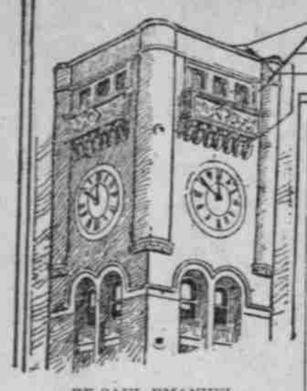
RADIO WAVES AND RIPPLES



BY SAUL EMANUEL.

COMPLAINTS often are received from radio fans by the operator of a broadcasting station, that the concert is being spoiled by a lot of ugly buzzes from one or more amateur spark stations.

"Can't you stop them?" an impatient fan will ask. "They're breaking up the fine music you're sending out."

For the benefit of these fans and others who are interested in radio, the several causes of broadcast interference will be explained.

In the first place, all classes of stations, including broadcasting and amateur, are given by the government certain wave lengths to transmit on, and are required by the government to stay in that wave length. If his wave is specified as 360 meters, he is supposed to send on 360 meters and on no other. If, through careless tuning, the station emits a wave of, say 200 meters, the law is being violated, and the station will be interferring with those to whom such a wave length has been granted. Amateur stations are given the 200 meter wave length to work on. If any of them get on a higher wave than that, they will be in a position to cause interference with the stations using the higher lengths.

As long as each class keeps inside its specified length, neither will interfere with the other. As between themselves, the law prescribes a definite sharpness in tuning. Using the proper type of receiver, any one of the stations can be tuned in or out as desired. However, if the transmitters are "broadly" tuned, either will be "nogging" the air to the disgust of the listeners.

The receiving set plays an important part in the selectively of tuning in and out certain stations. When the big radio wave struck the country a few months ago, receivers were put on the market that were not much better than junk. Selectivity with these sets was impossible. With such an outfit, reception of a broadcasting station might be excellent, if no other station had happened to be working.

But if another station on another wave length started up, it is "good-bye" to the concert, until the interfering station stopped.

The great problem between the amateurs and the broadcasting stations lies in the type apparatus used both in receiving and transmitting. Each class of station is widely separated by law, as to the wave lengths used. With a good type of receiver, as long as each station will remain in it's own yard, so to speak, according to the law, neither class should interfere with each other.

RADIO QUERIES AND ANSWERS

Editor Radio Waves and Ripples:

1. I have no water pipe to hook up to for a ground. Which of these would be the best ground, a piece of chicken wire six feet square buried three feet deep, or a copper plate about two feet square hung in the well?

2. I have an aerial with a lead-in about 70 feet long. Is that too long?

3. I dropped my headphones one day and have not been able to hear anything with them since. Is there any way to fix them, or will I have to get a new pair?

4. What is C. W. and I. C. W.?

R. T., Yelm, Wash.

1. If the chicken wire has been buried in good damp soil, it will make the best ground. A very good plan would be to use both the chicken wire ground and the plate in the well.

2. The aerial is too short for good reception. Have the length, including the lead-in, at least 150 feet long.

3. Telephone receivers are delicate pieces of apparatus. Dropping them may put the parts out of adjustment. It is possible that there is a break in the circuit of the magnets. If the receiver cases are broken it will be necessary to get a new pair.

4. C. W. is the abbreviated term for continuous wave radio communication such as is used in radiophone work. I. C. W. means interrupted continuous waves generated by the use of a rectified alternating current in the plate circuit of the tubes.

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Editor Radio Waves and Ripples:

1. Will you kindly publish a list of the necessary instruments for the construction of the most effective crystal set now in use?

2. Has the radio page ever covered the construction of a loose coupler, and if not, would you mind outlining the essentials in making one?

AN APPRECIATIVE FAN.
Portland, Or.

1. A short wave variometer, crystal detector, small variable condenser, fixed phone condenser and pair of high-resistance telephone receivers.

2. The construction of a loose coupler will be taken up in a future issue of The Oregonian. A good one can be made by winding 100 turns of No. 22 enameled wire on a tube six inches long and four inches in diameter. The secondary coil of about 200 turns No. 28 cotton covered wire, tapped in 10 places, should be wound on a tube that will fit loosely into the larger coil. Slides must be made so that the secondary coil will move in and out of the primary coil.

