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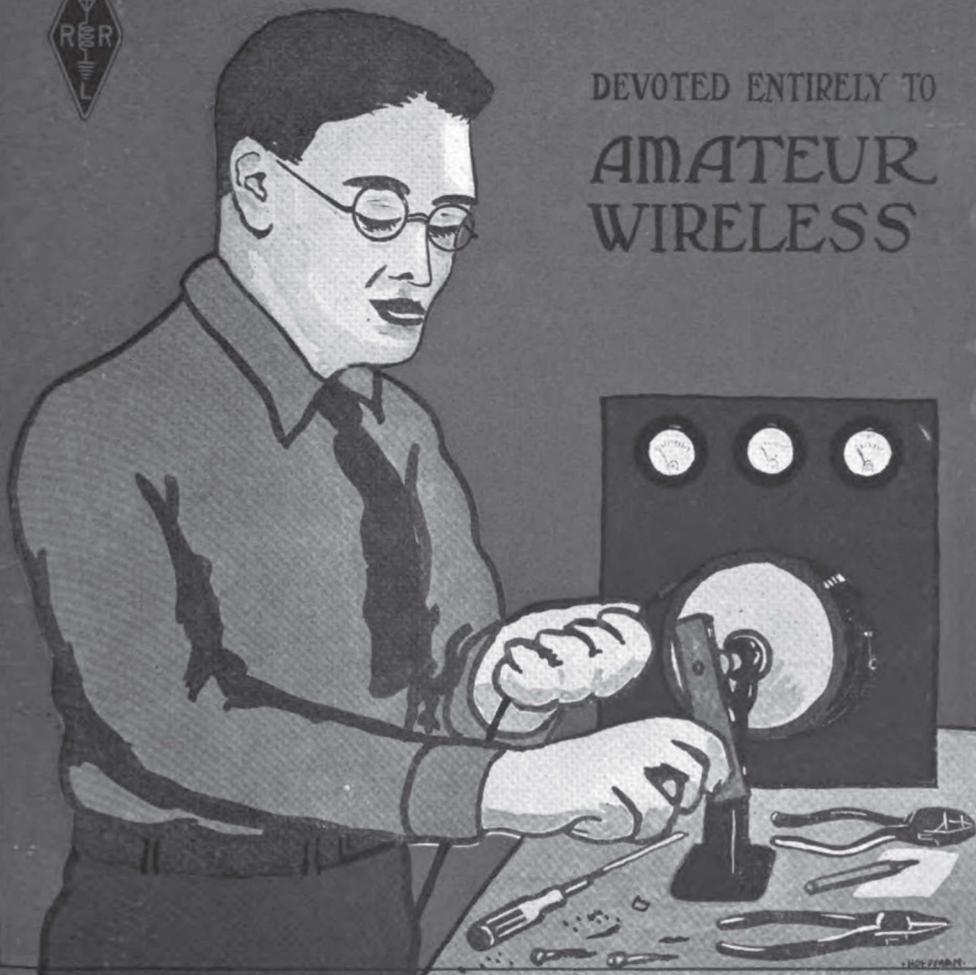
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# QST

A MAGAZINE DEVOTED EXCLUSIVELY TO THE

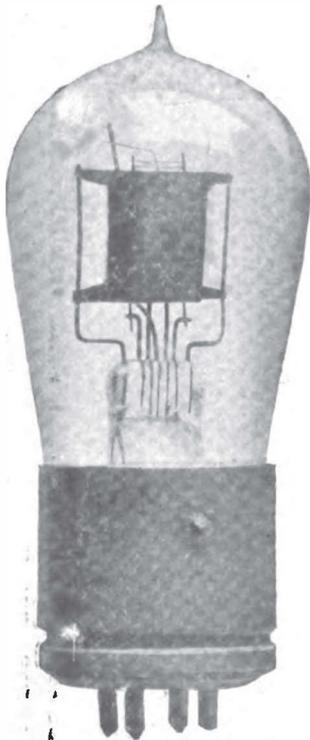


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**AMATEUR  
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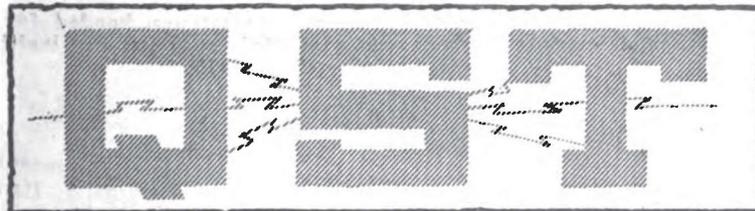
## ATLANTIC RADIO COMPANY

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## Some Thoughts on Spark Operation

OUR thoughts these days turn largely to C.W. Transmission but it is noticeable that the traffic still goes mostly via spark. We haven't power tubes in any quantity or variety yet, and it's a case of each man building a set around whatever tubes he is fortunate enough to secure, so that to date we have no standardization in C.W. equipment, no definite sort of a C.W. transmitter to hold up as a guide, and our articles on this subject in QST have had to be largely along the line of suggestions which each individual could take and shape to his particular equipment. In the case of spark sets, however, the passing years have just about reduced amateur transmission to certain definite practices which, if carefully observed, will not fail to produce results. The varying degrees of success attained by different amateur stations is more a matter of the degree of thoroughness employed in the arrangement and adjustment of the transmitter, and of the degree to which the different component parts are suited for work with each other, than it is a question of the principles involved, for we can come pretty close to saying what constitutes good design in a spark transmitter. It will be the purpose of this article to outline a few of these fundamentals.

### Aerials

The radiating qualities of an antenna depend upon a quality known as its "radiation resistance", and this in turn seems dependent upon two factors, its physical arrangement and the voltage at which it is operated. In Mr. West's article on page 19 of the April QST, and subsequent "Communications", the importance of the latter point was well brought out. Mr. West points out that a good amateur aerial should be as high as possible, should have the center of capacity as high above the earth as possible (with a cage lead-in), and should have a fundamental period materially less than the working wave,

with considerable inductance at the base of the aerial, which will result in increasing the effective voltage and in lowering the decrement thru making the aerial system a more persistent oscillator. The voltage on an aerial should be just below the value which causes brushing, if best radiation is to be obtained, and it is pointed out that as the capacity of the antenna system is reduced, the voltage to which it is charged is increased. For any given transmitter, then, best results will be obtained when the capacity of the aerial is so reduced, by gradually reducing its length, that it is just at the brushing point; then adding another

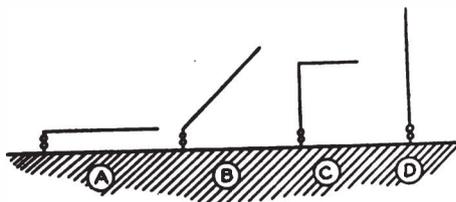


FIG 1

wire in parallel so that brushing just ceases (for when brushing occurs the decrement is greatly increased).

As to the physical disposition of the aerial, we are concerned here with what is known as "form factor"—the feature which makes one form of aerial a better radiator than another. In Fig. 1, imagine we have a certain aerial connected to ground thru a transmitting set at one end, of 100 feet overall length, and free to be placed in any position. If this system is arranged as an inverted L aerial of minimum height, say as shown at A with a height of 2 ft. and a horizontal length of 98 ft., it will have the maximum capacity, the lowest apparent resistance, and be the poorest radiator that this combination can produce. These qualities will gradually change as the open end of the system is raised above the ground as shown at B, or as the ratio of vertical portion to horizon-

tal portion is increased as shown at C, resulting in less capacity, higher apparent resistance, and improved radiating qualities. When this is carried to a maximum and the aerial disposed as a straight vertical antenna as at D, the system has the minimum capacity with respect to earth, the highest apparent resistance when excited by a transmitter, and the best radiating qualities. This is briefly the theory of the fan antenna and its reputation for good transmitting.

From these points we are led to the conclusion that the ideal amateur transmitting aerial probably would be a vertical

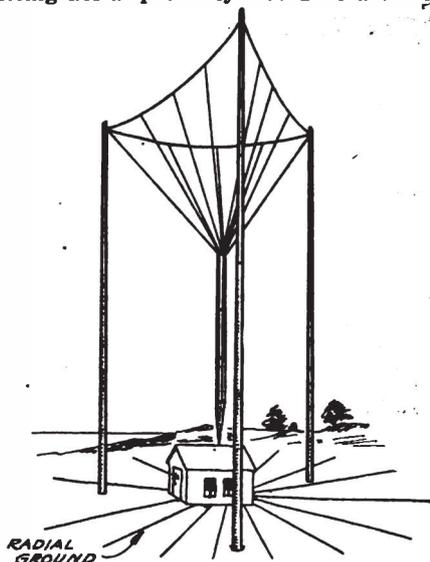


FIG 2

multi-wire aerial of the form of an inverted cone, supported by three towers about 100 ft. high set in an equilateral triangle, with the wires formed into a cage at a height of about 60 ft. to keep the center of capacity high. Fig. 2.

Three towers, set close enough to support an inverted cone aerial, exist only as a dream for most of us, and so in practice we find our aeriels are vertical fans, slanting fans, or plain flat-tops, as we can afford. And indeed, when all is said and done, it is quite questionable whether one gets his money's worth from the added investment called for by a vertical aerial when compared with the old reliable T or inverted L type, either flat-top or cage. Most of the vertical aeriels are doing admirable work, but many of the flat-tops are also, and most of the fans have been erected by experienced amateurs who mastered the rudiments of the game years ago.

In a general way it is desirable to have an aerial as big as possible, but over-long

aeriels are the cause of more violations of the wave length law than any other thing, and the desire to get up as much wire as possible should not prevail to the extent that one puts up an aerial with a natural period of 190 meters and hopes to transmit at 200. It can't be done efficiently, but it is fine for about 240 meters—and that's the way some of these stations get the way they are. It is hard to define the proper length of an aerial, as nearby objects influence it, etc., but we believe it can be said as a working rule that for 200 meter work the total length of the open circuit—flat-top, vertical part, lead-in, and ground lead—should not be over 100 feet, for a 4-wire inverted-L. The wires should be spaced 4 feet—not 2 ft. Don't worry about directional effect—it is not an important factor until the flat-top length is several times the vertical height. The T aerial is the better aerial theoretically, but the difference is not marked. The effective length of a T aerial is figured by adding the length of the vertical part and one half of the total flat-top length; and, because the other half of the T increases the capacity more than it decreases the inductance, the over-all length can not be as great for 200 meters as in the case of the inverted L.

An amateur inverted L aerial, with a flat-top consisting of four wires 50 ft. long, spaced 4 feet apart and suspended 50 ft. above the ground, with the four wires joined into a cable about 15 ft. below the flat-top and run straight down to the set, and with ground lead only a few feet long, is well fitted for excellent 200 meter transmission.

Just a word about receiving aeriels. There is no practical advantage in using more than one wire, and the improved signal-stray ratio of such an aerial over the higher capacity used for transmitting leads us to suggest that general relay traffic would be improved by the use of a single fairly low wire about 150 ft. long for receiving.

#### Grounds

The ground is the hardest thing in the amateur station to get right. Reams have been written in QST about grounds. There are all kinds of grounds and the average amateur is so governed by surrounding conditions that no law can be laid down except to say that securing a low-resistance ground is a job that requires perseverance and considerable time. It is not true that the best policy is to ground onto "everything in sight". The best ground is one that delivers all the energy to earth at the same instant. It is therefore advisable to bring separate leads from the various ground connections and use the combination that gives greatest antenna current. Counterpoises are hardly advis-

able in cases where a good connection to damp soil is attainable. If a counterpoise is used, let it be well insulated from earth, for a leaky counterpoise is but an extremely high-resistance direct ground.

#### Oscillation Transformer

The O.T. must have low resistance, and be readily adjustable in both circuits and in their coupling. The spiral pancake type, with one winding hinged to swing so as to quickly adjust the coupling, is the most convenient type in the opinion of many amateurs, altho admittedly a matter of opinion only. The really important thing is that the conducting path be large enough, and that means lots of surface. A 1 k.w. O.T. with half inch ribbon is a joke—the primary ought to be  $1\frac{1}{2}$  inch ribbon and the secondary 1 inch.

#### Condenser

No attempt will be made here to describe the construction of condensers. They can be made or bought. The mica type is probably the most efficient obtainable on the amateur market, but unfortunately costly. The capacity of .007 mfd. is recommended for average 200 meter work, altho with the right voltage, the right gap, and careful tuning, .01 mfd. can be managed with consequent greater power. Homemade condensers should be immersed in oil to prevent brushing, and every effort should be made to keep the current path as short as possible.

#### Gaps

The gap is the most interesting part of the amateur station. It determines the note of the signals, and upon its correct design depends more of the station's efficiency than on any other part. Its purpose is to keep open the primary circuit without leakage while the condenser is charging, then to close the circuit with as little resistance as possible for its discharge, and to quickly reopen the circuit when the energy is transferred to the antenna circuit. We have talked so much in QST about the attribute of quenching in rotary gaps that we will not say more about it here than that for good results the gap should have a high peripheral velocity, preferably by combining fairly high speed and fairly large diameter, and proportionately less studs.

