

RADIO LORE FOR NOVICE AND EXPERIENCED FAN

United States Maintains Great Interest in Radio Development

Army and Navy Jointly Operate Vast System Over Entire Country.—Departmental Laboratories Build and Experiment Daily

BY A. G. WEST.

One of the most important, as well as one of the most fascinating problems of the day is the radio. It is hardly appreciated that Uncle Sam is tremendously interested in his own account in this wireless exploration of a realm vastly greater than was dreamed by the pioneers of an earlier day.

History repeats itself. And just as Spain and Portugal, Holland and Russia sent out emissaries to find a short route to the riches of the Orient, so the nations of this later day and age are supporting scientists to explore the hidden mysteries of the upper atmosphere, and the secrets of the short wave. And if the explorations are conducted behind closed doors rather than on the high seas, it is merely the new technique in this race for supremacy. A race in the field of knowledge; a vital asset to the military prestige of a nation.

For the radio is the first solution of a problem that has baffled military commanders by land or sea through the centuries. History is replete with instances of the use of couriers, and the replays with the instances of their failure to reach the beleaguered armies, or to avert disaster with the shifting of the tide of battle. The early Roman built staunch roads in Gaul and in Britain and Spain, over which the couriers of the post rode, and the speed in relaying, changing their horses at the "posts" along the way.

But the navies of all countries were dependent on visual signals from ship to ship, which greatly hampered their movements in time of battle so far as an exchange of information or a change of orders was concerned, and even with the event of the discovery of the telephone and telegraph, it was impossible for the commander of the battle to communicate orders to vessels beyond visual range of the flag officer.

How greatly the situation has changed in the last few years in respect to naval communications is best appreciated by the off-told tale of the mystery radio set that was discovered on the Leviathan during the war, when it was intercepted by this country. Prior to that time radio messages were sent over by the enemy on a short wave that is sometimes quoted as being around 40 metres, but in either case, though the authorities had good grounds for suspicion that messages were being transmitted, they were watched for on a wave length of 1500 to 2000 metres, and, of course, were not found.

Even as late as three or four years ago, when the noted amateur, John L. Reinhardt, spoke of his intention to communicate with the West Coast at night on a wave length of 40 metres, the idea was hoisted at ... but not for long. And today, so swift is the pace of radio development, that the radio wave, a transmitter owned by the army is now under test for wave lengths of 17 metres on which it is hoped reliable communication may be had from Washington to San Francisco both by day and night.

Uncle Sam, in fact, is taking his radio very seriously. He has not only found that it is the one method by which he may send messages at a tremendous saving of time and power, but the speed of transmission is as effective almost as it is by land, or if anything, a little better. Instead of having a series of radio outfits for each branch of the service, however, it has been arranged so that the navy and the army divide the labor together, and the running cost of equipment and upkeep is thus materially lowered.

Through a special arrangement formulated by the joint army and navy board and approved by the President, the navy handles all ship-to-ship communication, as well as all long distance radio. The army handles all point-to-point communication within the United States, and schedules for both services are on a 24-hour basis. And whereas the telephone and telegraph and cable was formerly the right hope of the military service, they have now been completely replaced, and in some cases superseded by the radio transmission of messages so that an increasingly large and important branch of the Government is linked up to its "radio center."

Translated into action, this means that the simple phrase, "naval communications" is a phrase to conjure with Washington, D. C., as the capital of the nation and the seat of government is the natural center of many of these activities, and is the focus around which many plans are made and executed. The radio to China for the State Department, the message to the Philippines from the Secretary of War to the commanding General; the time signals to ships at sea, demand a background of trained personnel, transmitters and receivers, and their constant attention as maintained by improvements and repairs on limited appropriations. They demand, too, the oversight of a tremendous plant scattered all over the country. In isolated little villages as in Alaska, or in strategic points on our long coast line.

Many of these activities are to be found in an inconspicuous spot in the Washington Navy Yard known as the radio test station. A small staff of 10 picked inspectors and a few assistants in charge of Lieut. William Klaus, U. S. N., act as radio doctors to the seven navy radio stations on the Potomac and Severn Rivers. These include the sets at Annapolis, Ancon, Dahlgren, Quantico, Washington Navy Yard and Radio Center at the Navy Building at Washington.

This staff also co-operates with the famous research laboratory at Bellevue, where such men as Dr. A. White-Taylor and Dr. R. H. Bates, are engaged in special research in problems affecting the upper atmosphere in competition with the scientists in England and elsewhere. All new materials for the battle fleet, such as condensers or screws, or radiating generally, must be completely tested by the inspectors under Lieut. Klaus before acceptance by the Government, and this may be merely a brief affair of moments or it may require many months, or a year, of patient, cautious work.

The shop not only inspects and invents radio apparatus, but it applies to the day's work. Each person arriving on duty there is given a special signal on the radio, and his or her at-

Attention is drawn to this call for the first few days until it is thoroughly learned.

Much of the work at the radio test shop is done under heavy pressure and frequently after the regular hours and in addition to them. It is no unusual thing for the staff to be called out in the early dawn to make repairs to the radio installation of one of the stations, and then to be back on the job at the shop after breakfast in order to get out some special order for the fleet.

A story is told of a race against time last year with a certain outfit intended for the U. S. S. Denver. Three sets had already been ordered and were under way in due process of construction when Lieut. Commander Raymond telephoned over one day with the news that the Denver was due to sail for Tacoma-Arica from Panama in 15 days and that the last steamer that could catch her was a boat leaving New York on the following Wednesday, five days off.

The staff at the shop took a long breath, rolled up its sleeves and tore into the delicate mechanism that goes to make up a transmitter and the rest of the outfit. They worked all that night until 2 in the morning, and all day Sunday and up to 11 p. m., and also Monday and Tuesday and into Wednesday morning, when the job was completed and the biggest and huskiest inspector in the place selected to rush it up on the ship in New York.

He had his orders to land that radio on the boat, regardless, and it is no secret that a number of taxi drivers met their Waterloo, as well as a lot of red tape when he reached the dock and the officials tried to keep him off the boat in question. However, the Denver got its radio when the vessel docked at Colon, but the best part of the story is the tale of the success of that same XW set after its graduation into active duty. It had cost in the neighborhood of \$500, but in 30 days had saved the Government \$500 in cable tolls, and will no doubt receive a distinguished service stripe on returning to Washington.

Nowadays "remote control" is the proper method of handling extensive radio traffic, whether it is for the Government wireless or for private concerns. The radio operator at the Navy Building sits at a desk in a room known as "Radio Central" with his "bug" beside him and a typewriter in which he decodes the messages coming in on his head phones.

These are translated and handed to the supervisor, back off and send in by carrier to the communication office on duty to forward to the proper official. One operator may be sending out to the West coast and the one beside him receiving messages from the same place, and the two operators are thus using the same transmitter for two channels of communication. Any free time interval on the part of one of these operators allows the transmitter to be used by the second man for some other channel. The normal method is when one set is between several of the operators.

There are about 47 men in duty in this office, with three shifts of eight hours each, so that there is 24-hour communication without a break in the service. The two off-duty crews report for an hour each week to the instructor, P. G. Cronan, who gives them expert post-graduate radio work during their two-year tour at the Washington office prior to their duty at sea with the navy and the army.

One of the most interesting aspects of their work is that the radio operator in the navy handles all ship-to-ship communication, as well as all long distance radio. The army handles all point-to-point communication within the United States, and schedules for both services are on a 24-hour basis. And whereas the telephone and telegraph and cable was formerly the right hope of the military service, they have now been completely replaced, and in some cases superseded by the radio transmission of messages so that an increasingly large and important branch of the Government is linked up to its "radio center."