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Editor Radio Waves and Ripples:

My wireless outfit equipment consists of two variometers, one vario-coupler, a variable condenser, a fixed condenser, a rheostat, a bulb and phones. My aerial consists of a single wire 200 feet in length. Will you kindly answer the following questions:

1. What is the best hook-up for such a set?

2. I have a few diagrams but do not understand them. Where could I get a list of the meanings of the various symbols?

3. What book would you advise me to purchase which has the various hook-ups in it with the construction of steps of amplification?

4. Is my aerial too long? Would a shorter aerial with more wires be better?

5. Would you suggest that I use a grid leak?

6. What is the potentiometer used for, and would it improve my set?

7. For what is a choke coil used? And would it improve my set?

8. My lead-in comes down the trunk of a tree with about three inches of space intervening. Does that interfere with the receiving?

9. Would a few sharp turns in my lead-in interfere with the receiving?

10. What would a one-stage amplifier cost in addition to my set?

11. What are undampt waves?

12. What is a regenerative circuit?

13. Would the cost of each succeeding stage of amplification equal the cost of the first?

14. How many volts has a Bosch magneto a capacity for producing? How many amperes?

15. Could two 12-volt batteries be used for an A battery?

C. M., Dundee, Or.

1. The hook-up has been mailed to you.

2. Write to any of the dealers advertising in this section.

3. Write to the dealers advertising in this section.

4. No. Your aerial is O. K. A shorter aerial with more wire would not be as good.

5. Yes. A grid leak will result in your tube operating more efficiently.

6. A potentiometer is a form of rheostat used to regulate the voltage applied to any device. It is used in radio work to vary the potentials applied to the plate circuits and sometimes the grid circuits of a vacuum tube. With the use of it you can vary the potential of your batteries very finely.

7. A choke coil is used in various circuits to keep back the high frequency currents from entering circuits where only the low frequency currents are desired.

8. Would advise that you have your lead-in further away from the tree trunk, as the close proximity of the trunk will absorb a good deal of the received oscillations.

9. The sharp turns will not interfere a great deal if the lead-in is made as short as possible.

10. A one-stage amplifier can be purchased for a bout $25 or $30 or can be assembled together for about two-thirds of that cost.

11. Undampt waves are those which do not die quickly away after being emitted.

12. A regenerative circuit is a special circuit connected from the plate of a vacuum tube through a device which allows part of the plate current to be fed back to the filament. This continual feed back of the plate current regenerates the tube or amplifies its action.

13. The cost of each step would be the same as the first.

14. Cannot tell you what the capacity of such magneto would be. Suggest that you get the information from some automobile concern.

15. No. The A battery must not exceed six volts.

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Editor Radio Waves and Ripples:

In The Sunday Oregonian of July 16 you had a diagram for a radio amplifier. I would like to know if that could be used with a crystal set, and if so, where would it be placed in the circuit and where connected?

G. L. F., Nelson, Wash.

Amplifiers have been used with crystal detector with fair success. The primary of the amplifying transformer is connected to the telephone binding posts of the crystal set, while the phones are placed in the plate circuit of the amplifier tube.

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Editor Radio Waves and Ripples:

1. Are Frost phones good phones for receiving?

2. How many meters would a loose coupler have with 250 turns on the secondary and 300 on the primary, which is tapped every 30 taps, making nine taps in all?

3. What is the humming noise you hear in the day when there is no music?

J. R., Forest Grove.

1. The Frost phones are one of the reliable makes on the market today.

2. Such a coil will give you as much as 2000 meters.

3. Such noise is most likely caused by induction from nearby power lines.

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Editor Radio Waves and Ripples:

My aerial runs north of my radio station. I get only the stations in Portland and Seattle, while my uncle, whose aerial runs south of his station, gets California stations exclusively. I read in a little booklet that radio waves hit the aerial on the end opposite from the station, and as they went further toward the set, the signals become louder. Is this correct?

A. L. C., Woodburn, Or.

Although there is some directional effect to all antennae whereby stations are received in one direction better than from others, your difficulties may be due to local conditions around your station, such as poor ground, atmospheric or magnetic conditions, close proximity of power lines or buildings.

University Speeches to Be Sent Out by Radio.

Talented Musicians Will Be Heard Many Miles Away.