#### Transformers

We have on the amateur market two types of transformers, the non-resonant or constant voltage type, and the resonant or magnetic leakage type. The latter depends on a resonant rise in voltage thru its leakage, and as the time element enters, it is distinctly unsuited for use with a high spark note. Maximum energy per wave train, and maximum antenna current, are

obtained with such a transformer with the use of a relatively low tone, the best value to be found by experiment. Lower frequencies do not work the set to capacity, and higher frequencies do not give the condenser time to charge to full voltage. The non-resonant type of transformer, however, is capable of maintaining across the condenser approximately whatever voltage obtains as the product of the turns-ratio and the instantaneous primary voltage, which is to say that the spark frequency may be about whatever value is desired. In this case, as the spark frequency is increased, more power is drawn by the transformer and more actual watts may be put in the aerial, but it is interesting to note that this does not necessarily indicate an increase in range and in fact, in many cases, merely means that the power bill will be larger and that the apparatus will become heated.

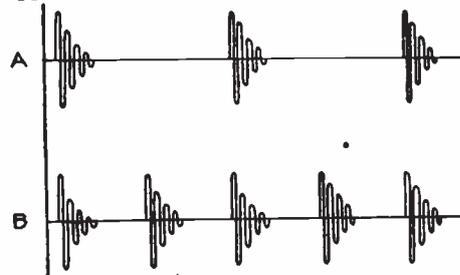


FIG. 3

Let us consider an imaginary transmitter having a condenser of .007 mfd. and a variable speed rotary gap, and using either a magnetic-leakage (resonant) transformer or a non-resonant transformer. With the resonant transformer a certain critical gap speed will be found for maximum output, and let us imagine that at this frequency the condenser is charged to a voltage that all but breaks down the safety gap. The wave trains sent out will then have the maximum energy content PER TRAIN that is possible with this transformer. Running the gap slower will cause the safety gap to break down, and running it faster will reduce the antenna current and the actual power drawn, altho the power factor will be so greatly reduced that the amperes taken by the transformer will be higher and liable to overheat it. Consider now the non-resonant transformer, and imagine that its secondary voltage is of the same value as that of the other transformer when the set was properly adjusted—i.e., all but sufficient to break down the safety gap on the condenser, a comparison in transformers that will be realized in practice, if the non-resonant transformer has the correct voltage for the condenser, by the fact that the adjustments of the resonant transformer for

best output would be those which duplicated the voltage of the non-resonant one. At the same gap speed as before, the non-resonant transformer will give the same antenna current—it cannot give more, for we imagine in both cases that the condenser is charged to the spilling point, and more than that it cannot be. Now as the gap speed is increased we will find that with this type of transformer the secondary voltage will hold up and the condenser will continue to be charged to the same voltage, drawing more and more power from the line as the spark frequency is increased, until, with this transformer, we realize an input of 1000 watts—which is difficult to attain at ordinary voltages on a 200 meter condenser with the resonant type of transformer. However, and here is a vital point, the ENERGY CONTENT PER WAVE TRAIN will be just the same as in the case of the lower note, and just the same as in the case of the same low note on the first transformer. And it is the energy content per wave train that produces response in the receivers at the other end. Therefore, in spite of increased power drawn by the higher frequency on the non-resonant transformer, the audibility at the receiving station will be no higher, if we neglect the increase in the sensitivity of average headsets and the human ear at frequencies around 1000 cycles. In other words, the additional power drawn, and the additional power radiated has been unable to increase the instantaneous amperes shown by the antenna current meter, will contribute

not one bit to increasing the “noise value” of the wave trains, and will do nothing but heat the apparatus except to the rather limited extent that the higher note would be easier to read thru strays or more effective on a certain headset or a certain ear-drum.

Fig. 3 conveys the idea, A representing a wave train of a certain maximum energy content under the imagined conditions using a resonant transformer, and B representing similar conditions, except with spark frequency doubled, with the non-resonant type. The energy content of all the wave trains is clearly the same, but because each train is rectified and applied SEPARATELY to the phone diaphragms, it will be obvious that the increased energy radiated in the case B will in general only double the spark note and not increase the audibility.

From which we see that, in addition to knowing that amperes in an aerial mean nothing unless we know its resistance, and that watts in an aerial mean nothing unless we know the decrement, watts drawn and watts radiated on a given decrement are no criterion of audibility unless we also know the spark frequency—the energy content per wave train—the thing that “makes the noise”.

Elsewhere in this issue QST announces a contest for articles on the best practical relay transmitter, which will bring forth for our readers intensely interesting and highly valuable data on how to put these principles into practice.

## *The Young Squirt's Third Epistle to The Old Man*

By QRU

**G**OOD evening, Old Killjoy. How is your osmosis this evening? I am feeling magnagorgious and hope that you are the same. Everything seems bright and cheerful; my old VT is oscillating, the robins are singing in the November snow drifts, nature has on its belated coat of drab for autumn, and there ain't a rotten thing in sight.

Irving Vermilya is mooching along at a 2:40 clip at WSO and IHAA, Elmer Bucher and H. C. Gawler have embarked upon a new enterprise to make amateur radio better (and when these birds start anything they usually finish it) Warren Harding and Cal Coolidge have been elected our chief executives, and I have started to shave. So, old Pessimistic

Platitude, you see that there is not a cloud on the horizon.

I expected that Eddie would have a “Rotten” story in the November issue of our magazine. As he failed to come caco I have about decided that that dried-up think tank of yours wants a rest, or that you've gone tautog fishing in the Mississippi river. I do not want to hold a dissertation on angling except as it might be applied to whyorless, but I beg that I may hand you this little gem of knowledge. It is this: the way to catch tautog is to whisper in the critter's ear. This, old timer, may be conveniently done with the aid of a five stage amplier and a positive potential on the fish hook. Please pardon this digression from our shocking subject,

but I hope this won't prove to be rotten advice.

I was out visiting a brother ham the other evening. This guy is not only a bird of brilliant intellect, he is most distinctly a winged creature of the filliloo variety. After listening to the soothing strain of an inch spark coil for some half hour, more or less, I picked up a copy of our QST which happened to be lying on his table. I was reading the chapter that told of the heroine doffing her #%-&'()—pardon me, Gloomy, that was another book I was reading. Anyhow, friend ham called my attention to the fact that a "wise guy" had started knocking the Old Man and he ventured it as his opinion that the whole darned proceeding was a blankety blanked shame. He asked me if I didn't think so too. Then the fun started. Ye Gods, the Charge of the Light Brigade had nothing on the line I handed that guy. The argument was somewhat as follows. New York and Boston papers please copy.

"Say," said friend Ham, "have you been reading QST lately?" If that wasn't a foolish question to ask me, I'll give up. So I answered, "Sure, y' darn nut, anyone that wants to be up to date reads QST every month."

This little rejoinder must have hit the old boy right in the thorax, for he was nonplussed for the moment. Finally he piped up, "Wonder who in the name of Diadelus is this guy who is knocking The Old Man? Shooting is too good for the likes of him. They oughta tar and feather, draw and quarter and hang him as high as Haman. Young Squirt! I wonder how he gets that way? Some good natured ham oughta hitch him to the tail end of a step up resonance transformer, coax about seventy-five amps at a pressure of some two hundred and fifty volts to shoot him in the think tank, after which he should be carefully picked up, placed in a concrete coffin and be made to recline beneath the weeping willows. And last, but not least, a bakelite monument should be erected to his memory and it should be inscribed as follows,—"Here lieth the body of The Young Squirt. He squirted altogether too much, the darn skunk."

Oh Boy and Ye Gods, imagine my feelings! I could feel the long hair on the top of my head and the shorter ones in the back of my head rise up in righteous indignation. My vision grew dim but red, shot-guns and sledge hammers floated before my eyes, but with the speed of Jamaica ginger I retorted, "Nothin' doing, I think that that prehistoric Dingbat of an O.M. has gone too far. Didn't George Washington say while crossing the Mississippi river, 'Down with the knockers', or words to that effect? Now The Old Man might be a good lookin' feller, he might wear a

high silk hat, he might attire himself in gorgeous carmine breeches and might carry a gold headed walking stick and still preserve his equanimity, nevertheless he is a knocker. Therefore in the words of the Latin phrase, 'Sic semper telephonus' or better still, 'Downus withus decremetus'. The ancient party's wave front is too full and his decrement is too high."

I paused for lack of breath and, the better to add an air of nonchalance to my argument, I adjusted my necktie and lit a havana. (O yes, I smoke havanas, they're made down in Connecticut somewhere). But I digress.

My friend then pushed a dandy one at me. Said he, "Hmm, must be some friend of yours that's doing that bum-writing, or you'd never stick up for him. I never knew you to stick up for anyone before,



"A Bakelite monument should be erected to his memory."

anyhow!" Just like that. "I'm s'prised that Eddie don't go over that junk of The Young Squirt's with a fine toothed comb and then chuck it into the waste basket. Why, I'll bet that that guy is as old as Pharoah an' he was the guy who dug the moat around the Sphinx so that the critter wouldn't get its feet wet. Come on, own up. Who is this loud shouting, brainless son-of-a-gun? He can't be much good or he'd sign his name to that collection of rubbish that he hands us each month. I guess that Fred Kolster and Emil Simon ain't got much to fear from him. If he was funny that would be some excuse for him to publish his so-called epistles, but next to influenza, he's absolutely the rottenest thing that ever perambulated down the pike."

Needless to say, I was getting madder and madder every minute and by this time I was twice as angry as the proverbial wet hen. Perspiration was seeping from every

poor pore in my body, my collar had wilted and my brain was in a whirl. My choice havana by this time was chewed into a mass on the end and I could be sent to State's prison for the thoughts that were running riot in my brain. So I turned to him, threw out my chest and retorted, "Why, y'poor fish, I dunno who's writing that stuff, all's I know is that I agree with him, like I always agreed with Teddy Roosevelt and Clarence Tuska, and them's two good men to foller. I ain't got nothin' against anyone in the world except the feller who invented work, grid leaks and measles. Now if you've got the idea in



"He turned purple around the gills and threw a book at my head."

that shallow bean of yours that I know this Young Squirt, you're nuts, that's all that I've got to say. I only know that I agree with him fully when he says that all things in amateur radio ain't rotten. Old Faded Whiskers would make a rotten lot of us indeed, and it seems that he has a worthy second in you. Them's my sentiments, take it or propel your nether extremities away over the long, long, trail."

That fixed friend ham. Zowie! He jumped up out of his chair, rushed over to me with the speed of a Pawtucket taxicab driver looking for a drink of Rock and Rye (gentle strains here from Chopin's funeral march), shook his fist under my nose and yelled in an outrageously high pitched voice, "I'm a rooter for the Old Man, and if you don't like it you can go to Heligoland. I'm gonna listen in on my set and see if I can hear 2XJ. Things have to be quiet to get him at all—I hope that I make myself plain!"

I jumped to my feet, let out a roar, and hollered just as loud as he did, "Well, darn your picture, your father's picture and every blankety blank phisog in your whole toe-kissing family. If duels were popular just now, I'd make it Colt automatics, if

you wasn't so husky I'd knock all the electrons out of your hide—but as things stand, I'm gonna beat it. But before I go, take notice, yea, write it in big black letters—when I reach my domicile, I'm gonna put the family Bible on my key; I hope that you'll get 2XJ, but I have my doubts."

With this he turned purple around the gills and worked himself into such a rage he threw a book at my head. I deftly caught it—noted its title which was, "Wireless Course in Seventy Lessons". I shouted, "You're as out of date as this text you peruse", and retired in good form.

He yelled, "Bring back my book of knowledge or I'll have Hezekiah North after you!" Hezekiah is our town constable, he ain't afraid of me any an' I don't do any trembling when he approaches. So I beat it up the street.

I was madder than Josephus when the navy didn't take 'em over. I mean the amateur radio stations. Arriving home I proceeded to my wireless layout at a high rate of speed and turned the juice into my set, started my rotary, which ain't a Betsey, and placed a large volume upon the key. I then sat me down to peruse the Saturday Evening Post.

I let the old spark buzz for about a half hour and didn't even shunt my meter. I figured that revenge was so sweet it was worth what the old a.c. cost to get back at this fresh gazabo. Finally I felt the call of Morpheus and shut the old ether disturber off. You wait, that guy'll change his mind and I'll have him eating out of my hand before our next QST is out.

I've got to chop some wood for friend wife now, after which I'm gonna pull the kitchen clock to pieces as I want to get a gear for my new rotary, but before I close this edifying epistle, I want to remark that I hope we'll hear from old locoed Pete before long.