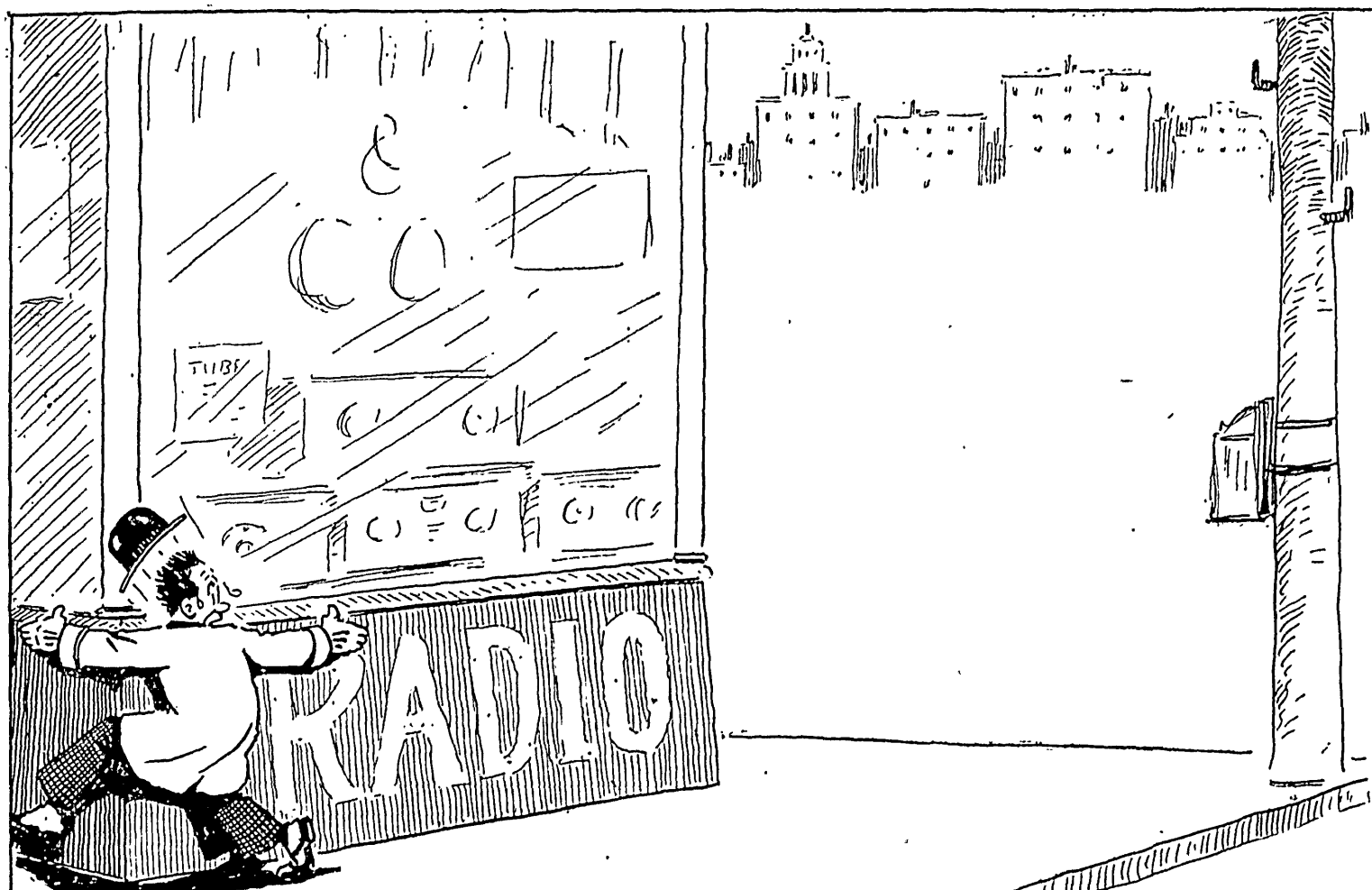
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SHORT CIRCUITS



The man who has always horned in with the remark that his little old crystal set was good enough for him anytime—decides to buy a Tube Set—

NAVY "RIGMAJIG" INTERESTS TWINS

Mama's Name for Beam Transmitter Brings Laugh

So Daddy Explains New Method of Sending Radio Messages Direct to Specified Destination and Doris and Donald Decide They Will Try It

"I see where the British navy has fixed up a rigmajig on the warship so the Duchess of York can ask each day how her baby, the Princess Elizabeth, is," remarked Mama one night after dinner.

"Rigmajig! Ye gods!" ejaculated Daddy. "Mamma, don't you know any more about radio than that?"

The twins were lying on their stomachs, flat on the floor, absorbed in Grimm's Fairy Tales, but they were all attention immediately upon the mention of radio.

"Why doesn't she go and see the baby herself?" asked Don.

"Why didn't she take the baby, too?" Doris wanted to know.

"Because the climate would be too hard on a little baby; it would be safer to leave it at home with the Queen."

"Why didn't she stay home and look after it?" scornfully asked the little Miss Doris.

"Because the King sent her and her husband to Australia, and when the King commands we must all obey, even the Prince of Wales." This from Daddy.

"How does she ask about the baby every day? I want to know," inquired Donald.

"Yes, John, do tell us how she can communicate with England. I'm curious, too," said Mamma.

"Well, to begin at the beginning: The scientists have long dreamed of greater secrecy in radio communication. Even Hertz, the discoverer of radio waves, worked with the idea in mind of directing his waves, back in 1885, when radio was merely a toy for scientists to play with. However, advances of radio have made appreciable progress since then."

"Most leaders in the radio field experimented with directional transmission until radio began to meet with its commercial success in 1902. But most of the inventors, even Marconi, dropped it along with a lot of other ideas about this time. But the idea must have persisted with Marconi for about five years ago he set to work to make the most monstrous undertaking of his career, the building of what we know today as the Trans-Atlantic Beam Radio Chain."

waves move out in all directions at the same time, which uses a great deal more power than the beam and also lets people all around hear the station.

"Although Marconi has simply improved the devices of another, it must be remembered that his a long shot from sending signals over a few feet of space in a laboratory, as Hertz did, and in sending them half-way around the world as Marconi is doing."

"Stations in the great Empire chain have been erected at South Africa, Australia, India, England, and in Montreal, here in Canada. Each station is so erected that it may communicate with only one station in the chain. Separate aerials are used for transmitting and for receiving. Later, experiments in the transmission of speech have proved successful and are intended to be carried on with a view to starting a trans-Atlantic telephone service so that a person may talk direct to another almost anywhere in the British Empire from his private telephone. However, at present practically all correspondence is telegraphed by means of automatic equipment. The regular rate of two-way communication is 1200 letters per minute (600 transmitted and 600 received). There are two complete transmitting and receiving stations in Quebec near Montreal; one communicates with England and the other with Australia. Now, do you understand how the Duchess of York can ask Queen Mary if the Princess Elizabeth has cut her first tooth yet?"

"Yes, I do, and I think the twins do, too. Now, it's bedtime, off to bed with you youngsters," ordered Mamma.

"Let's build a beam transmission station and see if we can send radio messages ourselves," said Donald as they climbed the stairs to bed.

"Let's. We'll start right in in the morning," agreed his sister.

(The Fenwick Radio News Service, Toronto 5).

ON ASSEMBLY

Set Builder Should Study Diagrams with Care Before Construction.

When planning the construction of some particular type of radio circuit it will be well to first be familiarized with the pictured diagram by listing the parts. It will also be beneficial to go out and look at the construction of several different types of radio receiving circuits so as to become acquainted with the logical method of arrangement of parts.