EUGENE, Or., Aug. 5.—(Special.)—Plans for broadcasting throughout the northwest the speeches of assembly speakers at the University of Oregon and musical concerns held by the associated students of the university when the regular term begins next fall have been made known by Garrett Lewis, the only commercial radio operator in Eugene, who has a sending station at his home at 1271 Emerald street, which has been copied in Canada and four miles south of the Mexican border. Mr. Lewis, who is a university student and was connected with the Emerald radio station last spring on the campus, has not yet discussed the matter with the university authorities, but says he believes there will be no difficulty in obtaining permission to increase the assembly audience a thousand-fold.

Last spring the university students voted to impose upon themselves a quarterly fee which would be used in paying the expenses of the most talented singers and musicians in the country and for this reason it is expected that the assembly musical bookings will include the services of many noted musicians. Also several times during each term of the scholastic year speakers of national prominence appear to address the students and the broadcasting station planned by Mr. Lewis will send these speeches to all parts of the northwest.

Broadcasting of university concerts and assembly talks as planned by Mr. Lewis will not necessitate any great amount of work or expense on his part and his tentative plans can be realized in a few hours simply by constructing a loop from his station to the assembly platform. Mr. Lewis has a 10-watt station and it is equipped with many contrivances which makes it one of the best of its kind on the coast. Mr. Lewis, during the war, was a naval operator and received extensive training in the Harvard radio school.

There are more than 200 radio receiving stations in Eugene at present and local radio men estimate that before the winter is over, 1000 radio phones will be receiving concert matter here.

GIRL BUILDS RADIO SET WITHOUT AID EXCEPT IN STRETCHING OF ANTENNAE

Acquaintances of Miss Dorothy H. Bennett Laugh When Work Is Begun, but Admire Skill After Completion of Apparatus for Receiving Programmes for Wireless.

MISS DOROTHY BENNETT, PORTLAND RADIO FANETTE, TUNING IN HER OWN-BUILT SET TO THE LOCAL CONCERTS

LISTENING to the radio concerts may be a great pleasure to most folks, but it's nothing to the thrill you will get when they come pouring in on a set that you put together all by yourself.

This is the opinion of Miss Dorothy H. Bennett, 575 East Twenty-fourth street North, Portland, who built her own set and is now getting excellent results with it.

"I had a lot of fun making the set," declared the ardent radio fanette. "All my friends laughed at me when I started, but when they heard The Oregonian broadcasting a fine programme one night they stopped laughing and became interested."

Miss Bennett assembled the set without any help. She put together a standard type regenerative receiver and one stage of amplification in units with the aid only of a printed diagram.

The men folks of the family were drafted, however, to help her with the antenna, which was stretched between a nearby tree and the roof of the house.

Miss Bennett has grown to be as handy with a pair of pliers as any radio amateur of several years' experience. At present her set may be termed as a "haywire" outfit by a professional operator, but just give her a little time.

According to her plans, another stage of amplification is to be added to the set in the near future and the whole set arranged in a bookcase panel.

Marmot Chorus Wanted for Radio.

Wireless Expected to Carry Out Voices of Animals.

WASHINGTON, D. C., Aug. 5.—(By the Associated Press.)—"The next number on tonight's programme will be a piccolo imitation entitled 'The Whistling Chorus,' by the Rocky Mountain Marmot Singing society of 1,000,000 voices."

Such may be the announcement to astonish the ears of any number of listening radio fans in the near future if a proposal before the national park service of the interior department is carried through. It possibly will be the most novel treat that the numberless radio amateurs could ask, whose apparatus would tune in with a broadcasting station in Glacier national park in the heart of the Rockies, which would catch and transmit the shrill whistling of these small doglike animals.

Within 50 miles of the park, in the northern part of Montana near the Canadian border, resides the largest colony of the animals on the North American continent. It is estimated there are close to a million of them, living in dense population. On still nights the wonderful shrilling chorus of the piccolo-like voices is carried miles on the rare mountain air, and tourists in the camps enjoy the programmes immensely.

It has been proposed that a receiving set and broadcasting station of 200-watt capacity, sending at a 360-meter wave-length, be installed close enough to catch the voices clearly. Such power would be capable of sending throughout a radius of 1500 miles and could be picked up almost from coast to coast.