## ANOTHER WASHINGTON'S BIRTHDAY RELAY

RELAYS on February 22d, it will be remembered are a kind of hobby with our friend Kirwan, Old Man 9XE. Old 9XE is planning such a relay for this coming Washington's Birthday, under the auspices of our A.R.R.L. Operating Dept., and wants to know what you fellows think of the idea. It will be a big popular relay in which many stations can take part, and will be a really novel affair, the present idea being to get a 20-word message from President-elect Harding addressed to all governors and mayors, and break it up, (Concluded on page 14)

## A Contest for Practical Articles

*A personal word by the Editor*

**F**ELLOWS, I have a new idea for improving our QST. QST is good—we all think it's the best amateur magazine in the world—but this is an idea that will make it still better. We want more practical articles for the amateur who wants to build a real spark station and doesn't know how. C.W. is a fine thing, and it will not be neglected in QST, as I sincerely believe the ultimate relay station will be operated with C.W., but at present 99% of our relay work is being handled by spark and it behooves us to give the spark station more consideration. We must remember that altho the men who already "know how" are more interested in articles on special and deeper subjects, the truly good spark stations of the country are only a very few dozen in number, as contrasted with many thousands of mediocre stations whose owners are looking diligently for the information that will enable them to bring their sets up to the A- class. And it is more particularly to QST that they look for this kind of material, as it is our chosen field. I don't mean that we want to publish reams of matter of the "Junior Operator" class, for that is a thing better handled by textbooks; we are faced with the more difficult problem of instructing the average A.R.R.L. member how to improve his already-existing station to the top-notch class. These stations are already as good as textbooks can tell their owners how to make them, and the secret of the rest is a thing found, not in books, but only in the personal experiences of the men who have owned successful DX stations.

The thoughts of our older readers will go back immediately to QST's articles on "The Ideal Amateur Station", in 1917, and indeed it is articles of exactly that calibre, only brought up to date, which we now need. Our Publication Committee has got together and discussed how this material may be brought to light—how the successful men in our midst may be induced to overcome their modesty and tell how they do it for the benefit of the rest of us. We have decided to hold a contest and to invite every amateur to participate. This contest will not be to secure a description of the best amateur station in America, but to get the best practical information on how to build an ideal relay station. As receiving is so simple a thing that most of us already receive over much greater distances than we transmit, we will pay particular attention to the transmitting side, and we define the subject we want treated at **THE IDEAL**

**RELAY SPARK TRANSMITTER.** For the best manuscripts submitted on this subject, under the conditions below, we will award

A First Prize of \$50.00 cash  
A Second Prize of 30.00 cash  
A Third Prize of 20.00 cash

### CONDITIONS

1. Manuscripts shall treat of the subject "The Ideal Relay Spark Transmitter" and shall cover, in whatever order the author prefers, the following sub-topics: Masts; Aerial and Lead-in; Ground; Change-over and Control; Selection of Proper Transformer; Condenser; Gap; Oscillation Transformer; Arrangement of the Transmitter; Wiring, Keys, and Line Protectors; Tuning the Transmitter; Receiving Tuner; Detector; Amplifier; Selection of proper Phones; Selection and Care of Storage Battery, if used; Practical Operation of the Receiving Set. As most of us have satisfactory receivers, the topics above relating to receiving equipment may, at the option of the author, be grouped as one topic and treated only briefly, without detracting from the value of the paper.

2. This contest is now declared open. All manuscripts shall be received in Hartford by Feb. 15, 1921, on which date it closes. Awards will be announced, and the First Prize Article published, in QST for April, 1921. Manuscripts shall be addressed to Publication Committee, QST Magazine, 721 Main St., Hartford, Conn.

3. The A.R.R.L. Publication Committee will act as judge of the contest. For the article deemed best, they will award the First Prize of \$50; for next best article, the Second Prize of \$30; for the next best article, the Third Prize of \$20. No manuscripts will be returned. It is agreed that all manuscripts submitted become the property of QST and may, even if not awarded prizes, be used in part or entirely in QST, due credit being given the author. Honorable Mention shall be awarded any material so used.

4. All manuscripts shall be typewritten, double-spaced, on 8½" x 11" paper, on one side of the paper only. The author's name and address shall appear in the upper right-hand corner of the first sheet. There is no limit on the length of the article, but it should be no longer than necessary to cover the subject.

5. Manuscripts will be judged for their practical value in improving amateur operation. Authors should bear in mind that the idea is to aid less experienced men in perfecting their stations. The articles **MUST** be practical. Fantastic design to

secure highly theoretical results will be heavily discounted, but the applied theory must be sound. Constructional details—the conveying to the reader of exactly what to do and how to do it—is what is wanted. Clearness of expression will count.

6. Manuscripts **MUST** be illustrated—the more so the better. Illustrations may be by rough sketches or good clear photographs, or both. Where the construction of a piece of apparatus is described, the sketches must be sufficiently comprehensive to unmistakably convey the idea.

At first we thought we would ask for articles on the best condenser, the best aerial, etc., but as one man's rotary gap would have no relation to another man's condenser, there would be no co-ordination. Indeed, the trouble in the average amateur station today is probably exactly that—the

units are all right but they don't work together to form a harmonious whole. So to be of any value the articles must cover the station from power supply to antenna insulation. This is a "large order", but six weeks is plenty of time to fill it.

We cordially invite you and your friends to enter this contest. A contest of this nature by our QST ought to bring to light the best practical information in this country—which is absolutely what we want. Remember that this is a contest for the practical man—the pure theorist and the mathematical shark haven't a ghost of a show at it. If YOU own a good DX station, you have in your experience the stuff which will win these prizes, with a very small effort on your part. Help us to get this material for QST—describe the construction of the station which your experience in spark operation tells you will deliver the goods.

## The Fading Tests

**O**UR readers will be interested in a preliminary report of the October fading tests which the A.R.R.L. carried out for the Bureau of Standards. It will be remembered that these were the second of four series of tests which, when completed, will give not only a collection of data on fading but will enable a comparison to be made on the conditions in summer, fall, winter and spring. As this is being written, recorders are being chosen for the third series, the Winter Series, which will take place during January, with the final series occurring in April. The tests will probably be made on the same nights as before, Tuesdays and Thursdays, and again we ask the co-operation of all amateurs in reducing QRM to a minimum during the transmission periods. We know we are asking quite a lot, and occasionally it will mean a little self-sacrifice, but we are doing a fine piece of work, fellow amateurs; we are adding to the prestige of the American amateur, we are attracting the notice of scientists the world over, and thru the excellent staff of the Bureau of Standards we are sharing in the world's first serious attempt to get at the explanation of fading signals. Do your part in this by causing no unnecessary QRM.

Preliminary reports from the Bureau show that, in general, the October tests were considerably more satisfactory than the summer tests, both because a larger number of records (about 2200) were secured and because, the recorders for the second tests being paired, the data are more reliable. Co-operation on the part

of stations near recorders was a great aid, and in the First and Third Districts, especially, interference was reduced to the point where some recorders made practically perfect scores. The relaying of NAA's time signals by NSF's phone was inaugurated so that the transmitters might check their starting time, and this resulted in great improvement in this respect.

In the First District, very consistent recording was done by almost all of the officially appointed recorders. The Second District performed very indifferently, almost none of the recorders doing both good and consistent recording. The Third District was intermediate between the First and Second in performance. In the Fourth District few records were obtained because of strays and coastal station interference. The Eighth and Ninth Districts, as would be expected from their size, did not perform the same thruout; in general, stations in or north of Chicago performed well; those to the southwest of Chicago were hindered by strays, those to the southeast performed fairly well, while those to the east and northeast suffered from interference originating in Cleveland. Cleveland and Philadelphia have the distinction of having given the Bureau no reliable records, because of local amateur interference. It is rather surprising to note, also, that in general the special stations seemed to do much less careful and consistent recording than general amateur stations.

As to the performance of the transmitting stations: 1AW was consistently heard, as usual, coming thru regularly at points which reported hearing no other

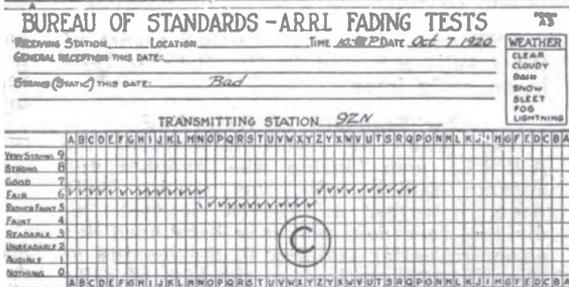
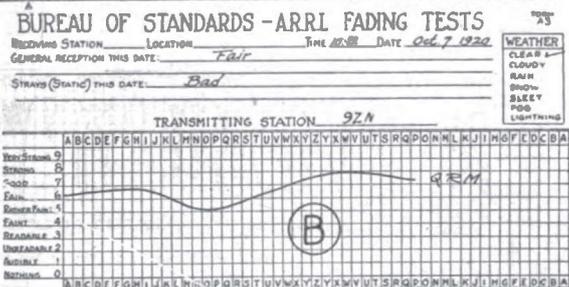
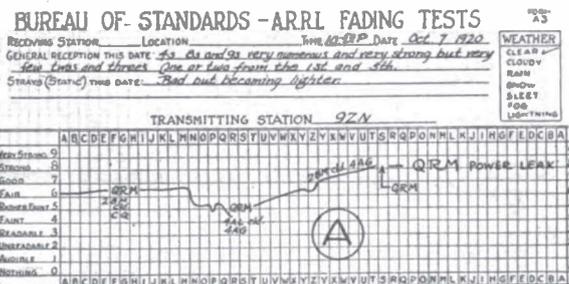
First District station. NSF was the most widely heard station, but chopper trouble experienced on several of the nights made some of the reports of questionable value. 8ZW was very consistent also. 8ER (now 8ZL) and 9ZN, particularly the former, were copied by practically all recorders on some evenings and by remarkably few stations on other evenings. 9ZN's signals appear to carry far better to the west, northwest, north, and northeast than to any point south of Chicago. Three schedules were missed; on one of these 8ZW substituted for NSF, whose power supply was cut off by fire at the Naval Air Station; on the last test 8ER had a station breakdown of some kind which would have caused the loss of the tests except for the quick action of 8ZW, who perceived the situation and transmitted the 8ER schedule on 375 meters, the use of longer wave resulting from lack of time to change back to 250 meters. As everyone was searching for 8ER, very few missed this test.

Special tests were sent from 8XK to determine if the erratic and abrupt swinging of that station's signals, as described by Mr. Kruse in December QST, were due to a characteristic of the set or of the location. These tests consisted of two parts, the first being sent on 8XK's usual set using the power tubes as oscillators as described in September QST. This test faded erratically as usual. The second part of the test, sent a few minutes later, was transmitted by the same tubes operating as amplifiers of a small oscillator. The erratic swinging then disappeared, leaving normal fading. Apparently when acting as oscillators the power tubes had been blocking or shifting frequency, this effect being superimposed on the true fading.

Two sets of daylight tests were also sent. One, at noon-day, was a complete failure, no signals being received over 100 miles. The other, at sunset, has not yet yielded any information except confirmation of the fact that signals become stronger a few minutes after sunset.

About a week after the start of the tests, short wave radio abruptly dropped out of existence in Virginia, as commented upon by Mr. Groves in November QST, and for three test nights no signals were heard, altho ship signals retained their usual intensity. A week later the same phenomenon occurred in the District of

Columbia and not one of eleven recorders there was able to hear any signals outside the District with the signal exception of 2RK, Brooklyn (normal audibility 5000), who swung in very faintly just long enough for his sine to be recognized. The same conditions obtained in Baltimore, but at both points 450 meter ship traffic was very little less than usual intensity, while 952 meters seemed to suffer not at all. Still later during the tests the Ninth District experienced a similar blank. We seem now



in a fair way to get a line on the cause of this phenomenon, which has always been a thing that perplexed us amateurs. The Bureau learns from the Magnetic Laboratory of the Carnegie Institution of Washington that during the time when no signals were heard in the District of Columbia, the conductivity of the atmosphere was most abnormal; and that on the evening when signals returned, it changed quite abruptly from a very high value to a very low value without a corresponding change in atmospheric potential gradient.

It is notable that during the evening in question, the "dead" condition in the District abruptly departed and within five minutes afterwards stations in the Ninth, Eighth, Fifth, Fourth, Second and First Districts had been copied. It is to be hoped that a careful examination of these data will develop an understandable re-

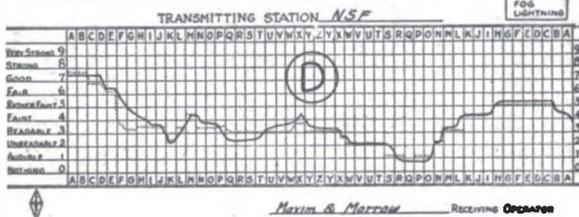
the best class of work done in the tests. Curve B is fair only, missing minor variations. The poverty of information furnished is, however, the main defect of this sheet. "Fair" indicates nothing as to the direction of best reception, neither does "bad" tell if the strays are increasing or decreasing. Curve C is valueless and indicates only that 9ZN was heard on the 7th. If there had been rapid swinging the system of using one check mark per group of five letters would have been totally inadequate. Finally, the weather has not been checked.