This is very important if it is desired to have a neat appearing and well balanced job as the result of the efforts. Do not spread the parts all over creation, yet do not place them in such relationship as will cause squealing and howling. Do not run grid and plate leads all parallel to each other, regardless of how the picture diagram shows it.

Keep in mind that the diagram as pictured is a standardized method of depicting a circuit and it is drawn in the neatest possible way, which in nearly every case means that the wires are shown parallel. It is not always possible to arrange parts as they are arranged in the diagram and, for the most part, bear in mind that this is not absolutely essential.

If the diagram is followed is one made up actually picturing the parts it may be possible to get some idea as to the arrangement of the parts in the finished set, otherwise it is well to always remember that the radio hook-up is but a diagrammatic picture of the actual wiring of the set and that it does not show just how these wires will be laid out in the finished receiver.

RADIO PROGRAMS

WEAN broadcasts today at 10:40 a. m. services of All Saints Church; a concert from the Boston Square and Commonwealth Club at 4 p. m. an organ recital at 6:30 p. m. and music by the Asia Serenaders at 7 p. m. Monday at 9 p. m. a musical program will be given by the Melody Ramblers and Tuesday at 9:30 p. m. Pauline's Novelty Orchestra will be heard. Wednesday at 7:30 p. m. the annual banquet of the Providence Engineering Society will be broadcast from the Biltmore Hotel and Thursday the station's regular entertainers will be heard. Friday at 9 p. m. a concert will be given by the Melody Ramblers and Saturday at 9 p. m. dance music by the Rhodes Orchestra will be broadcast.

WJAR presents tonight at 7:20 the program of the Capitol Theatre Family, and at 9:15 p. m. the Alvin Karpis and his band. Monday at 7:45 p. m. a short talk will be given on "Maine Day" by Past Department Commander John J. McGrane of the Veterans of Foreign Wars, and Tuesday at 8:35 p. m. bus songs will be sung by Elton A. Cook. Wednesday at 8:15 p. m. the National Cavalier Male Quartet will be heard and at 7:50 p. m. Thursday a chat about the Community Fund will be given. Friday at 8 p. m. services from Temple Beth-El will be broadcast, and Saturday the regular schedule will be followed.

WLSI broadcasts today at 6:30 p. m. a program of the International Bible Students' Society. Monday the station will be silent. Wednesday at 8 p. m. the program of the Book Shop will be heard, and on Thursday at 8:15 p. m. a talk will be given by Carl B. Marston on investments and securities. On Friday at 7:30 p. m. a talk on travels and tours will be given by Eli Ayresworth. Tuesday and Saturday the regular schedules will be followed.

WDWE will give its Sunday recital this afternoon at 4:45 p. m.

WEAN—THE SHEPARD STORIES—361. 500 Watts—Standard Time.

Today.

10:40 a. m. Services from All Saints Church. 4:20 p. m. Y. M. C. A. Concert. 7:40 p. m. Y. M. C. A. Concert.

Monday.

11:55 a. m. Time signals. 12:10 p. m. Shepard Colonial Concert Orchestra. 12:15 p. m. Weather report. 4:00 p. m. Musical program. 4:30 p. m. Weather report. 6:30 p. m. Boston dinner dance, "Dok" directed by Ann G. Randall, subject, Rhode Island. Subject, "Complicity Assurance."

Tuesday.

10:40 a. m. Home Service Radio Club for Girls, by Miss Kathleen Atkinson. 11:55 a. m. Time signals. 12:10 p. m. Shepard Colonial Concert Orchestra. 12:15 p. m. Weather report. 4:00 p. m. Musical program. 4:30 p. m. Weather report. 6:30 p. m. Boston dinner dance, "Dok" directed by Ann G. Randall, subject, Rhode Island. Subject, "Complicity Assurance."

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Today's Programs in Brief

For the convenience of radio fans, the following hourly schedule of broadcasting to-day is given in brief form, the complete program being given under the regular listing of announcements. Figures following stations denote wave length.

The hours are based on Eastern Standard Time.

LOCAL STATIONS		6:30—Muscle, WBZ, 233.
10:40—Church, WEAN, 367.		Orchestra, KDKA, 309.
4:00—Concert, WEAN, 367.		Orchestra, WBAL, 248.
4:45—Recital, WDWE, 441.		Orchestra, WCCO, 416.
6:30—Organ, WEAN, 367.		Orchestra, WJIN, 221.
6:30—Concert, WLSI, 441.		Orchestra, WJIN, 221.
7:00—Concert, WEAN, 367.		Orchestra, WJIN, 221.
7:20—Concert, WJAR, 485.		Orchestra, WJIN, 221.
9:15—Concert, WJAR, 485.		Orchestra, WJIN, 221.
OUT-OF-TOWN STATIONS		7:15—Church, WJZ, 508.
9:00—Children's hour, WJZ, 454.		Church, WCN, 516.
9:30—Sunday school, WJW, 422.		Church, WCN, 516.
10:00—Church, WJAR, 485.		Church, WCN, 516.
10:25—Church, WJAR, 485.		Church, WCN, 516.
10:30—Sunday school, WSP, 428.		Church, WCN, 516.
10:35—Church, WKBW, 362.		Church, WCN, 516.
10:45—Church, WOO, 508.		Church, WCN, 516.
10:50—Church, WKBW, 362.		Church, WCN, 516.
11:00—Church, WJZ, 508.		Church, WCN, 516.
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5:00—Church, WJZ, 508.		Church, WCN, 516.
THURSDAY.		9:00 p. m.—Classical and semi-classical music.
5 p. m.—Studio program.		10:00 p. m.—Organ recital, Alex. Rell.
6 p. m.—Weather report.		11:00 p. m.—The console.
7 p. m.—Community fund chat.		12:00 p. m.—Chorus hour.
8 p. m.—Theater of the Powers Hudson-Essex orchestra.		1:00 a. m.—Orchestra.
9 p. m.—Chequid Club Eskimoes.		
10 p. m.—Concert. Features under the direction of Henry Burr.		
Friday.		
9 a. m.—Hudson radio Exchange. A department conducted by Mrs. Wood on all matters of household interest. All questions submitted will be answered by radio.		
5 p. m.—Studio program.		
6 p. m.—Weather report.		
7 p. m.—"Musik Takelak" by Mabel Woolsey.		
8 p. m.—Services from Temple Beth-El.		
9 p. m.—Health talk, sponsored by the Rhode Island Medical Society.		
10 p. m.—Patricia Butterliners.		
11 p. m.—Charles E. Price, secretary—Rhode Island Automobile Club of Rhode Island. Subject, "Compulsory Auto Insurance."		
12 p. m.—Chateaux, tenor.		
1 p. m.—Whittall's Anglo-Persians.		
Saturday.		
5 p. m.—Al Williams and his Harmony boys.		
7 p. m.—Weather report.		
WLSI-LINCOLN STUDIOS, INC.—411		
Today.		
9 p. m.—Bible Students' Society program.		
Monday.		
Tuesday.		
9 p. m.—Hotel Dreyfus Trio.		
10 p. m.—Campana Girls.		
11 p. m.—Book Shop program.		
12 p. m.—Billmore Market hour.		
1 p. m.—Narragansett Hotel Orchestra.		
2 p. m.—Talk by Carl P. Mayhail on "Investments in Securities."		
3 p. m.—Talk by Ed Aylesworth on tours and travels.		
4 p. m.—Arcadia Orchestra.		
5 p. m.—Billmore Hotel Orchestra.		
Wednesday.		
DWT-PUTNEY WILCOX ORCHESTRA—411		
Today.		
5 p. m.—Jetties.		
OUT OF TOWN STATIONS		
To-Day		
PWX—HAYANA—400		
5 p. m.—Concert.		
6 p. m.—Orchestra.		
7 p. m.—Jockey Club.		
KDKA—EAST PITTSBURGH—309		
5 a. m.—Service of the Christ Methodist Episcopal Church.		
6 a. m.—Organ recital by Dr. Charles Heinroth.		
7 a. m.—Vesper service of the Shady Side Presbyterian Church.		
8 a. m.—Symphony orchestra.		
9 a. m.—Service of the First United Presbyterian Church.		
10 a. m.—National weekly review.		
KFI—LOS ANGELES—467		
5 p. m.—Services under direction of Loe A. E. Kefauver.		
6 p. m.—San Francisco Symphony Orchestra.		
7 p. m.—Services under direction of Loe A. E. Kefauver.		
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Evolution of Music from Noise Typifies Broadcasting Advance