The perfection of the radio now suggests the idea of broadcasting this volume of weird, whistling music, which has a tone all its own, to radio receivers as far as the waves will carry.

When the full chorus is on it sounds as if a whole city were playing piccolos in concert. The radio fan who is lucky enough to listen in will not have a bit of trouble in recognizing the marmot voices even though no preliminary announcement is made from the broadcasting station.

* * *

There has appeared in England a line of radio time signal indicators for use in shop windows and on outside walls so that the time signals may be flashed to a larger number of persons in the streets. One of the indicators takes the form of a miniature Eiffel tower (for the signals are received from the Eiffel tower in Paris) with an electric light at the top. As the radio time signals are received, an operator presses a key so that the light flashes in accordance with the intercepted signals. It is true that an appreciable loss of time takes place because of this relaying, but it is estimated that the interval of lost time is not greater than one-hundredth second. Another form is in the shape of a metal frame, with a glass face carrying the necessary lettering to indicate the elapsed minutes, such as "10-46," "10-47," and so on to the final dash at 11 o'clock. A system of lights controls the flashing of the proper minute reading, while a lamp on top of the frame and an electric bell are actuated when the final 11 o'clock dash is received.

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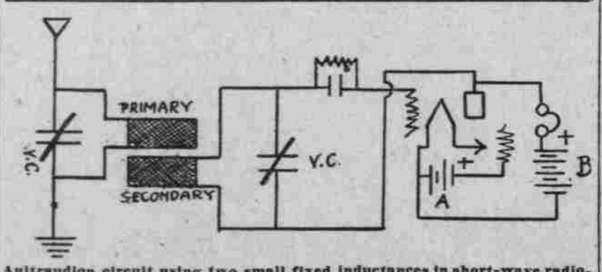
OLYMPIA, Wash., Aug. 5.—Probably the first surveying party in the state to claim the honor of enjoying radio concerts while in the mountains at work is the United States general land survey party under Herbert N. Raymond, located high in the peaks near Republic, Ferry county.

The first concert was received from the station at St. Martin college at Dacey a few miles east of here and since that time music as well as news dispatches have come from Seattle, Portland, Wenatchee, Yakima and even as far away as Oakland, San Francisco and Los Angeles.

The set, which is a single circuit receiver of standard type with one stage of amplification was built in camp by Herbert Chase and Mr. Raymond. The most serious problem connected with it was that of a good ground. This was solved by running a two-chain tape under the aerial, rather upsetting the idea for good grounding. The aerial consists of a single wire 150 feet long stretched to a tree about 80 feet high.

ULTRAUDION IS FOR USE IN INCESSANT WAVE RECEPTION

Invention of Lee De Forest Still in Use in Many Receiving Stations and Is Simple in Action.



Ultraudion circuit using two small fixed inductances in short-wave radiophone reception. Primary coil has 75 turns, secondary coil 50 turns.

ONE of the first audion circuits known, for use in continuous wave reception is the "Ultraudion" which was invented by Lee DeForest. It is still in use in many receiving stations and is very simple in its action. The only difference between this and the other form of continuous wave receivers is that the lower side of the secondary coil goes to the plate instead of the filament.

The secondary of a set connected in this manner will oscillate continously at a wave length depending upon the inductance and capacity in the circuit. These radio frequency circuits, passing through the telephones, will produce no sound in them. However, when the continuous waves are tuned in the primary of the loose coupler, they will produce a beat note with the secondary oscillations, thus creating an audible sound registered by the phones.

Although the ordinary loose coupler or vario-coupler can be used in such circuit, it seems to function better with two fixed or honeycomb coils and two small variable condensers. For radiophone work at 360 meters, the primary coil should be of 75 turns, and the secondary of 50. Both condensers can be of the .001 micro-farad capacity. The tuning is done with the condensers alone. Connect up the units as in the diagram above.

Radio Notes.

A CHOICE of "listening in" to either of two programmes being sent out by the big broadcasting stations will be a feature of an unique radio system being installed in a 72-family apartment house in Newark, N. J. Two complete receiving sets will be installed, each with a large loop or directional aerial, pointed to a particular broadcasting station and the programme received without interference from whatever may be coming in on the other loop.