**BUREAU OF STANDARDS - ARRL FADING TESTS**

RECEIVING STATION *41W* LOCATION \_\_\_\_\_ TIME *10:30 P* DATE *Oct 5 1920*  
 GENERAL RECEPTION THIS DATE: *Ther. very few stations heard*  
 STRAYS (State) THIS DATE: *Lead cracks making tuning and copying very difficult*

WEATHER

CLEAR
CLOUDY
RAIN
SNOW
SLEET
FOG
LIGHTNING

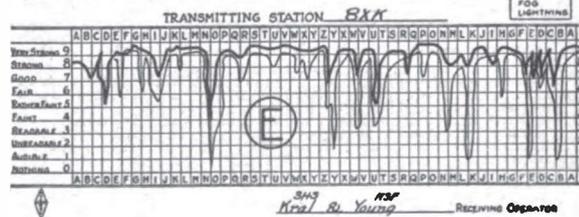


**BUREAU OF STANDARDS - ARRL FADING TESTS**

RECEIVING STATION *227* LOCATION *Washington* TIME *10:00* DATE *Oct 23 1920*  
 GENERAL RECEPTION THIS DATE: \_\_\_\_\_  
 STRAYS (State) THIS DATE: \_\_\_\_\_

WEATHER

CLEAR
CLOUDY
RAIN
SNOW
SLEET
FOG
LIGHTNING



lation between magnetic conditions and radio transmission phenomena.

QST expects to have further report of the results achieved in the October tests in an early issue.

**Our Standard of Recording**

The grade of recording done by the A.R.R.L. men during the summer and autumn fading tests was good. There were, however, differences between individual recorders that may have been due either to better training in the making of scientific observations on the part of some of the men, or to incomplete understanding of the requirements on the part of others.

Just what is required can be best explained by illustrations. The curves A, B, and C were taken in the same city at the same time, on an evening when slow fading made it quite likely that they were all hearing the same thing. Curve A is carefully drawn and useful auxiliary information is furnished regarding QRM. The weather check has been made, strays indicated, and complete "general reception" information furnished. This is the sort of curve that is valuable, and represents

transmission.

Recording is at the best a tedious job and it seems well worth while to put into it the small added effort that will produce really worth-while curves during the January tests.

**ANOTHER WASHINGTON'S BIRTHDAY RELAY**

(Concluded from page 10)

sending every second word but one thru A.R.R.L. stations from the west coast, and the other words, except one, from Atlantic stations, the two remaining words to be key words and started from opposite ends of the Central Division; and the whole traffic to be so routed that every station in the country will be able to get the complete message. C.W. stations will be given preference—probably the first time C.W. has had a prominent part in big relays.

Interested parties especially C.W. men are invited to communicate with Old 9XE at once so that definite plans can be formulated without further delay. His address is: W. H. Kirwan, Box 148, Davenport, Iowa.

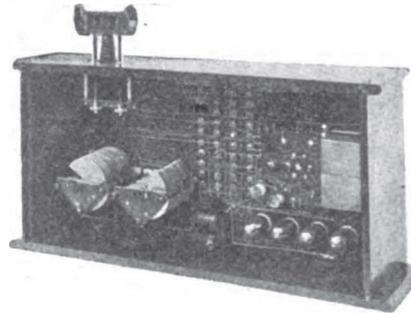
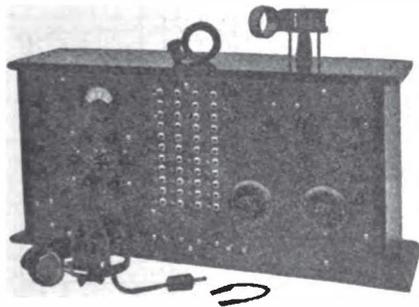
## Some Interesting Receiving Equipment

By John H. Miller

**T**HE receiving set shown in the accompanying photographs was built primarily for experimental work, and is so arranged that the connections of the various inductances and condensers as well as the vacuum tubes are made on the front of the board with flexible leads and plug connectors. Being used with various sizes of honeycomb coils, a large wave length range is attained. The extreme convenience of the set is attained with some loss of efficiency, but using all four bulbs, and tuning properly, almost any station can be brought in loud enough to read if the static will allow it. Estimates of this loss of efficiency vary, but it is doubtful if it exceeds 15%.

filament circuits, reading the current; or the voltage of either the detector or amplifier "B" batteries may be read on other points of this rotary switch which places a calibrated resistance in series with the circuit. Thus one meter serves to read six different quantities, although it is usually left in the filament circuit of the detector bulb.

A high resistance is shunted across the "A" battery whenever the main switch is on, and a variable contact on this resistance connects to ground, which serves to give the grids of the bulbs a definite voltage relation to the filaments. This value can be varied by rotating the contact, although when the optimum point has once



The set is enclosed in a mahogany cabinet, with a removable back. The panel is made of black bakelite,  $\frac{3}{8}$ " thick, grained on the front with sandpaper and oil. Everything except the B batteries, transformers, and coil mounting is mounted on the panel itself.

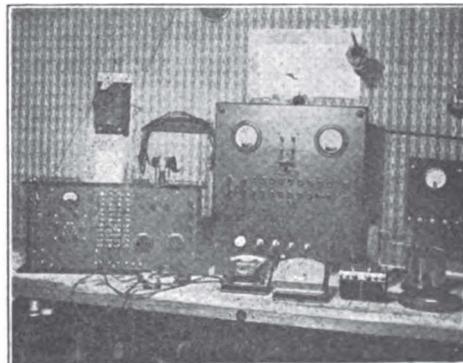
The coil mounting is of the conventional type, with standard plug connectors to take the mounted coils now on the market. The movable coils are actuated from the front of the panel by means of small knobs which work through bevel gears of a 3-to-1 ratio to the vertical shaft carrying the coil mountings.

The condensers are of conventional design, with a maximum capacity of about .0013 microfarads.

The vacuum tubes are held in a bank of four sockets made in one assembly. Their filament circuits include a shunt for measuring the current, and a variable resistance. A main switch opens the "A" battery circuit entirely so that resistance settings may be left as they are when shut down. The instrument shown is a millivolt-meter, and by means of the rotary switch in the shunt, it may be placed

across the shunt in any one of the four

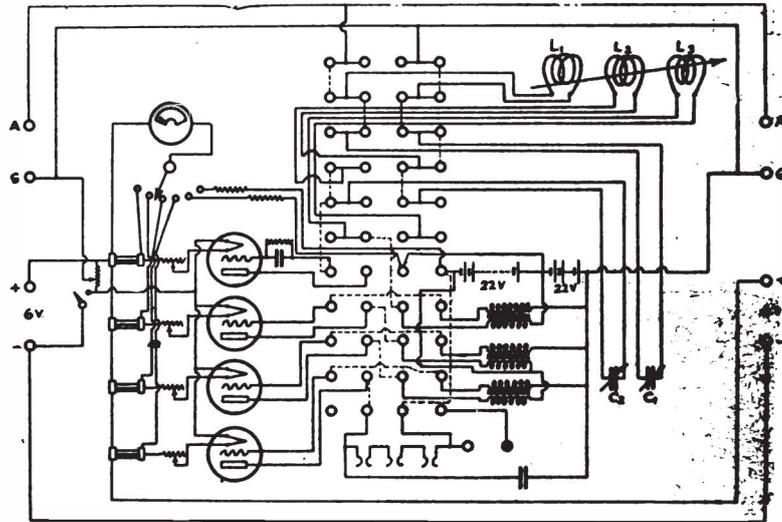
been found, further adjustment is rarely necessary. The wiring diagram shows the general layout and the dotted lines show the connections to be made on the front of the panel for a coupled, parallel condenser circuit, suitable for long waves, with a detector and two amplifier bulbs in cascade. It will be noted that there are binding posts at each end of the panel for antenna, ground and battery, which is merely for added convenience.



As an example of the general convenience of the set, we can use audiotron bulbs if we wish, measure the filament current, and plug in an external "B" battery with a variable potential switch for each bulb so used. Any part of the set may be replaced by another external piece of apparatus and the connections easily made by means of connectors with plugs on one end and clips on the other.

All the internal connections from the sockets and other terminals should be

the condenser are made with heavy bent rods equipped with spade terminals. The set was calibrated against a navy decrementer and checks well within one per cent when compared with other standards. When used to receive, a crystal detector connected unilaterally is used, and when used as a generator, a small buzzer and a single dry cell connected across the inductance serve to excite it sufficiently to check on the receiving set any incoming wave.



made with fairly heavy, say No. 16, bare copper wire, and all circuits that should be well insulated from ground may have varnished cambric sleeving slipped over the wire. To facilitate the tracing of internal circuits the wires should be run in straight lines with right angle bends.

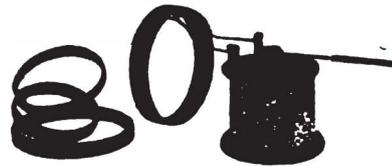
So much for the receiving set.

The wavemeter is merely a very carefully made variable condenser with several coils and suitable coil mountings. The condenser plates are mounted on heavy brass rods with large spacers, with end plates of hard rubber containing the brass bearings for the rotary plate assembly. The plates are of the logarithmic shape giving nearly a straight line wave length curve when plotted against the evenly divided condenser scale.

The coils are wound on micarta tube having a  $\frac{1}{8}$ " wall. The shortest wave coil has been seven turns of "Litz", the next coil 30 turns of "Litz" in a single layer, the third coil has about 100 turns of No. 10 cottanamel in three layers, bank wound, and the last coil has 10 layers or 420 turns of No. 26 silkenamel. This gives four coils which with the condenser cover a wave length range of from 100 to around 18,000 meters. The coils have binding posts on their inner surface and the connections to

The photograph of the writer's laboratory shows the above apparatus, the alternating current board, the rectifying panel for charging the 6 volt storage battery, and some miscellaneous instruments, inductances, etc.

The alternating current board is simply a large plug board which serves to carry a transformer and an ammeter and volt-



meter. The transformer was described in *Everyday Engineering* of June, 1917, and has separate coils for 112, 28, 28, 14, 14, 7, 7, 7, and 7 volts. These coils are connected to the sockets on the face of the board and by plugging in the 112 volt line to the 112 volt coil, the other coils may be placed in series or parallel, and by further varying the primary coils an almost unlimited range of secondary voltage is available.

The rectifier uses tungar bulbs, and is connected by plug connectors to the other  
(Concluded on page 18)

## QRM and QRN Reduction

By Charles W. Eliason, Jr.

**I**NTERFERENCES from neighboring stations or from ethereal disturbances are the great troubles of every wireless operator—amateur or professional. Any system which can even partially obviate difficulties imposed by QRM and QRN certainly should interest the majority of "radio-bugs".

Most systems in use now-a-days depend for their action upon the "opposition of circuits", the effect being the reduction of static or other interference to a large extent, coupled with a relatively small loss of signal strength. This is all very well when one has amplifiers and amplifiers and amplifiers, but to the average operator, such a system means a very serious loss of received energy and receiving range. My plan is essentially the opposite of the type of elimination now used. The function of my scheme is to build up signal strength very greatly, at the same time increasing interference or static intensity very little. All very nice, you say, but how is it to be done? It might be interesting to know of some of the experiments made to this end.

One of the first successful circuits was a very simple affair. A lead from a short, low antenna was brought to one terminal of secondary tuning condenser, while the other terminal was grounded. See Fig. 1. (For the sake of simplicity only a crystal hook-up is shown). Very marked results

It consisted of a single turn, triangular in shape, eighty feet on a side and horizontal. It had no directional properties. To this aerial system was added means of tuning—an inductance and a variable—the whole being shunted across the primary of the receiving transformer. (See Fig. 2.) The writer used honeycombs in a regener-

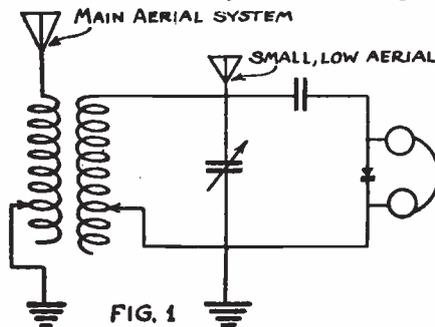


FIG. 1

active hook-up, and it was found that by placing  $L_1$  in inductive relation to the "tickler", further amplification resulted.

I am particularly pleased with the foregoing circuit—it seems to possess the very qualities I was looking for. A great deal more energy is put into the receiving instruments; signals that were entirely inaudible on my set using an "aerial-ground" circuit come in by dozens—C.W. especially. At the same time QRN has the same or

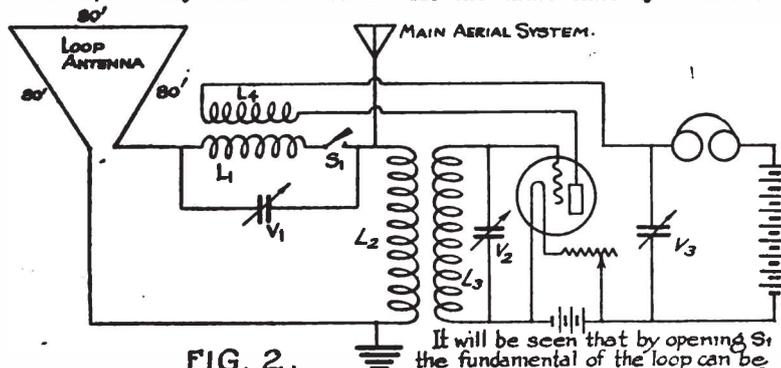


FIG. 2.

lowered by  $V_1$ , while by closing  $S_1$  the fundamental can be raised by choice of inductance values and the capacity of  $V_1$ .

It will be seen that by opening  $S_1$  the fundamental of the loop can be raised by choice of

were obtained with this arrangement; looser coupling was made possible and QRM thereby reduced; finally the effect of the low aerial was to increase the signal strength considerably and not to increase static materially if at all.