Modern Quality Reproduction Required Years of Hard
Work and Many Discouraging Experiments.—First
Amateurs Had to Build Most Parts

By LLOYD JACQUET

Nothing typifies the broadcasting progress as much as the evolution of music from noise.

While engineers have solved many problems of pure broadcasting at the transmission end, the audio frequency amplification part of modern receiving sets, in connection with well-designed loud speakers, really show the real development of radio.

Only a short decade ago amplifying transformers could not be procured by the average amateur experimenter. He had to design and build his own amplifier. The desired to make use of the novel effects just discovered by Dr. Lee De Forest, in which signals could be actually magnified, coupling them by means of "transformers."

It was in 1915, long before broadcasting was thought of on the scale of today, even by the most visionary, that the first commercial transformer for amplification in radio circuits was designed and produced by Louis G. Paenat, an amateur experimenter of considerable ability then in the employ of an electrical company.

The author remembers purchasing one of those "intensifying transformers," as they were called then, for \$15, a large sum at that time for a single piece of apparatus, even when a good grade of variable condenser cost as much as \$35. Upon opening up the oak box in which it was encased, he curiously examined the new wonder of the wireless world.

Those crude transformers looked very much like the conventional radio coil of today, but they were made of a primary and secondary winding of enormous dimensions. The whole assembly was thoroughly paraffined and wedged into the small coffin-like box carrying the conventional four terminal binding posts.

For frequency amplification range these intensifying transformers exhibited characteristics which would make them curiosities to the radio fan of today. They were built for a frequency range of from 500 to 1000 cycles, which was quite sufficient, of course, for the average and general run of spark telegraph signals which were the only joy of the experimenter of years ago.

Two such intensifying transformers hooked up to the early De Forest "Audions" gave remarkably improved signal strength on coast spark stations as far away as Norfolk, Va., Chatham, Mass., and even the Great Lakes. The whole outfit was cumbersome, as the transformers measured easily six inches in length, and it was decidedly expensive to set up and operate.

Set builders and users of today have the benefit of years of experimenting, research and manufacturing, which has gone to improve every separate radio device, the least of which is not the amplifying transformer. The shapes and sizes of all instruments have been considerably altered from year to year and many can remember no doubt the small amplifying transformers which were made a few years ago. Today the trend is back again to the 1915 size, and veritable "cover" transformers are the order of the day.

It requires much iron and much copper to amplify a wide range of musical frequencies. Indeed, all of the present high grade or so-called laboratory grade transformers are veritable giants alongside the small transformers of a year or two ago. Not only in enormous proportions, but in many other details, the present transformers differ from the old-timers. Thus in the case of the transformer of 1915 the iron had to be selected after a series of exhaustive tests. Bolts have been avoided in assembling the inter-meshed leaves or laminations of the core. The windings have had to be designed with a minimum of distributed capacity, which is achieved by sectional windings. The number of windings has had to be determined by painstaking tests. The ratio of primary to secondary windings has been the subject of long experimentation. The audio-frequency transformer problem is solved for the present, at least, and will remain amply solved until loud speakers and broadcasters take another vast stride ahead in realistic tone.

The first step toward quality amplification, therefore, is to select a good grade of modern transformer. With practically no inherent distortion, the good transformer goes away with all manner of shunted high resistance and condensers aimed at improving the quality which should be present in the first place. It is a plain case of over-provision, made necessary by a long start, so to speak.

With good transformers no accessories are required across the primary or secondary windings. However, a small condenser of say .0005 microfarad capacity may be placed across the primary winding simply to bypass the energy flowing through the detector plate circuit. This condenser, however, has nothing to do with the operation of the transformers or amplifier itself.

Speaking of by-pass condensers, it is desirable to employ by-pass condensers of one or two microfarad capacity across the B and C batteries, particularly when these batteries are somewhat run down. By-pass condensers only facilitate the flow of radio frequency currents by providing an additional detour through a high-resistance battery, but also tend to even up the output of the battery so as to avoid voltage fluctuations and their subsequent noises.

The most frequent cause of distortion in the properly built audio-frequency amplifier is the overloading of the vacuum tubes. In fact, good transformers alone are not sufficient for quality amplification, good tubes of ample capacity are also necessary, for it is the combination of these two factors which provides quality amplification with plenty of volume.

While the usual 201-A type of vacuum tube will perform satisfactorily with limited volume, it is not the full volume called for in most instances. Thus the second tube of the stage amplifier becomes overloaded, and consequent distortion. The second stage of audio-frequency amplification should therefore be provided with a power tube, such as the UX-112 or UX-120, depending on whether the amplifier is operating on storage battery or dry battery.

Power tubes are a logical development in present-day radio reception. It should be borne in mind that a 210 type tube for instance is about a 7½ type tube with 400 volts on the plate. The undistorted output from such a power tube is about one-tenth of the energy required, or 0.75 watts. On the other hand, the standard 219-A type takes about one watt of energy, with an undistorted output of about 0.1 watt. The undistorted output from a 210 is surprising small, indeed, under

critical test our engineers have found the undistorted output to be as small as one-sixtieth of the total output. Is it any wonder, therefore, that power tubes are so essential for good reception?

It is especially in connection with summertime reception that the power tube is an important factor. Today, with higher power at the broadcasting end, it becomes impossible to cut down the static background to negligible proportions. The radio-frequency end of reception may be made exceedingly selective, so as to tune in sharp, clean-cut signals. Then with a power tube for the second stage of the audio amplifier, the clean-cut signals can be built up to the desired volume, as compared with the usual practice of tuning broadly with plenty of static included, because of the limited amplification of the audio end.

NEW TRAIN SIGNALS

Germans Patent Device for Sending and Receiving Aboard Trains

An invention has recently been patented in Germany which will permit the sending of signals between trains by means of high frequency radio waves. According to a report to the Department of Commerce, under the system each train would be equipped with sending and receiving apparatus, both tuned to a particular wave length, for a certain track. The sending set on each train is to send a certain warning signal continuously whenever the train reduces its speed or stands still. This is automatically done by a direct connection to the compressed

air brake system, or by a connection with the brakes themselves.

This message would be received by the set on the following train running on the same track. The attention of the engineer of the train would be attracted through a peculiar noise, or else the receiving set would fix the brakes of the second train and automatically reduce its speed or bring the train to a stop if the wave transmission from the preceding train continued.

BROADCASTING TRICKS

Stations Sometimes Devise Pranks to Mystify Public

Have you ever noticed that at the conclusion of a program some of the broadcast stations go right on without a moment's notice, writes W. F. Crosby, in the January St. Nicholas. You may have heard WJZ do this. The program will be coming from some hotel orchestra and when it is finished the announcer will tell you about it; but right in the middle of a sentence, another announcer will come in and conclude what the other man started. The only way that you can tell this is to listen closely and detect the slight differences in the voices.