A special radio room in charge of a licensed operator will house the equipment. From this room will emanate two complete circuits connected to each of the 72 apartments and so arranged that the tenant may plug in his receiving set to whichever of two programmes he may prefer. The apartment operator will tune in each evening to the two stations that offer the best programmes or are heard the clearest and in this way the tenants will be able to enjoy the best in the ether each night with the least of trouble.

* * *

The famous "N. C." planes carried as part of their equipment for the trans-Atlantic flight not only half kilowatt spark apparatus, but also vacuum tube radiophone sets. The radiophone transmitters employed were built for short-wave work, operating on wave lengths below 600 meters. The sets were designed to operate either with trailing antennas or with built-in antenna, the range with the trailing antenna being about 50 to 75 miles. Either buzzer modulated or telephone signals could be employed.

The transmitting sets employed on the "N. C." planes used three five-watt tubes, two as modulators to modulate the output of the single oscillator or generator tube. A 12-volt battery furnished power to light the filaments of the transmitting tubes as well as power for driving the dynamotor for generating the necessary high voltage for the plate supply.

To aid in adjusting the transmitter to the required wave length a small wave meter fitted with a lamp to indicate resonance was supplied so that the wave length could be determined almost instantly.

Radio equipment for use in airplanes must be as light as possible as well as compact and efficient. The three tubes used on the "N C" planes were all controlled from a single filament rheostat, thus simplifying the control system and eliminating two rheostats.

The entire transmitter complete weighed only slightly in excess of 100 pounds and this included the storage battery.

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Though the government has recently passed an edict forbidding the use of its stations in political campaigning, it is extremely unlikely that this method of appeal to the voters will be passed up this fall. Whether the stations are thrown open impartially to candidates of all parties, or whether they have to rent for special occasions, it is certain that the competing parties will not easily pass up this cheap and efficient means of appealing to a large body of voters at the same time.

So many advantages are attendant on this method that it is to be hoped that red tape will not stand in the way of its being utilized. One of the important needs of a republican form of government is that the largest possible number of voters be reached. It is now impossible to do this in the case of a great number by direct personal appeal. The elements of time and expense make it impossible for the speaker to canvass the thinly populated farm districts, and even in the cities bad weather or other distractions tend to keep the voters away from the meetings. No voter has a legitimate excuse for not keeping himself posted when the arguments are brought directly into his home.

* * *

A plan for broadcasting concerts and other events of international interest with possible application to future developments has been evolved in outline by Peter A. Sensenig, of the publicity department of the Westinghouse Electric & Manufacturing company.

Mr. Sensenig's plan provides for centralization on a large scale. He would have the present law amended to allow the broadcasting stations to use three different wave lengths, dividing them into three classes, one for each wave length to be used, according to size and importance.

With a chain of the largest stations operating on the same wave length he would have the best talent sing, for instance, from a large station in a metropolitan district and have stations all over the country pick up the message and pass it on. In this way the very best talent would be available for everyone and would not be confined to metropolitan districts, as there is a danger of its being confined as in direct broadcasted singing. In European countries no further facilities would be necessary for international sending from country to country than would be required for nation-wide work here. International broadcasting would then be only one step further for us.

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The success of this year's experiments in broadcasting educational courses would seem to indicate that radio will found its own schools and universities in the future. Practically, there can be little said against the plan. In the college courses particularly the routine could well follow that of any other institution of higher learning, the period of instruction being opened by a question calling for a ten-minute written paper (which could be mailed to the instructor and returned corrected) followed by the lecture and, at certain times, criticism of the previous papers. The system would correspond somewhat to the "honor system" now in vogue in so many institutions.

It would seem that here is really a great opportunity for poor but ambitious young men and women; true they would miss the environment and social opportunities of a college, but that is now denied them in any event; on the other hand the actual information, the guidance in study and a measure of the discipline and the influence of the professors' personalities would be theirs, the most important part of education, after all.

And in this way, perhaps, the now agitated question of excluding certain classes would be settled, for though there might be objection to those classes using the same dormitories and classrooms, there could be no possible objection to their utilizing the same ether.

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There are many methods used by radio operators to improve the sensitiveness of the crystal detector. The little piece of mineral which you use to get the concerts on often is sensitive in certain spots only. Sometimes it will take a good deal of time to find the sensitive spots and part of the programme may be lost before they are found. Here is one way you can improve the detector. Take the crystal and pulverize it into small flakes. Do not break it very finely. Put some of the flakes inside of a metal casing and screw it into the cup of the detector. You will be surprised to note how quickly you can find good sensitive spots now.