The next advance was made with the construction of a loop of peculiar qualities.

lessor intensity than with the ordinary hook-up. Looser coupling is possible because of the greater energy input and also because the coupling of the loop inductance to the "tickler".

The general features that I find valuable are low antennae systems, loops in con- (Concluded on page 68)

## "Station Reports"—A New QST Feature

THE A.R.R.L. is arranging to assist the Bureau of Markets of the Department of Agriculture in the dissemination of market reports via amateur radio, about which more will appear shortly in QST. The first work has already been arranged between the Department of Agriculture and the Bureau of Standards, and WWV, the Bustands station, is commencing the transmission of reports for the territory around Washington. As the work will probably be done in the early evening, it involves the selection of stations whose ability to hear each other is practically positive, and this brought to our Operating Department the problem of knowing always who such stations are. Our "Calls Heard" show where our signals are reaching, but that is no guide at all to working ability, as we all know; our trunk lines route via the reliable stations, but only in certain directions and do not show anything about working abilities in other directions around a particular station. An unofficial suggestion by Mr. S. Kruse, Associate Engineer of the Bureau of Standards, opens the way for the collection of the data: that we have certain of our good stations report every month who are the steadiest stations and who are the loudest stations from each district heard at their own station. This is an excellent idea and has been adopted by our Operating Department. To inaugurate it, all officials in the Operating Department personnel are being asked to send in such reports with their regular monthly reports. Thus they will be collected here at Headquarters and will be a monthly guide to the Traffic Manager in the selection of stations for any important work. But of more especial value to most of us will be their publication in QST—which will show not merely who is heard, but who is heard loudest and most consistently. This will help all of us to improve our stations.

Mr. Kruse has started the ball rolling with a report from Washington. This information was compiled by him from reports of reception by members of the Washington Radio Club at nine different stations. Mr. Kruse, it will be remembered, has been in charge of the fading tests at the Bureau of Standards, which adds much weight to this report upon our signals, and gives us definite information as to which of our stations are the best performers when one is receiving at Washington. We are asking Mr. Kruse to favor us with such a report every month—which should be a constant guide and inspiration to all of us to IMPROVE.

The report of stations as received at Washington follows:

First District: No consistent station. Best ones 1AW, 1HAA; latter about 50% as reliable.

Second District: 2RK at least ten times as good as next competitor and never fades clear out. Only one other station outside of Washington received as well.

Third District: Hard to choose. No consistent performer at all. Toss-up between 3BZ, 3GO and 3VV. None of the specials are worth much. Old 3NB was fine, but not heard lately.

Fourth District: Fine and steady some evenings—nil at all on others. When the district as a whole is in, it is a choice between 4DM, 4YB and 4AL.

Fifth District: No consistent performer. 5XA best (if he would talk instead of always CQ-ing). 5ZP, 5ZL and 5DA all good.

Sixth District: (Think we heard 6EA once.)

Seventh District: Nil.

Eighth District: 8ZL never fades clear out. 8XK second best (a very good second at that). All others fade out at times and some evenings can not be worked. 8ZW very good here but is no further off than 1AW. The Eighth District is the best we get (except 2RK and 9ZJ) but in the light of commercial standards it must be confessed that even they are not always "there". Among the best are 8ZY, 8HH, 8ACF, 8DV. At the time when old 8DA was going he completely eclipsed all others but he seems to have dropped off the earth.

Ninth District: 9ZJ has it all over all others out of town—2RK included. Among the best are 9CP, 9ZN, 9AU, 9LR, 9LQ, 9OJ, 9AKC, 9AEQ, 9AJI. Of these the loudest are at times 9LR and 9ZN but the most consistent are 9AU and 9CP.

### SOME INTERESTING RECEIVING EQUIPMENT

(Concluded from page 16)

board for the AC source, thus eliminating the need for another transformer. The meter on its face measures current on charge or discharge as well as voltage by means of a rotary switch which connects in shunts or series resistance.

## A Rotary Gap of High Quenching Characteristics

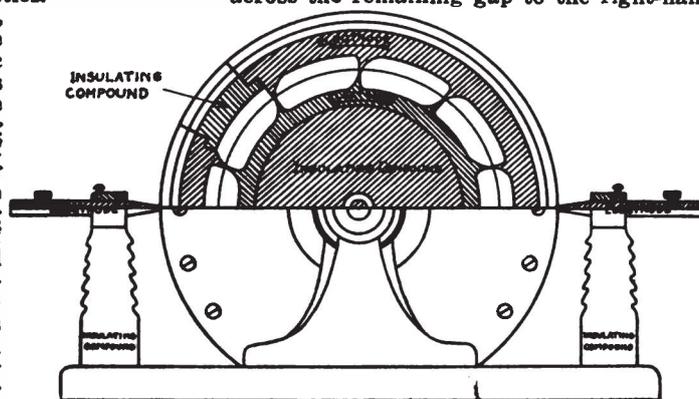
**T**HROUGH the courtesy of Mr. Ernest Oke, of Peterboro, Ont., we present drawings of a rotary gap, designed by him, which should possess excellent quenching ability. Its construction is beyond the average amateur, but those with mechanical engineering experience and facilities will doubtless be interested in its possibilities.

As the drawings show, the principal idea of the gap is the two concentric members bearing two sets of ten electrodes, the inner member revolving clockwise at a speed of 3000 RPM and the outer member counter-clockwise at the same speed, giving an effective speed of electrode movement equal to 6000 RPM and providing a spark note of 500 cycles. The designer has employed several approved methods of securing superior quenching: four gaps in series, gaps in parallel, and a time constant at the peripheral speed attained calculated to limit the time of sparking to four complete oscillations in the closed circuit on 200 meters.

The inner revolving member consists of a conducting rim bearing ten teeth, supported on an insulating disc. This disc is fastened to the main shaft, which is driven by the right-hand pulley shown in the side view. The outer revolving member consists of the metal rim of a kind of revolving case, the sides of which are formed of insulating material, and the inside of the metal rim bears ten electrodes similar in shape and spacing to those on the inner member. The outer member, however, is divided into two equal sections of five teeth by inserted segments of insulating material. One such segment is shown in the upper left quarter of the left-hand drawing, and the other segment is diametrically opposite (altho not shown). The driving pulley of the outer member is directly connected thru a flange to the insulating material which forms one side thereof. Two stationary electrodes, disposed on either side of the revolving parts, are also provided. These electrodes spark directly to the smooth outer edge of the outer revolving member, but are adjusted as close as possible.

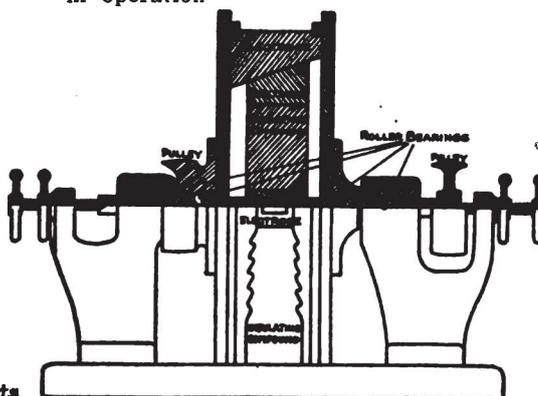
The spark path, then, is from the left-

hand stationary electrode to the lower section of the outer revolving member, thence across the five teeth thereof (in parallel) to the five opposing teeth of the inner member, thence thru the five other teeth of this inner member (in parallel) to the five opposing teeth of the upper section of the outer member, and thence across the remaining gap to the right-hand



stationary electrode.

The electrodes are in the form of knife edges and of ample width to provide the necessary sparking surface. The edges of the revolving electrodes are not parallel with the shaft, which permits adjustment of the length of gap by adjusting the set screws and lock nuts at the ends of the shaft which bears the inner member. This adjustment may be made while the gap is in operation



Roller bearings are used thruout. It will be noted that the outer member revolves counter-clockwise over the very  
(Concluded on page 28)

## Experiments With Single Layer Coils

By A. L. Groves

HAVING stated previously that the Honeycomb and Duo-Lateral coils were rather inefficient on the short waves and suggested a method of winding and mounting single layered coils for these waves in August QST, the question naturally arises as to why the honeycombs and other windings of this character should show to a greater advantage on one range of waves than they do on another.

With this in mind I set about to experiment further with the "unit type" of single layer coils, and while the statements I make in this article must not be taken as conclusive, I will give to you fellow amateurs what data I have collected in my experiments so far and hope it may lead to discussions that will give us all a better and broader view of the receiving end of radio.

After completing the short wave coils as described in November QST, I wound a bakelite tube, 5 3/4" outside diameter and 9 inches long, full of No. 32 enameled wire for a secondary coil for long waves. This was approximately 990 turns of wire. At the same time I wound several other coils with No. 28 enameled wire for the primary circuit, and incidentally the plate coils. After testing out this secondary coil it was found to be almost exactly equal in inductive value to the DL and HC coils No. 1000, and with a 23 plate condenser in

longer waves tuned in with as much ease and clearness as they did on the shorter waves, KIE and OUI being received with equally the ease of BZR, BZL, NAW, NAU, etc.

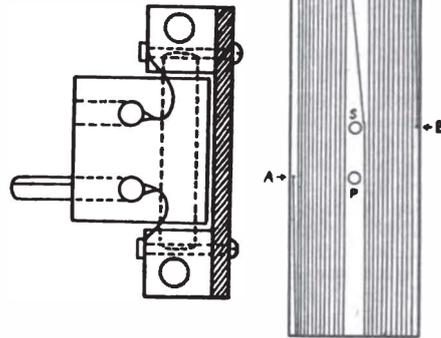


FIG. 2

FIG. 4.

My next trial was with a secondary coil 5 3/4" outside diameter and 4 1/2" long, wound full of No. 32 enameled wire, which was about 495 turns. This coil represented the same inductive value as the DL-600 coil, which is slightly more than the corresponding HC-600 coil. It was found to respond over a wave length range of about 2,000 to 6,800 meters with the 23 plate condenser in shunt and, like the other coil, the effect of condenser capacity did not seem to hurt it in the least and KET, FL, NAR, etc., on 6,500 to 6,800 meters, were received with equally the ease and clearness of the stations around 2,000 to 3,000 meters, represented by WNU, US, PWA, MPD, WDR, etc. I also made direct tests on the waves to which both of these coils would respond, and the results on about 4,000 to 6,800 meters (including BYB, XDA, VAL, BZL, NAW, NAU, NAT, NAR, FL, KET and many others) further strengthened the first impression that the coils were not appreciably affected by condenser capacity.

Without going into details regarding my further experiments will say that the 75 turn coil previously described in November QST approximately represents HC or DL-150. A coil 1 1/4" long wound with 110 turns represents coils 200; 1 3/4" long, wound with 165 turns, represents coils 250; 2" long, wound with about 192 turns, represents coils 300; 2 3/4" long, wound with about 247 turns, represents coils 400; 3 3/4" long, wound with about 385 turns, represents coils 500; 4 3/4" long, wound with about 495 turns, represents

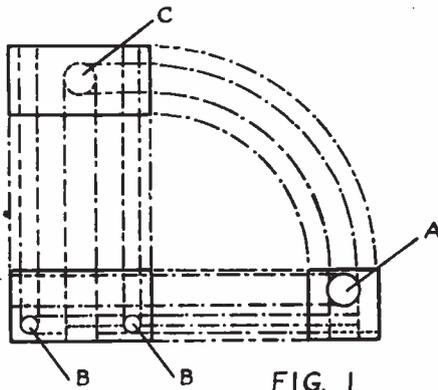


FIG. 1

shunt it responded over a range of waves from a little less than 4,000 meters up to about 11,500 meters. The first noticeable peculiarity of this coil was that signal strength did not appear to be the least decreased by the use of a large amount of the condenser. That is, signals on the

coils 600;  $6\frac{1}{4}$ " long, wound with about 715 turns, represents coils 750; and  $9\frac{1}{4}$ ", wound with about 990 turns, represents coils 1000.

All coils are  $5\frac{3}{4}$ " diameter and wound with No. 32 enameled wire. The extra  $\frac{1}{4}$ " length which these figures allow will be explained later.

It is well to note that my experiments did not seem to warrant the use of larger size wire than No. 32. While larger wire would undoubtedly be somewhat better it necessitates longer cylinders and a given number of turns with large size wire does not represent as much inductive value as the same number of turns with smaller wire, so after many experiments I finally decided No. 32 was best suited for all-around use. As an example of the inductive values of different size wires, with a coil of 315 turns of No. 28 enameled wire, NAH on his 1500 meter press wave tuned in with the condenser at 17 degrees; WNU on about 2,500 meters tuned in at

that it is impossible to obtain correct transfer of energy.

It is apparent that the regular mounting cannot be used with the longer coils and I herewith present a plan for a mounting that is well suited for any length coil and also for the regular D.L. and H.C. coils as well. In Fig. 1 we have a piece of brass  $1\frac{1}{2}$ " square and 1" long, drilled lengthwise with a  $\frac{1}{4}$ " hole as at A. Turning the piece of brass sidewise, drill two  $\frac{3}{16}$ " holes as at B,B. Then on the under side drill another  $\frac{1}{4}$ " hole about  $\frac{1}{8}$ " deep, as at C. Four such pieces are needed for the completed mounting.