In one case of this kind, recently a hotel orchestra was timed to keep pace with another several miles away by both orchestra leaders having on head-receivers. The controls were so arranged that one orchestra was gradually cut out while the other was at the same time slowly cut in so that there was no perceptible difference to the listener. Imagine the radio fans' surprise when, at the end of the selection, they discovered that the new program was coming from an entirely different hotel!

Trees for Future Generations.
Planting and raising trees for future generations are one of the activities of electric power companies of which few people hear. A single company in northern New York State planted 4,000,000 trees between 1914 and 1926 and expects to make the total 10,000,000 by 1930.

RADIO PROGRAMS

Continued from Page Six
9:15 p. m.—Atwater Kent hour.
10 p. m.—Musical program.
10:45 p. m.—Male quartet.
11 p. m.—Weather report.
11:50 p. m.—Organ recital by Hugo Philter Goodwin.

WCC—DETROIT—316.
7:30 p. m.—The Detroit Symphony Orchestra.
8:00 p. m.—Art Appreciation talk.
7:15 p. m.—Services from Central Methodist Episcopal Church.

WEAF—NEW YORK—402.
2:00 p. m.—Inter-denominational church services.
3:00 p. m.—Young people's conference, address by Rev. Daniel A. Telling, "The Church's Debt and Safety."
4:15 p. m.—Address by Dr. S. Parkes Cadman, subject, "Lincoln's Bequest of Our Republic."
7:30 p. m.—Lucille Blane, pianist.
8:00 p. m.—Serena from "Romeo and Juliet."

2:00 p. m.—Musical program from the Capitol Theatre.
8:15 p. m.—Atwater Kent hour, presenting Mary Lewis, soprano.
10:15 p. m.—Bible story.

WEEL—BOSTON—348.
10:30 a. m.—Services of the Old South Church.
2:00 p. m.—Concert.
4:00 p. m.—Phantom.
4:00 p. m.—Address by Dr. S. Parkes Cadman.
5:20 p. m.—Radio chats.
7:20 p. m.—Capitol Theatre program.
8:15 p. m.—Atwater Kent hour.
10:15 p. m.—"Crucible the Air."

WENC—BERRING SPINGS—316.
12:40 a. m.—Chapel service.
9:15 p. m.—Sermon, Elder W. A. Westworth.

WENR—CHICAGO—266.
3:00 p. m.—Chapel hour of better music.
10:30 p. m.—Trio.

WFAA—DALLAS—176.
3:30 p. m.—Farmers' hour.
5:00 p. m.—Bible class.
8:30 p. m.—Service, City Temple.
8:30 p. m.—Duo.
12:00 p. m.—Symphonic orchestra.

WFI—PHILADELPHIA—301.
4:30 p. m.—Address by Rev. Dr. Charles R. Erdman.
7:30 p. m.—Services from the Arch Street Presbyterian Church.
9:15 p. m.—Atwater Kent hour.

WGRS—NEW YORK—316.
4:00 p. m.—"Little Church Around the Corner."
9:30 p. m.—Old-time minstrel show.
10:30 p. m.—Symphony Orchestra.
10:30 p. m.—Orchestra.

WGH—CLEVELAND—266.
3:00 p. m.—Orchestra.

WGHP—DETROIT—276.
7:30 p. m.—St. Paul's First Church Christ Scientist.

WGR—BUFFALO—319.
10:45 a. m.—Services from the Westminster Presbyterian Church.
7:45 p. m.—Services from the Central Presbyterian Church.
8:15 p. m.—Atwater Kent hour.
10:15 p. m.—Concert.
11:15 p. m.—Weather forecast.

WHAD—MILWAUKEE—275.
4:15 p. m.—Turner symphony orchestra.
7:15 p. m.—Concert of sacred music.
7:45 p. m.—Selections from the Bible and science and health with key to the Scriptures by Mary Baker Eddy, read by Augusta E. Stetson, C. S. S.
9:00 p. m.—Organ recital, Mary Ray Plimney.

WHAR—ATLANTIC CITY—275.
10:45 a. m.—Services of the Chelsea Baptist Church.
2:15 p. m.—Trio.
2:45 p. m.—Sermon, Rev. George W. Yard.
7:45 p. m.—Services of the Chelsea Baptist Church.
9:00 p. m.—An hour with the classics.

WHAS—LOUISVILLE—299.
11:00 a. m.—Services of the Broadway Baptist Church.
5:30 p. m.—Religious evening service from Christ Church Cathedral.
7:30 p. m.—Capitol Theatre program.
9:15 p. m.—The Atwater Kent hour.

WHN—NEW YORK—361.
12:20 p. m.—Organ recital.
5:45 p. m.—Dance orchestra.
6:00 p. m.—Orchestra.
6:30 p. m.—Orchestra.
10:00 p. m.—Orchestra.

WIP—PHILADELPHIA—508.
4:00 p. m.—Lecture by Arthur Holmes of the University of Pennsylvania.
7:15 p. m.—Service from Holy Trinity Church.
10:00 p. m.—Symphony orchestra.

WJR—DETROIT—316.
10:00 a. m.—Service from First Baptist Church of Pontiac.
12:30 p. m.—Dr. Magary's Question Hour.
1:30 p. m.—The Woodward Avenue Presbyterian Church.
2:00 p. m.—Novena service from Shrine of the Immaculate Conception.
2:30 p. m.—Detroit Symphony Orchestra.
5:45 p. m.—Concert.
10:30 p. m.—Services from the First Baptist Church of Pontiac.

WJZ—NEW YORK—151.
9:00 a. m.—Children's hour.
11:00 a. m.—Park Avenue Baptist Church service.
3:55 p. m.—Vesper service.
5:30 p. m.—Vesper service.
7:30 p. m.—Coffey Lindlow, violinist.
7:45 p. m.—Organ recital.
8:10 p. m.—Male quartet.
8:30 p. m.—Meditation in cruise, "Cyprus."
9:00 p. m.—Concert orchestra.
9:30 p. m.—National weekly review.

WKBW—BUFFALO—362.
10:30 a. m.—Services of Churchhill Tabernacle.
12:15 p. m.—Concert.
2:00 p. m.—Services of Churchhill Tabernacle.

7:00 p. m.—Sacred concert and evangelistic service.
10:15 p. m.—Melody hour.

WLW—CINCINNATI—422.
9:20 a. m.—Sunday school.
11:00 a. m.—Services from the Seventh Presbyterian Church.
2:00 p. m.—Organ recital.
7:20 p. m.—Hymn time.
7:30 p. m.—Services of the First Presbyterian Church, Walnut Hills.
8:35 p. m.—Gitting Acquainted with Remothorn.
8:50 p. m.—String orchestra.

WLWL—NEW YORK—381.
8:00 p. m.—Church services.

WMAK—BUFFALO—365.
10:25 a. m.—First Presbyterian Church services.
3:00 p. m.—Musical program.
7:00 p. m.—First Church of Christ, Scientist.

WMAK—NEW YORK—341.
11:00 a. m.—Christian Science services.
12:30 p. m.—Concert.
1:30 p. m.—Orchestra.
2:00 p. m.—Orchestra.
2:30 p. m.—Concert.
2:55 p. m.—Chinatown Rescue Society services.

3:00 p. m.—Orchestra.
3:30 p. m.—Solos.
6:00 p. m.—Concert.
7:40 p. m.—Orchestra.
7:50 p. m.—String ensemble.
8:00 p. m.—John De Bueris and Walter Mueller, clarinet duo.
8:30 p. m.—Radio program.
9:40 p. m.—Music.
10:00 p. m.—Concert.
11:00 p. m.—Music.
11:30 p. m.—Concert.
12:00 a. m.—Music.

