ. 112 W. 13th St., N. Y. City.

WANTED—Back copies "Lightning Jerker," "CQ" or Radiomarine literature. Ray Terry, SS Alabama, Texas Co., Port Arthur Texas.

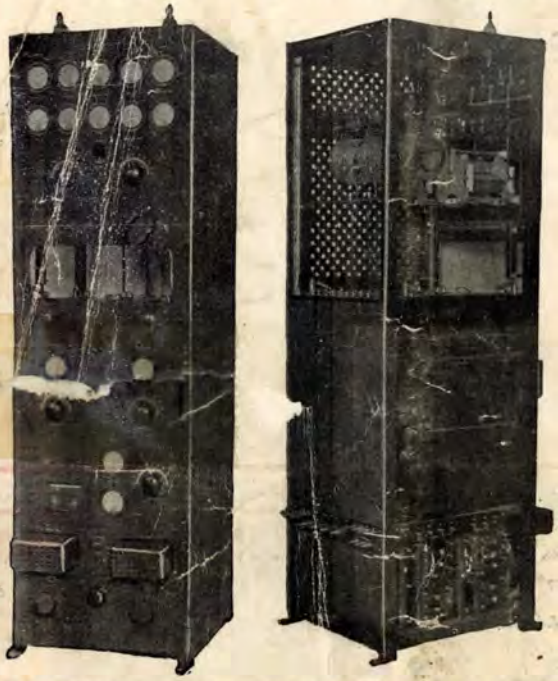
WANTED—Real bargain in Marine long and short wave receiver, Omnigraph, transmitting tubes, meters, etc. J. Grigg, 80 Roanoke Ave., Phoenix, Arizona.

100 WATT TELEPHONE TRANSMITTER

Approved by Federal Radio Commission

FOR BROADCASTING OR POLICE USE

REL



The above illustrates front and side views of the Cat. No. 256 transmitter. Note that the design allows ready accessibility to all parts. The illustration to the right clearly shows the plug-in cabinet arrangement and underneath this the "C" bias voltage divider resistance bank. The push button mounted in the lower center front automatically controls the motor generator. The plug-in crystal temperature compartment fitted with a thermometer is shown on the front illustration.

COMMERCIAL TYPE TRANSMITTERS

100 Watt Tel. and Tel. Transmitter

Cat. 256—Code "Edshu"

This transmitter will fulfill all the requirements for a modern radio station. It is adapted for broadcasting, ground stations for aircraft use, police service and any other similar applications. The circuit meets the requirements of the Federal Radio Commission regarding ability to maintain frequency stability. The quartz crystal is housed in a temperature compartment which will accurately maintain the temperature to 0.1 degrees C. When ordering specify exact operating frequency.

Electrical characteristics of the Cat. No. 256 are briefly as follows: Quartz crystal oscillator—Automatic heat control for maintaining crystal at constant temperature—Screen grid tubes in buffer and intermediate amplifier stages—Push pull power amplifier output circuit adapted for either telephone or telegraph transmission—100% modulation system—Power output for telephone 100 watts carrier 400 watts peak modulation—Telegraph output 100 watts carrier—Keying relay adapted for high speed transmission—All power obtained from one 3 unit motor generator set—Oscillator, buffer and intermediate amplifier circuits individually shielded in plug-in tray arrangement—Automatic overload relay gives full protection for generator and tubes—Full complement of meters.

Equipment comprising complete Cat. No. 256 transmitter installation: One Cat. No. 256 transmitter unit—One complete set of tubes—Two quartz crystals—One motor generator unit—One automatic starter—One Cat. No. 255 station amplifier and mixing panel completely equipped with tubes and batteries—Two microphones with floor stands, cords, plugs and studio connection plates.

The only other material necessary and not supplied is the antenna equipment and the electrical fittings and wire required for interconnecting the various units.

Size transmitter unit: 20" wide, 5'-10" high, 28" deep.
Size motor generator unit: 14" wide, 5'-0" long, 16" high.
Total net weight: 970 pounds. Total shipping weight: 1,270 pounds.

FREE: Send for Catalogue C1; Showing Commercial Transmitters.

RADIO ENGINEERING LAB'S., Inc.

100 Wilbur Ave. LONG ISLAND CITY, N. Y.