The brass rods that act as a hinge are then taken out of two of the regular DeForest mounting plugs, and  $\frac{1}{4}$ " bakelite rod is substituted in their places. Two of the brass pieces first described are now selected and one of the mounting plugs is placed between them with the projections of the  $\frac{1}{4}$ " bakelite rod in each of the  $\frac{1}{4}$ " holes shown at C, Fig. 1. These are

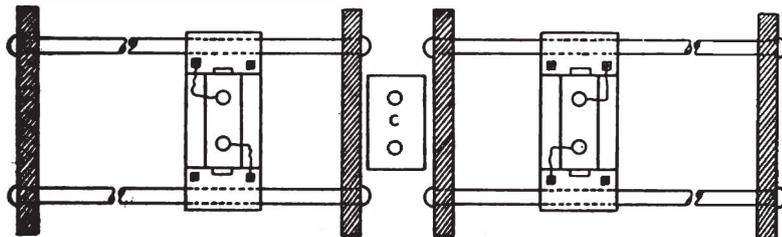


FIG. 3

63 degrees. With the same size coil wound with 200 turns of No. 32 wire, NAH tuned in with condenser at 20 degrees and WNU with condenser at 68 degrees, so it is seen that the 315 turn coil was only a shade larger in inductive value than the 200 turn coil with the smaller wire.

From my experiences with these coils side by side with both the Honeycomb and Duo-Lateral and the known inefficiency of the H.C. and D.L. on the short waves, and of the old style loose couplers in general, I have formed the opinion that it is not so much the form of winding of any of the new concentrated coils that make them appear so efficient but that most of their efficiency is due to their "unit" form, which frees them from the losses sustained by taps, switches, dead-ends, loaders, etc., which were so common to us all in the old pre-war apparatus. The dead-end losses are very marked if one makes careful experiments with tapped and untapped coils, but it is not nearly as deadly as the adding of loaders in the primary, and "grid coils" in the secondary, etc. Every loader added subtracts greatly from the efficiency of the set as it takes part of the energy already received to excite each additional coil and the coupling effect between primary and secondary is displaced to such an extent

secured in this position by a strip of bakelite and No. 6 brass machine bolts passing through the holes B in Fig. 1. The complete assembly is shown in Fig. 2. Two of these assemblies are necessary, one for the primary and the other for the plate, and each is mounted on  $\frac{1}{4}$ " brass rods of any length desired, 8 to 10 inches long being about right for the average experimenter. The complete mounting is shown in Fig. 3. A Sears-Roebuck 6A9166 is used for the center or secondary coil plug and should be raised with a bakelite block until it presents an even front with the primary and plate plugs.

In my first experiments the coils were mounted in the regular DeForest manner with DeForest plugs and a bakelite band, but as it was impossible to purchase the regular DeForest plugs, it was decided to rearrange the coils so the Sears-Roebuck 6A9166 plugs could be used. This method requires a  $\frac{1}{4}$ " longer cylinder, but makes a stronger and all-around better coil, as well as being cheaper and easier to make and mount. To make a coil of this kind, the desired length cylinder is secured and, referring to Fig. 4, drill two  $\frac{3}{16}$ " holes in the exact center of the coil as at "S" and "P". These holes are spaced exactly  $\frac{1}{4}$ " apart. A winding machine is made of a

piece of 5½" plank to which has been attached a handle and bearings. The cylinder is then slipped over this board and keyed in a firm and true position by means of little wedges inserted at each end of the cylinder. Secure the wire on the left hand end of the cylinder as at "A", leaving enough loose end for connection to "P" when finished. Give the coil a coat of shellac and wind in the direction indicated, which, when viewed from either end after completion, will be in a clockwise direction. Wind up to within a turn or two of the holes S and P and then skip to an equal distance on the other side of them as indicated. Finish winding to the end and secure wire at "B", leaving enough free end to be connected to "S". Attach the plug and the coil is complete. The "plug" of the plug is placed in position over the hole "P" and the socket of the plug over the hole "S" and screwed up firmly by the bolts that accompany the

plug, the end of wire at "A" being connected to the screw in hole "P", and the end at "B" to the screw in hole "S". This is important, and if the coils are wound and connected as indicated they can be interchanged with the Honeycombs and Duo-Laterals at will. That is, you can use one of these coils in the primary, a H.C. in the secondary and a D.L. in the plate, or mix them up in any manner desired. If connections or winding are reversed this cannot be done. The writer completed the 9¼" coil in 30 minutes and the 4¼" coil in 15 minutes and smaller ones in much less time, so the task of building them is not great.

If there is no objection to the space occupied by them I certainly believe these coils worthy of a trial, especially if one does not care to invest in the high prices of the Honeycombs and Duo-Laterals. Attention is also called to the fact that the  
(Concluded on page 24)

## January Transcontinental Test Messages

By F. H. Schnell, Traffic Manager

**T**HE sporting blood of the Operating Department personnel has been aroused over the forthcoming transcontinental tests, and a keen rivalry among the various divisions in preparing for the tests shows that they are a thing we have been waiting for. The enthusiasm is the kind that produces re-

continental Test Messages on January 14th, 15th, 16th, 17th, and 18th, 1921. Changes will be made where necessary between now and those dates if better plans develop.

TRANSCON No. 1 Jan. 15, 16, 17, 1921.  
1:00 A.M. E. S. T.

Scheduled Alter. #1 Alter. #2

1UQ	1CK or 1DY	1CK or 1DY	1CK or 1DY
1HAA	1HAA	1HAA	1HAA
1BBL	1AW	1AW or 1BBL	
2RK	3HJ	2RK	
	8DV	2JZ	
		3DH	
		3HJ	
		8DV	

8ZW

8ZL

9ZN

9JN

9HT

9ACF or 9UP

6ZH or 6JT

6BZ or 6BQ

9ZL

9ZC

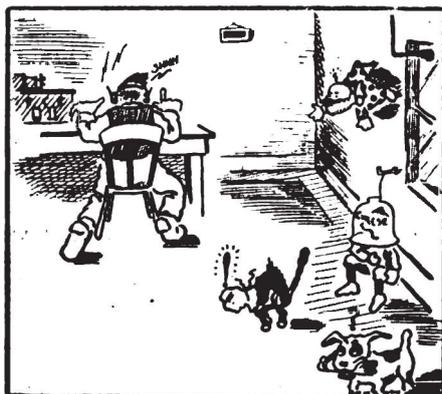
9WU

7IM

7CC or 7FT

7ZB or 7BP or 7DA or 7ZJ

Note: At 9ZN this message must go via two routes as shown. This is to test the northern trunk line with the central. Time of arrival in Portland, Ore., is very important, as noted over the two routes.



How to keep 'em quiet on the nights of the Transcons.

sults, and so we are assured of some real races against time in middle January.

### Routes

The following station routes have been selected for the transmission of the Trans-

TRANSCON No. 2, Jan. 15, 16, 17, 1921. 1:00 A.M. E. S. T.		
Scheduled	Alter. #1	Alter. #2
1AW	1AW	1AW
2RK	2RK or 2JU	2ZL or 2RK
8ZW	3DH	3DH
3AEV or 3BZ	3XF or 3KM	8ZW
4AG or 5DA	3AEV or 3BZ	3AEV or 3BZ
5XA or 5ZP	5DA or 4AG or 4YB	5DA or 4AG
5YH or 5ZL	5ZP or 5YH	5YH or 5ZP
5ZC or 5ZG	5ZC or 5ZG	5ZC or 5AJ
5ZA	5ZA	5EJ
6KP or 6JD	6ZH or 6JT	5ZA
	6BZ or 6BQ	6ZH or 6JT
	6ZK	6BZ or 6BQ
	6KP or 6JD	6ZK
		6KP or 6JD or 6JM

TRANSCON No. 3, Jan. 14, 15, 16, 1921. 10:00 P.M. Pacific Std. Time.		
Scheduled	*Alter. between 8ZL and 1AW	
6ZE	8ZL	
6BZ or 6BQ	8ZW or 8ZD	
6ZH or 6JT	8DV or 8RQ	
9ACF or 9UP	3HJ or 3DH	
	2JZ or 2ZL	
9LR	9HT	2RK
9KV or 9LC	9JN	1AW
9ZJ	9ZN	
8ZY	*8ZL	
8ZW	8ZD	
2RK		
	1AW	
	1HAA	
	1CK or 1DY	

Note: At 9ACF or 9UP this message must go via two routes as noted.

TRANSCON No. 4, Jan. 14, 15, 16, 1921. 11:00 P.M. Central Std. Time.	
Scheduled	Alternate
9WU	9EE
9ZT	9HM
9JN	9AEQ
9KV	9LC
5ZL	5YH or 5ZC
5ZP	5ZP

the Pacific Division. Mr. Bessey will be on the job to make his reply immediately upon receipt of Mr. Maxim's message.

In order to cut down the time necessary for transmission, the number of stations participating has been reduced to a minimum. Accordingly, many good stations have not been included. This is unavoidable and we hope that those not included will not feel that they have been neglected but will realize that the question of location had to be considered. Stations not included can co-operate by doing all in their power to keep the air quiet on those nights, and by clearing the paths as far as possible so that we may carry out our undertaking most successfully.

SPECIAL TRANSCON No. 5, Jan. 18, 1921. 2:00 A.M. E. S. T.	
1AW	
9ZN or 9AU	
5ZL or 5YH	
*5ZC	
5ZA	
6ZA	
6ZK	

\*5ZC will QRX for the stations on either side of him in case of emergency. We want to make this in the longest possible jumps reliably. If 5ZA can copy direct from 1AW, he should pass it on at once, being sure it is received correctly, and the same for other stations on this route. Speed is what we want on the message and the reply.

This will be a personal message from Mr. Hiram Percy Maxim, President of our League, to Mr. A. E. Bessey, Manager of

**Terminals**

- Transcon No. 1.—From Portland, Maine to Portland Oregon.
- Transcon No. 2.—Hartford Conn. to Los Angeles, Cal.
- Transcon No. 3.—San Francisco, Cal. to Boston, Mass.
- Transcon No. 4.—Ellendale, N. D. to New Orleans, La.
- Transcon No. 5.—Hartford, Conn. to Sunnyvale, Calif.

**Starting Times.**

Transcon No. 1 starts at Portland, Maine, Jan. 15-16-17 at 1:00 A.M. East. Std. Time.

Transcon No. 2 starts at Hartford, Conn., Jan. 15-16-17 at 1:00 A.M. East. Std. Time.

Transcon No. 3 starts at San Francisco, Jan. 14-15-16 at 10:00 P.M. Pac. Std. Time.

Transcon No. 4 starts at Ellendale, N. D., Jan. 14-15-16 at 11:00 P.M. Cent. Std. Time.

Transcon No. 5 starts at Hartford, Conn., Jan. 18th only, 2:00 A.M. East. Std. Time.

Because of the difference in time between the East Coast and West Coast, Transcons Nos. 1 and 2 will be starting from Portland and Hartford, respectively, on the 15th, while it is still one day earlier on the Pacific Coast.

**Prefixes and Replies**

In order to avoid confusion concerning the route to be followed for each message a special prefix has been adopted. On the night of the 14th, Transcon No. 3 will start from San Francisco at 10:00 P.M. bearing the following prefix: "Transcon 14 msg No. 3" etc. On the other nights the prefixes will be the same except for the change in dates ("Transcon 15 Msg No. 3" etc.). Replies also shall bear a special prefix in order that they will reach the proper destination. The speediest possible route shall be used for the replies and in the longest reliable jumps. Reply to Transcon 14 Msg No. 3 shall be in this form: "Transcon 14 Reply No. 3", etc.

**Alternates**

The stations taking active part in these tests shall make every effort to copy all or any part of each message and each reply, no matter from which station, and in case it does not reach their station after a reasonable period of time, via the route laid out, shall pass it on to the next station in line. However, each message and reply must be acknowledged in every case. Keep strict record of the time on every station you hear. We must try to follow the route as closely as possible, but weather conditions may interfere and necessitate calling alternate stations into action. Operators must exercise great care in calling alternate stations so as not to cause confusion among the others. Stations acting as alternates will remain silent unless they are called upon to assist in getting the messages through to the proper stations for further relaying. Stay on the job and QRX, as you never can tell what unforeseen interference may arise.

**All Stations**

In addition to the stations handling the tests, ALL AMATEURS are invited to copy

everything they hear concerning these messages and forward their complete data to this office, which will be used in compiling the story for QST. This information should include call letters of transmitting stations, time, and date.

The entire success will depend upon the co-operation in absolutely eliminating QRM, and to that end we ask you to keep your transmitters silent and your receivers in action on those nights. We want the entire assistance of our League in this respect and to have the members ask their friends to co-operate to that extent. We can make these tests the most interesting thing that ever happened in Amateur Radio.