* * *

The builder of homemade apparatus often places too little stress on the details of construction to get the greatest efficiency out of his radio outfit.

A very important point is to solder connections, yet many experimenters avoid doing this, for they really do not know how. The operation is very simple once you understand a few rules and get the knack of doing it. All that is necessary is some soldering flux, a little solder and some means of heating the joint and solder, such as a soldering iron or a small alcohol torch. The flux may be ordinary powdered resin or one of the prepared varieties that are on the market. A flux that has corrosive properties should be avoided in radio or electrical work. There is a type of solder in a paste form and another in wire form having a resin core that may be used to advantage. Wire solder is the most convenient for small work of all kinds.

The first thing to do before soldering is t scrape or clean the wires or parts thoroughly, as otherwise the solder will not stick. Then apply a little flux to the wires. The iron should be quite hot, but not too hot, as this will make soldering difficult. After the iron has been heated to the proper temperature, one side should be filed bright, touched with a little flux and given a coat of solder. This is called "tinning." The solder can now be run into the joint by aid of the heated iron.

Properly Erected Aerial Lightning Protector.

Antenna Stretched Above House Really Not Dangerous.

WITH ALL this talk about lightning switches and other protective devices being necessary in the installation of a radio set, many people who were on the verge of becoming interested, got "scared," and lost a lot of their first enthusiasm. Somehow they received an impression that an antenna stretched above their house, would at some early date attract to itself a bolt of lightning that was looking for some place to "roost." Far be it from such.

Lightning is the result of a discharge of electricity between a cloud and the earth. This discharge often amounts to millions of volts, which sounds very dangerous, but isn't, if it strikes somewheres else. Be assured, that the lightning is not going to follow you around and seek you out for a little light diversion. It seeks the fastest way out and the shortest way down. Now, if your aerial is properly erected and grounded, it will tend to equalize the electrical strain between the charged clouds over your roof and the earth beneath you, in very much the same way as a lightning protector or lightning rod.

In other words, a properly erected aerial is, in a manner of speaking, a lightning protector, and is therefore a safeguard, if anything, against lightning. The possibilities of a single wire aerial as an equalizer between the charged cloud and the charged earth, may not be very great, but it certainly can, by no stretch of the imagination be termed an attraction to lightning.

Assume that the electrical energy in a cloud decides to come to earth. A single No. 14 wire, strung as an aerial over your roof is not going to attract the going or coming of the lightning flash in the least. The entire mass of wire in your aerial won't move a million-volt lightning flash one iota of an inch. It is like trying to use a one-inch horseshoe magnet to draw a locomotive off its iron track when it is speeding at 60 miles an hour.

Lightning arresters are of value mainly to protect instruments from the extra heavy current charges caused by excessive static and from high potential current induced by lightning discharges taking place at a distance. But they offer no protection from a direct bolt of lightning, at least, no more protection than the mistaken idea that an aerial offers attraction.

The similarity between an aerial, properly grounded, and a lightning rod, is sufficient to cause the statement that a good aerial, well erected and well grounded offers the same protection against lightning that a lightning rod does. And this is effected, by the fact that the aerial and the lightning rod both tend to equalize the electrical potentials between the earth and the clouds above, thus preventing to some degree, the lightning flash caused by the difference in potential between the earth and the clouds immediately above.

INTENSITY OF RADIO VARIES ABOUT LIKE PIANO NOTES

Fans Are Told Why Some Numbers of Broadcast Have Abnormal Intensity While Others Weaken or Drag.

RADIO fans often wonder why some numbers of a broadcast are heard with abnormal intensity and others have a tendency to weaken or drag. This effect can be best understood by considering the manner in which notes of the piano reproduce and transmit. All who have listened to a piano recital by radio are familiar with the way some notes push through and do not sound normal in their relation to other notes.

This increase in the volume of certain piano notes is called "blasting." There is a definite group of notes on the piano in the middle register closest to the particular frequency at which the microphone or transmitter diaphram vibrates best. The combination causes the increase in volume and creates a "blast." Much of this unpleasant sound has been eliminated by building microphones which are particularly adapted for use with the various types of instruments and by placing the instruments at the correct distance from the transmitter. In one of the early broadcasting stations the piano was shifted for six months before a position was found which overcame certain acoustic effects, harmful to radio transmission. Many of the peculiar problems presented by the piano in radio work have been solved in this way, but further improvements are still to be made before the piano music can be broadcast perfectly.