WOC—DAVENPORT—481.
2:00 p. m.—Program.
7:30 p. m.—Address by Rev. A. J. Hollingsworth, subject, "Is Your Bible Duty?"
9:15 p. m.—Atwater Kent hour.
11:30 p. m.—Musical program.

WOR—ROCHESTER—316.
8:00 p. m.—St. Luke's Episcopal choir.
10:15 p. m.—Concert orchestra.

WOO—PHILADELPHIA—308.
10:45 a. m.—Services from Bethany Presbyterian Church.
2:30 p. m.—Sunday school.
6:00 p. m.—Organ recital, Clarence K. Bowden at the console.

WOR—NEWARK—405.
2:00 p. m.—Matinee musicale.
4:30 p. m.—Studio program.
6:00 p. m.—Studio ensemble.
7:00 p. m.—Veronica Wiggins, contralto.
7:45 p. m.—Florence Ware ensemble.
7:55 p. m.—Concert.

WOW—OMAHA—326.
10:00 a. m.—Chapel service of the Omaha Group.
2:30 p. m.—Father Flanagan's Boys' home period.
7:00 p. m.—Bible study period.
10:00 p. m.—Chapel service.

WUHQ—NEW YORK—360.
11:00 a. m.—Calvary Baptist Church services.
2:00 p. m.—Concert.
7:20 p. m.—Calvary Baptist Church services.

WUC—WASHINGTON—169.
11:00 a. m.—Services from local church.
4:00 p. m.—Services, Washington Cathedral.
6:45 p. m.—Vesper concert.
7:20 p. m.—Musical program from the Capitol Theatre.
9:15 p. m.—Atwater Kent hour.

WUNY—NEW YORK—371.
11:00 a. m.—St. Matthew's Lutheran Church services.
4:15 p. m.—Religious music.
4:30 p. m.—All Souls' Unitarian Church services.
5:00 p. m.—Twilight hour.
6:00 p. m.—Business men's hour.
7:30 p. m.—Church services.

WVAI—CINCINNATI—326.
11:00 a. m.—Services from the Presbyterian Church of the Government.
3:45 p. m.—Chime concert.
4:00 p. m.—Address by Dr. S. Parkes Cadman.
8:00 p. m.—Sermonette.
8:40 p. m.—Atwater Kent hour.

WSB—ATLANTA—428.
10:30 a. m.—Sunday school.
11:45 a. m.—First Presbyterian Church services.
4:30 p. m.—Atlanta Symphony Orchestra.
6:00 p. m.—Vesper services from Second Baptist Church.
7:30 p. m.—Capitol Theatre program.
9:15 p. m.—Atwater Kent hour.

WSM—NASHVILLE—282.
7:20 p. m.—Capitol Theatre program.
9:15 p. m.—Atwater Kent hour.

WTAC—WORCESTER—318.
4:00 p. m.—Men's conference from Bedford Branch Y. M. C. A., Brooklyn.
7:00 p. m.—Vesper service.
7:20 p. m.—Capitol Theatre program.
9:15 p. m.—Daily news bulletin.

WTAM—CLEVELAND—380.
10:45 a. m.—Services from Euclid Avenue Temple.
3:00 p. m.—Musical.
4:30 p. m.—Amusement guide.
6:00 p. m.—Orchestra.
7:00 p. m.—Orchestra.
8:00 p. m.—Services from Euclid Avenue Temple.
9:15 p. m.—Atwater Kent hour.
10:15 p. m.—Orchestra.

WTIC—HARTFORD—425.
3:00 p. m.—Organ recital from Yale University, by Prof. Harry R. Jepson.

WVW—DETROIT—332.
11:00 a. m.—Church services from St. Paul's Cathedral.
2:30 p. m.—Detroit Symphony Orchestra.
2:30 p. m.—Capitol Theatre program.
9:15 p. m.—Atwater Kent hour.

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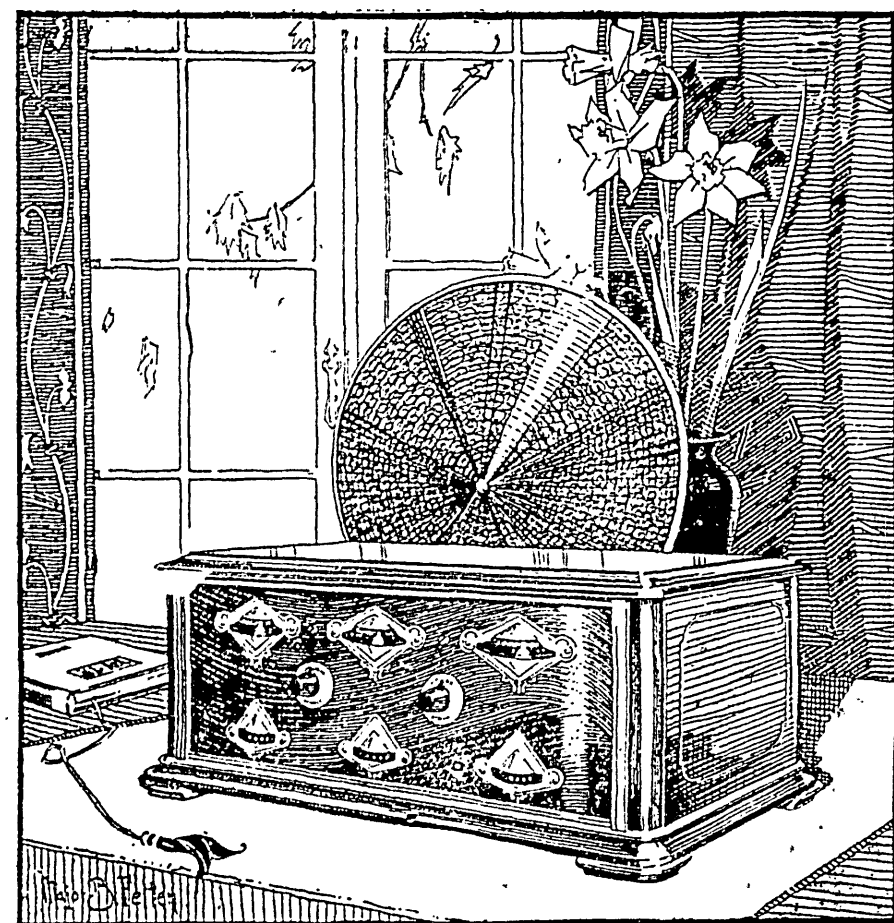


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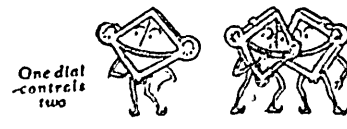
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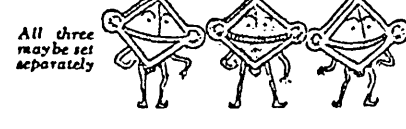
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NEW YORKER CASTS FIRST RADIO VOTE

Amateur in Jamaica on Business "Attends" Home Meeting

"Listens In" at Session of Radio Club of America Directors in Progress at Yonkers.—Holds Special Permit for Transmitting from British Soil

Casting his vote at a recent board of directors' meeting at the Radio Club of America, although 1700 miles away, John Grinan, old wireless amateur, in business in Jamaica, West Indies, "sat in" on the balance of the discussion, getting the entire proceedings from his friend, S. R. Runyon, Jr., 544 North Broadway, Yonkers, where the meeting was taking place.

This is believed to be the first authentic time that a vote was asked for, and received, all by radio, while the meeting was in progress.