**EXPERIMENTS WITH SINGLE-LAYER COILS**

(Concluded from page 22)

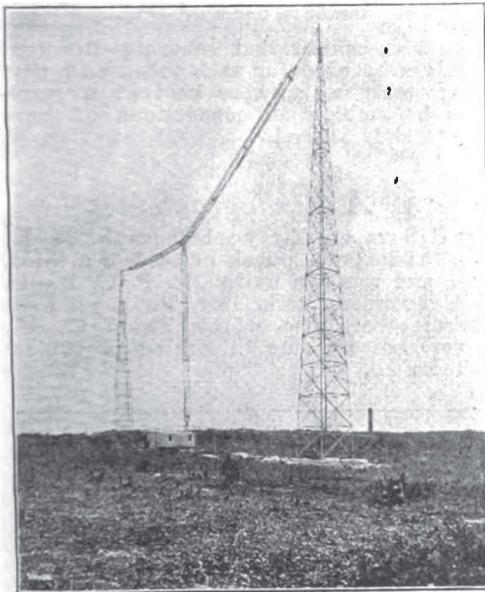
mounting need not be arranged to swing if not desired and the S-R plugs can be used throughout, making them stationary on primary and plate mounting, and using the sliding feature for coupling purposes entirely.

I would also suggest the use of banked windings on coils for the extremely long waves as it hardly seems advisable to use coils longer than 10 or 12 inches, nor would it be advisable to use wire much smaller than No. 32. In all, with a mounting as described arranged to take care of different length coils, many interesting and valuable experiments with different coils may be carried on, but as far as it is reasonably practical to go with the single layered coils in the unit form I believe they will give just as good an account of themselves as almost any of the others. Indeed I do not believe I am rating them too high when I say that for waves up to about 5,000 meters they are really better than the H.C. or D.L. and I have obtained audibilities from FL, OUI, KIE and KET with them that have not been duplicated with anything else. As far as my experiments have gone and considering all points, there appears to be a difference in favor of the single layered winding up to 10,000 meters, anyway. I have heard any and all signals on these coils that I have heard on the D.L. or H.C., notwithstanding the fact that they are wound with a smaller size wire.

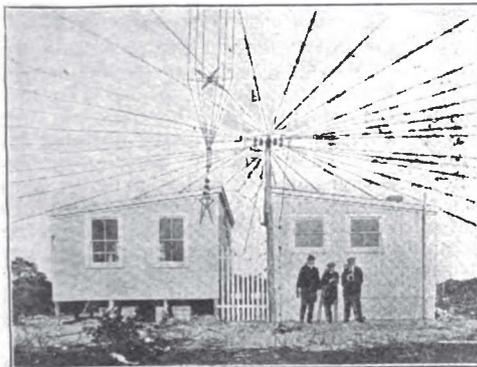
Therefore, notwithstanding the theories against enameled wire, distributed capacity and resistance, the single-layered coil appears to hold its own surprisingly well in direct comparison under actual working conditions against actual signal strength and distance, and indicates that perhaps the greatest improvements in the winding of radio inductances has been the making of "unit" coils, rather than any actual "form" of winding and criss-crossing the turns.

## Antenna Ideas Here

**T**HESE two photographs are of the new coastal station of Cutting & Washington, located at Easthampton, Long Island, call letters WSA. They contain a number of ideas of interest to amateur constructors. The aerial is a six-wire cage in a T-shape, the vertical portion likewise being a cage. The



close-up shows one of the former at the bottom of the vertical portion. The towers are of galvanized steel, total height 175 feet, 300 feet apart. A radial counter-



poise is used, consisting of 36 wires in six sets of 6 each, supported at the station by the short 20-foot pole shown in the close-up and radiating to similar poles shown in

the background of the general view, practically covering six acres. Note the insulation of the counterpoise wires. The far ends are similarly insulated.

Easthampton is about a hundred miles from New York, and the station should therefore be fortunately situated for handling New York traffic with shipping and avoiding the harbor QRM. Direct telephone and telegraph wires connect it with the city. The apparatus is Cutting & Washington.

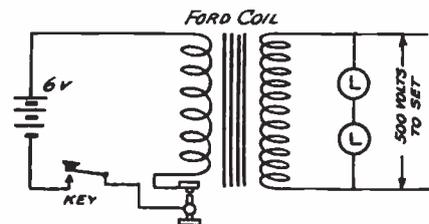
Incidentally, the center figure in the group alongside the station is Mr. E. A. Gisburne, their Superintendent of Traffic, formerly A.R.R.L. City Manager of Boston.

### Cheap I. C. W. Potential

**T**HE following scheme may solve some of the difficulties encountered in obtaining high potentials for I.C.W. Any amateur can make it simply and easily. The apparatus needed is:

- 1 Ford coil
- 2 250-volt 16 c.p. lamps
- 2 lamp sockets
- 1 6-volt battery

The connections are indicated in the diagram. A spark coil gives a very high voltage but the lamps act as an enormous load and bring down the voltage across



the leads to the set to the value of the drop across the lamp bank, in this case 500 volts. The tone emitted is the tone of the vibrator and no further modulation is necessary. Perfect modulation is obtained because when the cycle is at its positive half the bulb oscillates, and when at its negative half the bulb stops oscillating entirely and no energy is radiated.

The connections for such a set are simple and well-known. The device as described may be used for telegraphy in conjunction with the simple radiophone which I described recently in QST.

—F. S. Huddy, 111.

### Tuning the Colpitts Circuit

THE adjustments on a set using the Colpitts circuit are so inter-related that its tuning is generally rather difficult, and a few words on that subject may be of value. As commonly used by amateurs there are four adjustments necessary: the aerial tap on the inductance, the plate tap on the inductance, the variable condenser in the ground lead, and the variable grid condenser.

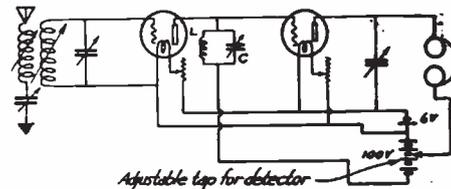
The aerial tap controls the wave length, subject to changes in the capacity of the series condenser and also being influenced to a smaller degree by the location of the plate tap. With the ground condenser set about mid-value, the aerial tap should be adjusted approximately to the wave length desired and the series condenser adjusted for maximum antenna current. The coupling tap is then to be adjusted, and in general as the proper position of this tap is approached the antenna current will increase as the plate current decreases, so that as a rule its position is that which gives the lowest plate current. This is because when not oscillating this set draws more current than when oscillating. In telephone work there is still another important adjustment—the grid condenser. This should always be a variable, for if its capacity is too large the drop across it is not as large as permissible and the possibilities of the set are not realized; while if too low, the potentials impressed on the grid will be sufficient to swing it thru its entire range of values and badly distort the speech. It should be possible to determine its correct adjustment by noting a flicker of the antenna meter when speaking in the microphone, particularly on the word "Hello!"

Because each of these adjustments have an effect on all the others, the operator should go over them two or three times until finally they are got down to their proper values.

### Radio-Frequency Amplification with A-P Tubes

THE Moorhead A-P Amplifier has a comparatively low internal capacity, amounting to 3.3 millimfds. between grid and filament, and 4.2 between plate and filament, as compared with 7.1 and 9.2 millimfds., respectively, for the VT-1. The University of California has carried out some tests which show that with care excellent results in 200-meter r.f. amplification may be had with this tube, using the circuit shown, wherein the first tube is an A-P amplifier, the second tube a gaseous detector, inductance L an L-25 honeycomb or 24 turns of wire on a 3" tube, and con-

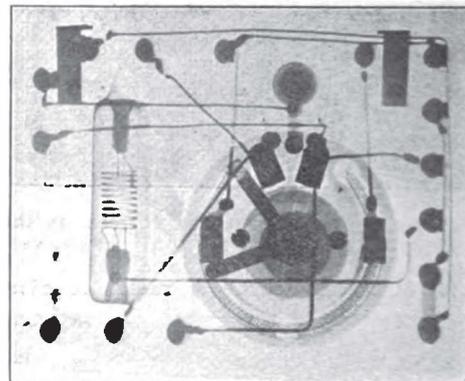
denser C a variable of 0.0005 mfd. maximum. This is an impedance-coupled amplifier, the circuit LC being tuned to the resonant frequency, at which point it offers infinite impedance.



It is essential that separate filament rheostats be used for each tube, and that electrostatic capacity be kept at a minimum by making all connections of bare wire, widely spaced.

### A Radiograph

THIS is an X-ray photograph of an AudioTron panel of  $\frac{1}{4}$ " Formica, and was sent us by Mr. P. C. Rauls, of Menominee, Mich. Mr. Rauls sent us several others also, of his Eaton Circuit Driver, but the one illustrated is typical of them all.



English magazines have been using such radiographs in their descriptive articles for some time. They serve to convey an excellent idea of the interior arrangement of a piece of apparatus, in some cases much better than can be done by either drawing or photograph. And they certainly show up anything in the way of inferior workmanship! Screws driven in cattawampus, bungled soldering, or untidy wiring, will stand out like the nose on your face.

What the Editor is c. to k. about the view reproduced here is how the effect of "high lights" was produced and why certain parts of the wiring, apparently at the same distance as the balance, were barely visible.

## Tuning the Transmitter

By James L. Autry, Jr., 5ZX

**D**URING our past season there was a great deal of trouble in connection with the QRM which made it impossible to get many messages thru in a hurry. To a great extent this was blamed on the fellows with spark-coils and the ones with transformers who never pretend to tune their sets at all. This was true in a great measure, but the long-distance fellows themselves caused a great deal of trouble in this way by not taking the trouble to tune their sets carefully, and leaving the set as it was when the hot-wire ammeter showed the greatest flow of current. This is a good rough way to tune, but the meter registers all the current that is put out at any and all wavelengths; while the energy at one definite wavelength is all that will be absorbed by the receiving station.

To be sure that you are putting out the maximum amount of current at one sharp wave and at no other requires more than to tune to resonance with a hot-wire ammeter. It is the purpose of this article to briefly describe a method which requires only a wave-meter, such as any amateur possesses, in connection with a hot-wire ammeter.

The first thing to do in tuning a transmitter is to get exactly the correct amount of capacity to obtain the greatest amount of radiated current and a clear spark. A condenser with single plate adjustment is very useful for this purpose, as very nearly the right capacity can be obtained easily. In this connection the ammeter can be used advantageously, merely changing the capacity and tuning to resonance again, until the greatest radiation is obtained. (Of course the closed circuit should be tuned to the open, on changing the capacity in the former, and not vice-versa.) The next question is the condition of the emitted wave, its sharpness and purity: which is really the object of this article. By means of the wavemeter tune the closed circuit to exactly the wavelength you wish to work on, taking care not to make it so small that under three or four turns will be used in the open circuit as this will broaden the wave somewhat. Then put the inductance of the wavemeter in inductive relation to the ground lead, taking care to place it so it is not in the field of the primary of the oscillation transformer—this can be determined by removing the secondary clips and turning the wave-meter so that the light does not glow. If the particular meter which is in use is not equipped with a lamp, put a three volt lamp in series with the inductance and condenser. Then put the clips on the secondary

of the oscillation transformer at the point of rough resonance (as determined by the hot-wire ammeter) and find the wavelength emitted by means of the wave-meter; in all probability it will not be within eight or ten meters of the wavelength to which the closed circuit was tuned, which means a broad wave. Next loosen the coupling of the oscillation transformer until the light in the wavemeter just glows, then vary the secondary inductance until the wavelength shown on the wavemeter is the same as the closed circuit was tuned to. The light should now be brighter than before the clips were changed as the two circuits are now in absolute resonance. Next tighten the coupling till maximum amount is radiated, and slowly loosen it until the current drops rapidly off, swing it just to the point where it starts dropping, and the wave should be as sharp as the aerial's decrement will permit. By substituting a detector and pair of phones for the lamp and moving some distance away from the transmitter, it is possible to tell if the wave has two humps, a flat top, or is absolutely sharp, by varying the wavemeter condenser slowly and noticing if the response is stronger in two or more places, over a range of a few degrees, or can be heard loudly in just one definite place. As a rule the same results can be obtained by watching the lamp closely and noting if it lights up sharply in one place or over quite a range, etc. The correct way to use the lamp is to have it just glowing on the maximum point and if it is not incandescent at all over a few degrees on the condenser scale to either side of the maximum point, the wave is sharp enough for practical purposes. It may be necessary now to change the secondary inductance slightly for the change in coupling.

By far the best type of oscillation transformer to use is the hinge type, as it permits the coupling to be changed while the set is in operation and the "critical point" or point where the current rapidly falls off, can be easily determined.

If the current reading on the ammeter is not as great as at the beginning of the tuning, do not think that you will not be able to do as good work as before, as the current now shown is now practically all in one wave, while in the previous reading it was probably in several different wavelengths. As an example: a station here in this city was tuned up in the usual way with an ammeter and the owner was doing good work on the wavelength of 200 meters, when several of the Government stations within a radius of 600 miles

reported him as working on a wavelength of 1350 meters! All the energy put out at the higher wavelength was worse than wasted.

The foregoing may seem hard as it is read, but it really takes but little more time than the usual method and the results are far more gratifying. Also QRM would not be nearly so bad as it was during our last season if every one would tune their sets in this way as there are quite a good many who have their sets tuned sharply

and it is easy to tune them out, while some of the fellows come in with the same intensity from 200 to 300 meters and all work must be suspended until they get thru their business.

#### A ROTARY GAP OF HIGH QUENCHING (Concluded from page 19)

shaft which is turning the inner member clockwise at the same speed, and something more than plain bearings is essential to minimize friction.