Brass instruments, such as the horn and cornet, have characteristics which require care in handling, especially in their position and distance from the microphone, but when properly placed they are most successful in radio transmission. If these instruments are played directly into the transmitter, "blasting" is certain to result.

The cornet is considered one of the best musical instruments for radio concert work. The saxophone ranks high so long as the musician stays away from the extremely low notes. Traps carry very well over the radio because of their sharp, clearly defined characteristics. The bass drum is too slow and low. The music of the clarinet carries exceptionally well, but care must be taken to place it far enough from the microphone so that the mechanical click of the stops is not picked up by the transmitter. The flute at times reaches too high and piercing a pitch. The violin has characteristics which make it a great favorite and one of the finest instruments for radio entertainment. Its tones are reproduced by the microphone almost to perfection.

Bells and the xylophone sound very good by wireless, as they produce tones which are clear and sharp, generally having a higher frequency than the natural vibrating frequency of the metal diaphram of the transmitter. The ukulele is not as good as the banjo and mandolin. The ukulele produces what might be termed dead accompaniments, as its notes, clearly defined at the beginning, suddenly die away or fade, making reproduction difficult. The mandolin can be reproduced a trifle more efficiently than the banjo or harp. The tenor banjo and harp when struck vibrate at certain frequencies and die out gradually, making them well suited for a place in the radio orchestra.

The human voice can be reproduced and broadcast to a finer degree than any of the musical instruments. Voices, like the instruments, have their peculiarities for radio transmission. Articulation and correct breathing must be given every consideration to render the concert a success.

Male voices reproduce and carry far better than female because of more efficient modulation. This explains why the majority of announcers are men. The baritone has the vocal strength and quality which produces excellent modulation and places it first among the voices adapted for radio. The bass has to be placed closer to the transmitter than the baritone and the tenor still nearer.

Soprano may be broadcast effectively and can be heard over great distances because of the high pitched notes. The alto and contralto singer must be careful in striking notes too low and deep, for they are apt to fade out and the beauty of the song will be lost in the microphone.

All singers do not have voices desirable for the radio, although on the concert stage they may be beyond reproach. In some cases personality and appearance capture an audience, but radio has not reached the stage where its invisible waves can transmit personality, therefore it is vocal qualities alone which make a singer a success as a radiophone artist. The distance of the singer from the microphone and the correct selection of the proper microphone for each class of music adds in a great degree to the perfection of the concert. Each instrument and each voice present a different problem.

The most popular and pleasing music to the average radio fan is the well-known jazz, and the ideal combination of instruments to send forth the tones as near to the originals as possible is the violin, saxophone, tenor banjo and piano. With a well-tuned receiving set the music is as clear as if its source were a few feet rather than many miles away.

Sarcasm Is Wasted.

Argonaut.

During the last presidential campaign a republican stumper was traveling through the Tennessee mountains in a vain endeavor to convert the mountaineers to the republican party. On one occasion before making an address he turned to a young mountaineer standing near him and asked, "Well, my young fellow, what are you?" Democrat," tersely replied the mountaineer. "And why are you a democrat?" persisted the republican. "Waal, my pap was a democrat and my grandpap before him, so I'm a democrat, too." "H'mm," snorted the republican campaigner, "suppose your pap and your grandpap had been horse thieves. What would you have been?" "Waal," the mountaineer considered it, but not for long. "In that case I reckon I'd be a republican."

Of Course the Star Prints This.

Kansas City Star.

The Wamego (Kan.) Times tells of a little boy of that city who was taking his first lesson in astronomy the other night and was very much interested in the names of the various stars and planets to be seen from the sleeping porch. Finally he asked, "Mamma, which one is the Kansas City Star?"

Memory Fails Small Boy.

Wichita (Kan.) Eagle.

Little Richard Castle, son of the cashier of the Bell Telephone company, on seeing his aunt, who has just returned from Seattle, where she has lived since her marriage to Fred Fellow two years ago, remarked: "I remember Aunt Helen, but I don't remember that baby."

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