Following the receipt of the vote, Grinan followed the proceedings of the meeting, being kept constantly informed about the developments by Runyon, who stayed at the key of his transmitter. The conversation, started some time after 5 p. m., continued until a quarter of 7, when the distant operator and director signed off to keep an engagement at a local hotel.

Successful communication had been carried on between the two American amateurs for a period of several months, it was learned.

Grinan is the only wireless amateur in Jamaica, an English possession, which is also one of the largest islands in the West Indian group. As he is transmitting on foreign soil it was necessary for him to obtain a permit from the Postmaster General, the official in charge of radio matters in the British Empire. He was granted a special permit to transmit, and is perhaps the only American amateur who has been thus honored by a foreign country, where radio regulations are extremely strict, particularly with reference to amateur work.

Four months ago Grinan left New York, where he has been extremely active for the past 15 years as an experimenter and amateur operator, for Jamaica, to take care of business on plantations.

It was only natural that he should attempt to communicate with his home and friends. He could buy no apparatus on an island where there is no broadcasting, and where wireless is practically unknown. He listened nightly to American amateurs on a receiving

set which he had brought, but could not transmit.

Parts for transmitting apparatus were sent down, and assembled quickly, with the friendly help of Runyon, who checked by wireless the various adjustments made by the experimenter in Jamaica. Some changes in the apparatus layout were advised by radio, and later made, which improved signals to a great extent.

Although the authorized wave-bank for American amateurs communicating on short waves is from 35.7 to 42.3 metres, Grinan has been using 33 metres. This is the official wave allotted him by the British Post Office authorities. His power is but 50 watts, and the sending has been mostly done in the late afternoon, during daylight.

In New York Runyon has a crystal-controlled push-pull 250-watt set, which is tuned to 80 metres. His call letters are 2AC. Grinan has been assigned NJ-2 FZ.

INDOOR AERIALS

Of the various kinds of indoor aerials, the best of these types is a regular aerial strung up indoors. Sometimes the wires can be placed in the attic or run down the hallway or through several rooms. An aerial placed in the cellar, in most cases, gives very poor results. There are other forms of indoor aerials, although they are really not all indoors, the most widely used being the attachment for a lamp socket. This makes use of the house wiring and the wires leading from the house to the transformer, which reduces the high voltage down to 110 volts. These are usually on a pole in the rear of the home. Another form of indoor aerial uses the telephone wires as the collector. With the latter type a piece of metal is placed under the telephone and a wire run from this metal to the aerial binding post of the set. The condenser effect between the metal plate and the telephone is the connection. Any one of these three methods make a very good substitute for the outdoor aerial.

Poor Ground Connections. Because some gas and steam pipes have rubber and other insulating materials at the joints, they are considered useless for ground connections.

BUREAU STUDIES WAVE ADJUSTMENT

Government Experts Develop Piezo Electric Oscillator.

New Radio Device Enables Station to Maintain Constant Frequency or Wave Length.—Also Said to Aid in Reducing Interference.

The increased number of broadcasting stations caused the Bureau of Standards to devote considerable attention during the last fiscal year to the problem involved in reducing interference, according to a report of George K. Burgess, director of the bureau. Dr. Burgess stated that the research has been successful. Notably among the important devices developed in this direction is the piezo electric oscillator, the report continues. By the use of this device it is possible for a station to maintain a constant frequency or wave length, and to a great extent reduce interference. During the past year a number of stations have adopted this method of wave length control.

The text of Dr. Burgess's report is as follows: "On the general problem of reduction of radio interference the bureau's work during the last year has been of importance. This work was devoted largely to the holding of broadcasting and other transmitting stations to their assigned frequencies. "Marked progress in the actual operation of the country's radio stations in this respect has been made possible primarily through increasing the accuracy of the bureau's frequency standards and certain procedures adopted

for their dissemination and application. These have included the transmission of signals of standard frequency and the setting up of a system of standard frequency stations.

"The accuracy of frequency standards has been raised to a higher level of precision through development by the bureau of specific application of the piezo electric oscillator, a remarkable device serving as a constant frequency standard. A form of this instrument, as well as other necessary measuring instruments, were designed for the use of radio inspectors of the Department of Commerce.

"The results of a statistical study of the distance range and interference conditions of broadcast reception were issued."

Cost and Upkeep of Average Set. The average cost of a receiving set of the five-tube variety, using two steps of tuned radio frequency, a detector, two steps of audio frequency, loud speaker, batteries and outdoor equipment is \$120. The average upkeep is over \$80 yearly.

A Useful Accessory. A small pair of scissors is useful in the repair kit to trim off loose and frayed insulation and for the slicing of insulation tape.

Vagrant Waves of Interest to Fans

Station KQW is located at a church in San Jose, Cal., and is the only farmer-owned radio station in the world. It has the backing of 90,000 California farm families and organizations.

Believing that the continuous rain and disastrous floods throughout the Danube countries were traceable to outdoor wireless aerials, which created lightning storms, farmers in Skolnok, Hungary, started to wreck the aerials until they were stopped by the police.

Radio broadcasting is to be used in England as a means of cultivating a standardized pronunciation of English.

Five hundred and thirty broadcasting stations in the United States use 80 wave bands by splitting time with others.

Programmes broadcast from British and French stations include weather reports, time signals, stock reports and

information of interest to the farmer, as well as music, talks, lectures and children's songs and stories. The smaller stations confine themselves primarily to concerts and lectures.

Next to the United States in number of broadcasting stations, Canada is

second with 37 active stations, two projected, four suspended and 11 which transmit from other stations. Australia has a total of 20 stations, as does the United Kingdom and Spain. Mexico and Germany follow with 19 each, followed by France and Cuba, each showing 18 stations on the air. Seventeen

stations are operated in Sweden, in Brazil and 10 each in Argentina, Finland. The other countries have less than 10 in active service. Russia is credited with only one active station, although 18 are reported to be projected or under construction.

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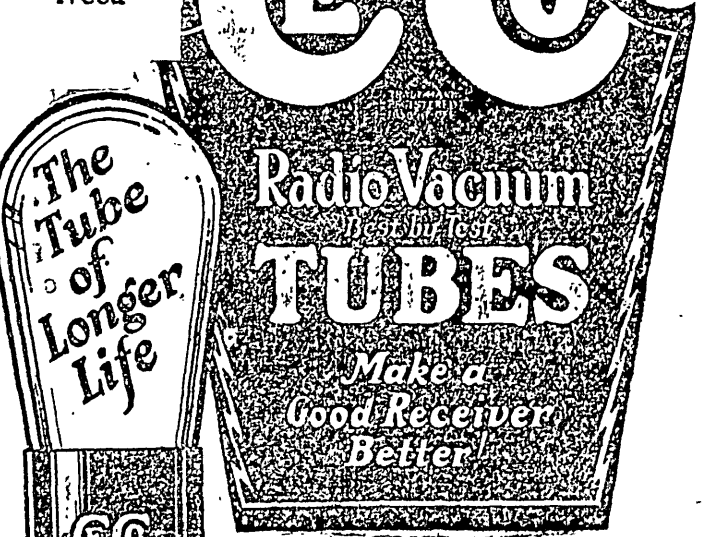
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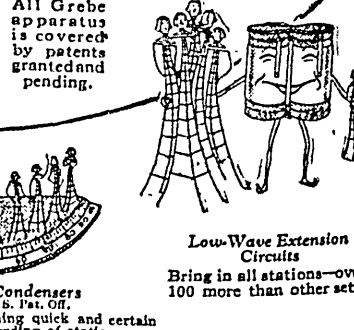
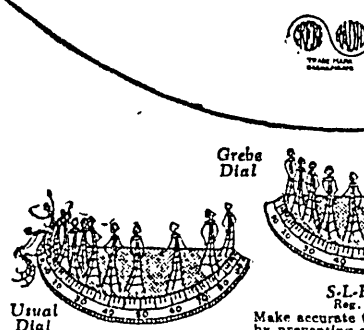
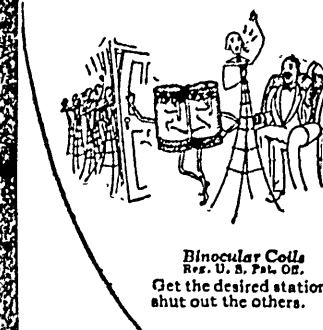
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Wanted—Real Estate 89

BUNGALOW—3-6 rooms with garage in or near one fare zone, give all particulars and price in letter. Address H-373, Journal Office.

HOUSE—2-family house in Mount Pleasant, prefer old house, regardless of condition, can pay cash. Address J-304, Journal Office.

HOUSE—WANTED, EAST SIDE, NEW 7 OR 8-ROOM HOUSE. GIVE ALL PARTICULARS. NO BROKERS. ADDRESS E-304, JOURNAL OFFICE.

SMALL FARM—Wanted, within about 10 miles of Providence, good neighborhood, buildings in good condition, with some conveniences. Address D-262, Journal Office.

FOR OWNER—Small house, in Providence, razed, condition, do own repairing, fence same. Address X-302, Journal Office.

LISTEN FOLKS—Have customer for 2-family modern, all Pleasant, reasonable priced bungalow, Elmwood, and 2-family modern house, off Hope st. You might be able to fill my car. Call Mr. Kestler, 16 Dorrance, Gaspee 2908.

NORTH ATTLEBORO—Will buy business property centrally located, must be good investment, with full particulars as soon as possible. Address F-306, Journal Office.

PRIVATE PARTY—Will buy your property regardless of condition, pay cash, close deal at once, any time. If you mean business, I do. Address I-305, Journal Office.

WANTED—Country, suburban, shore property to sell. Write or telephone what you have. William Bowker Co., Gaspee 830.

TWO AND THREE—Family houses wanted at Broad st. or Elmwood, must be modern. Burke Realty Co., 313 Grosvenor Bldg. Gaspee 0306.

PHILIPPINES PAY FOR RADIO MUSIC

New Nioto Bill Requires Funds From Set Owners

A bill affecting radio in the Philippine Islands and known as the Nioto radio bill has become a law, according to a report received from Trade Commissioner M. Butler at Manila, to the Department of Commerce.

In the past broadcasting in the Philippines has been hampered because the stations had no financial support save that obtained from the sale of receiving apparatus, a condition of which according to the broadcast law, the proceeds of the report. Hereafter every owner of a receiving set will help to support the station whose broadcasting he receives.

"Broadcasting, where it is supported by the sale of receiving equipment has, according to the general management of an American radio concern in the Philippines, a distinctly reciprocal character," continues the report. "Either the establishment of an adequate transmitter and acceptable program must create the demand for sets, or the sale of sets must reach such a volume that the proceeds may be devoted to the improvement of facilities and program."

In the past only a portion of the sales of receiving apparatus in the Philippines would accrue to the support of

broadcasting, and as the total possible sales in the Philippine Islands are limited, the result to be expected was not to be reassuring. Under the Nioto bill, which has now become a law, an equitable situation has been created whereby every owner of a radio set helps to support the programs he hears, regardless of whether the merchant from whom he bought the receiver is carrying on broadcasting or not."

The report states that the bill will make it possible for the people in the Philippine Islands to enjoy the many benefits and advantages which broadcasting can bring them.

A new broadcasting station is being erected atop of Manila Heights. When completed it is expected to have over ten times the efficiency of the present station. At the same time the new station is being installed, new and improved studio facilities and adequate

staff is being organized to carry out the arrangements of programs.

The Commerce Department report further states that the new broadcasting station will be on the air in February.

The Efficient Battery.

To have a battery working at its best efficiency, the terminals should be kept free from corrosion, a scale which is formed by the electrolyte or acid. To get rid of it, scrape the terminals until there is a bright lead finish. Washing the terminals with ammonia or some other alkaline solution will neutralize any acid that may be present and prevent corrosion. Take care that none of this solution gets into the battery, as it will neutralize the acid in the battery and also stop its action.

PEOPLES HARDWARE

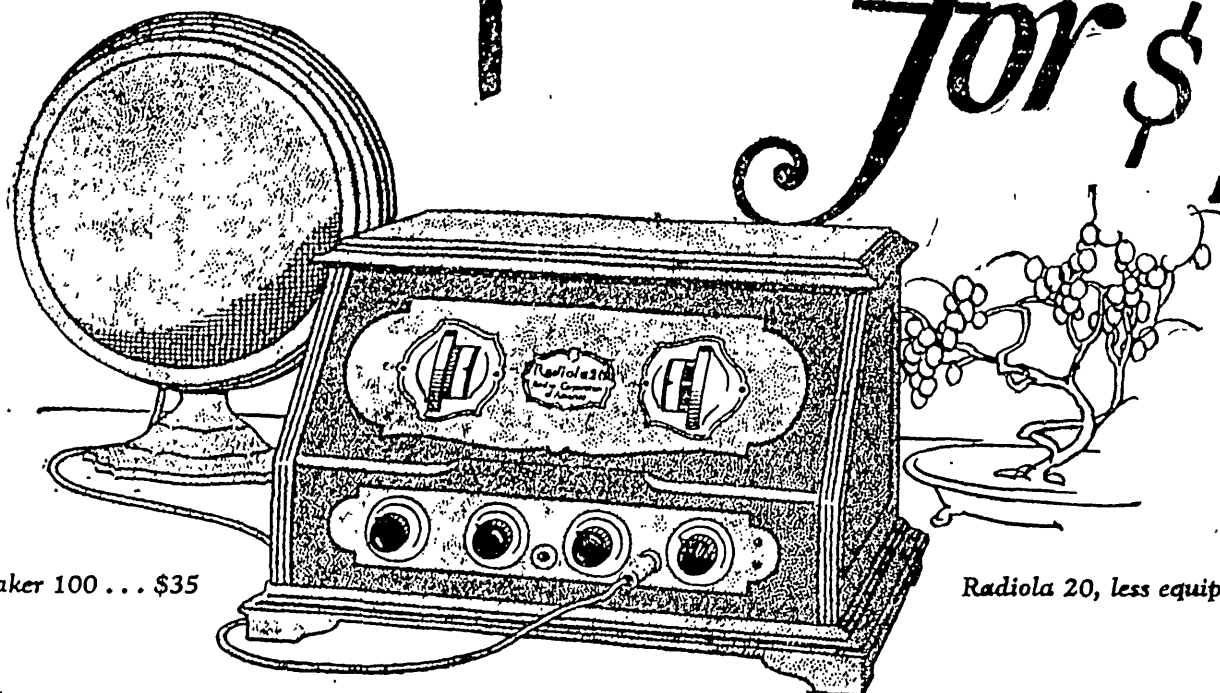
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On near stations, it provides ONE DIAL tuning. On far stations, a simple device

makes distance tuning clear and accurate.

The greatest value radio can offer today is in QUALITY OF REPRODUCTION. In this, Radiola 20 has challenged, and still challenges, any competitor—at any price. Its remarkably fine tone is one of the chief reasons why this Radiola has replaced so many sets in so many homes.

Ask for a demonstration at any RCA Authorized Dealer, before you judge the value of any radio set by its price.

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