## Theoretical Principles of Radio Telegraphy

By "Speedo"

Marion, Mass.  
Dear Eddie—Having visited the author calling himself "The Young Squirt" and succeeded in discovering his source of Moonshine, it has dawned upon me I should write you while I'm still happy. It is my intention to write a few Principles of Radio Telegraphy in an effort to help those who may be timid or doubtful. I thank you.

Yours truly,  
Speedo.

### THEORETICAL PRINCIPLES OF RADIO TELEGRAPHY

#### Chapter I

**Currents**—A current of electricity cannot flow unless there is something to push it. There usually is.

**Conductor**—This is a substance thru which electricity flows. If it does not flow thru it, the Conductor is an insulator and should be treated accordingly. There are different kinds of Conductors but these work on the New York, New Haven, and Hartford Railroad.

#### Questions on Chapter I

- 1.—Is it true that ordinary Currents in buns have magnetic properties with oscillating magnetic fields and static strains at right angles to them?
- 2.—What formula for resistance would you use on an A.C. bun?
- 3.—When a Current flows is it true that there must be a force to drive it? Does the force produce the flow, or does the flow produce the force? If so, why not?

#### Chapter II

**Alternating Currents**—Alternating Currents flow in opposite directions, but so quickly it is hard to tell which way they are going. They therefore appear to be stationary (not stationery—that's different—that's write.)

When Currents are obtained in this condition they are the cause of all wireless phenomena—known to science. They are measured by hot wires and Government Inspectors.

- 2.—Oscillating Currents are much worse. You can't tell which way they are going, specially on C.W. So let's not try. We will assume they are going one way or the other. This hypothesis fully explains all the phenomena of aether waves with their static strain lines and magnetic fluxes.
- 3.—A warning—Do not try to follow an oscillatory current round a circuit. Several nuts have been cracked just this way.
- 4.—Finally we have (or what they think we have) the Halves of Oscillatory Currents.

5.—Certain High Brows therefore have invented another hypothesis for these Current impulses—that is, that they travel around another circuit called an aperiodic circuit and there transform electrical vibrations into mechanical vibrations which rattle your diaphragms, transporting that which may or may not be intelligible signals, all according to the skill of the operator at the other end.

Some of these diaphragm rattlers or oscillations, have been found to have discrepancies in the logarithmic decrement—like 3HJ used to be.

6.—Sometimes oscillation frequency depends on make and break. This is particularly so with squeak boxes, and the cause of much of "The Old Man's" despair before "The Young Squirt" upset his equilibrium by using such language as to make the old man think he was intoxicated with the exuberance of his own verbosity or guilty of superuncounterdistinguish-ability.

#### Questions on Chapter II

- 1.—How do Oscillatory Currents flow in two directions at once? Do they meet in

the middle and bounce back or merely slide past each other?

2.—How would you set about the production of Oscillations in the tympanum of someone's auricular appendage by means of Oscillatory Currents? What apparatus is necessary?

If the Specific Inductive capacity of air = 1, what would be the use of a Condenser under these conditions? Would it work? Does a Condenser ever work? What is the capacity of the air hole in E. I. Phones?

**Chapter III**

Wireless means without wires. It does not mean no wires are used or even less wires, because it often happens there are more wires. Certainly more wires are wanted.

Wireless waves oscillate and eventually die. This is called damping. There are various kinds of waves—Air Waves, Sea Waves, Hand Waves, Marcel Waves, etc. The magnetic waves—Electro-magnetic waves—are what we are sitting up all night for. They are invisible yet they seem to draw diagrams of them.

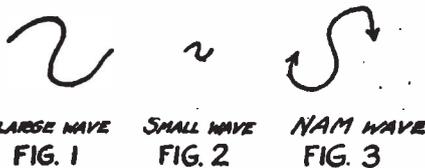


Figure 1 shows a large wave and Figure 2 a small wave.

The Navy has a wave all its own—especially NAM. This is built specially so it will hook into every other wave, and it's backwards—just to be Navy-like. Figure 3 explains.

**Questions on Chapter III**

1.—Explain the difference between Marconi

and Macaroni. Which is which?

2.—If a train is sent out in the rain does it get damped?

**Chapter IV**

**Detectors**—Most anything will do for a detector. The most common things used are as follows—Coke, Coal, Bunsen Burner, Wm. J. Burns, H<sub>2</sub>SO<sub>4</sub>, iron filings, Fleming Valves, Audions and DeForest lightning arrestors. Wireless Valves were invented by Fleming. He died of them. Any one that ever used 'em will admit it.

Ions play an important part in a Valve. They travel in one direction. It takes more than three of them to cover a pin point. Electricity used to go out of the + Pole but with Valves she's different.

**Questions on Chapter IV**

1.—Explain the difference between an Ion and an Iron. Who found the first Ion and where?

2.—Draw a diagram of a Coke Detector. Who else besides Springfield amateurs use Coke Detectors?

**ADDENDUM**

Fig. 4 shows sketch of a Portland, Maine, station which I don't communicate with.

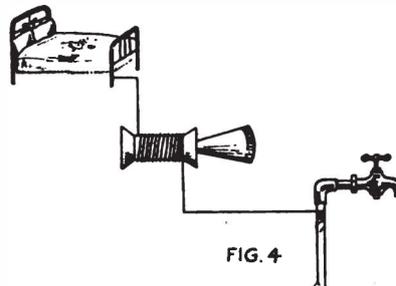


FIG. 4

**The Possibilities of Loop Transmission\***

QST receives many requests for data on transmission with loops. In general, loops unfortunately make very poor transmitters, and quantitatively the results approach those obtained from an aerial only as the size of the loop approaches the size of an ordinary aerial. This is of course because the phase displacement between the two vertical sides of the loop is so very small. If the two sides were very close together, neutralization would be practically complete, whereas if they were a half wave length apart, excellent results would be obtained; and between

\*Author's name withheld by request.

these two limits the results will be in proportion. For best results on small loops, then, very short wave lengths should be employed which, however, would leave them no place in 200-meter affairs. From the following paper those interested in this subject will gain a conception of the values of received energy that are dealt with in such work.—Editor.

**I**N general, we know a great deal about our T or other aerials. We know, for instance, that range is obtained by height; in fact, that it is directly dependent on the same. Also we know that in

some way our range improves with antenna current, etc. Our knowledge when loops are discussed is, however, much more limited, and what is more to the point, we rarely if ever know how to compare antennas of these two different types. In the following we will therefore attempt to show what is to be considered in average cases; that is, where two stations are not within a wave length of each other nor, on the other hand, where thousands of miles intervene and correction factors taking into account absorption, reflection, etc., must be employed.

Before all other things we must have a clear conception of the field intensities produced at distant points by our transmitting antenna; if we have that, then it is quite immaterial what type of antenna we are using at the transmitting end. For the sake of clearness we will consider only the electrostatic field, altho we know that wherever such a field exists an electromagnetic field also is to be found, not only at right angles thereto but ninety degrees out of phase with the same. The electrostatic field is expressed in volts per centimeter. If, for instance, we consider two high tension wires one meter apart and with an effective difference of potential amounting to 10,000 volts, we would have a potential gradient of 100 volts per centimeter, which is the electrostatic field.

Now let us consider the field produced by an antenna say 15 meters (49 ft.) in height, operating at 500 meters with an antenna current of 1 ampere. Expressing heights, distances and wave lengths in meters, we find the electrostatic field at a given distance by multiplying the height of the antenna by 18.86 and by the current in amperes, and dividing this by the product of the wave length and distance. Assuming that the receiving station is 6.2 miles or 10 kilometers away, we find our field to be  $5.6 \times 10^{-4}$  volts per cm. This looks very small, but our knowledge tells us that signals with our own set would be very loud at this distance; we therefore can make a mental association of an electrostatic field of a few microvolts per cm. with the signal strength obtainable.

The process when loops are concerned is only slightly different. To obtain the electrostatic field we multiply the loop area by 11.9 and by the number of turns and the current, dividing the whole by the wave length squared and the distance, all measurements being made in meters as before. Suppose we take a coil designed for 500 meter operation, having one meter sides, three turns, and of a resistance which will allow 4 amperes to flow with the same expenditure of energy as in the first case. Then we find that at a distance of 100 meters, or 328 feet, our field is  $5.66 \times 10^{-4}$  volts per cm., or about the same as before.

In both of the above cases we therefore will be able to get signals of the same intensity. To do so we will, however, be forced to operate at one hundredth the original distance if transmission is with a loop of the dimensions given; and if operated at the original distance, signals would of course be very much weaker. This disadvantage is not of very great importance when suitable amplifiers are available.

Altho we now have a conception of the field intensities dealt with, we should further examine the effect of such a field on our receiving antenna, be it a vertical wire or loop.

Assume first a vertical antenna ten meters high, placed at a point where a field 5.6 microvolts per cm. exists. Naturally the voltage produced is  $5.6 \times 10^{-4}$  times 1000, or  $5.6 \times 10^{-3}$  volts, which if applied to a detector, gives very loud signals. The current produced, if we assume our antenna to have a resistance of 10 ohms, will be  $5.6 \times 10^{-4}$  amperes. These values seem very small but when we realize that relays can operate on currents as low as  $5 \times 10^{-4}$  without any difficulty, we see that we have more than ample energy for receiving purposes. As soon as we substitute a loop, conditions are different and we will therefore proceed to investigate such a case. Before doing this it is of value to consider the table given below, which will enable us to tell very closely what sort of detector we will have to make use of.

**Currents required for signals of audible strength**

Crystal	$10^{-4}$ amperes (Bu. Stds.)
Fleming Valve	$10^{-4}$ " " "
Regenerative Tube	$10^{-4}$ " " "

Let us choose a loop at random; for instance, a loop having 4-meter sides and three turns. This loop will be at its best at about 500 meters and will serve for our calculation as well as any. The voltage produced in each vertical wire will be  $400 \times 5.6$  microvolts, where 5.6 microvolts is the electrostatic field at that point. The result will therefore be  $2.24 \times 10^{-4}$  volts. The phase difference must now be considered. It is obtained by multiplying the distance between the two vertical sides of the loop, in meters, by  $2\pi$  and dividing the product by the wave length. In this case, therefore, our phase displacement will be found to be  $5.05 \times 10^{-4}$ . The voltage produced per turn is therefore  $2.24 \times 10^{-4}$  times  $5.04 \times 10^{-3}$ , or  $1.13 \times 10^{-4}$  volts, and for three turns it will be found to be  $3.39 \times 10^{-4}$ , giving us a current, if our loop has 25 ohms resistance, of  $1.35 \times 10^{-4}$  amperes. From the above table we see that even here a crystal will suffice to pick up the signal, altho the currents

(Concluded on page 51)



### This A.R.R.L. of Ours.

WHILE this old pipe is pulling so nobly, and this belt is so comfortably tight, and this spirit of the New Year is still within us, we are moved to introspection. How many of the lay public are awake to our A.R.R.L.? How many realize what we are actually accomplishing every night in the year? How many suspect that real trans-continental relay traffic is going on as a regular thing; that Scotland already reports hearing us, that ships in South American ports hear us talking, that our radio telephones are already as thick as automobiles used to be, that QST is owned by us and that in its last issue it carried one hundred and twenty pages of which fifty-three were paid advertising, and that the indications are that we have only just begun to move. Honest, fellows, it is some outfit, this A.R.R.L. of ours.

Every now and again we meet our worthy predecessor in the Editorial Chair, Mr. Tuska. We love to meet him because it gives us a chance to tell him again of the number of desks we now own, the number of typewriters, the number of rubber erasers, the number and quality of our waste baskets, and the number and fullness of our inkwells. We love to tell him these things, because he always gasps and is led to recount how in his day, he thought the A.R.R.L. was some pumpkins with its one typewriter (hired), one kitchen table (borrowed), one kitchen chair (damaged and donated), one invalid waste basket, the whole assembled in one attic room in his mother's residence. He takes a noisy pride in pointing to the fact that he addressed every A.R.R.L. envelope with his own fists, licked the envelopes with his own tongue, the stamps ditto, and carried the whole in one hand to the mail box on the corner after supper. There were no automatic, double-gear modern dingbobs in his day, if you please.

That was in 1915. This is 1921. There are five of us now in the A.R.R.L. office. The entire five would have difficulty in licking the envelopes and stamps which we have to seal every night of our lives.

Where the postman used to hand Tuska the A.R.R.L. mail in the morning with one hand, it now takes a husky to get it off the elevator. Where Tuska pounded addresses out on a hired mill, we now run off a hundred a minute in our own nickel plated outfit, which stands on a table all its own. And when the month is done, and QST is ready for the mails, it is not the back seat of Mr. Maxim's touring car that accommodates the bundle. It is a three-ton motor truck.

Yes, fellows, we are growing fast. It proves that our A.R.R.L. policies as laid out by our Board of Direction and carried out by our Officers, have been pretty nearly right. It means that we have a fine, strong esprit de corps, which they talk to us so much of in France. It means that we have been able to overlook the little petty things and have kept our eyes on the big, important things. It means that we are able to speak authoritatively to our representatives in Washington. It promises a great and glorious future. We are part of a new and wonderful American development—CITIZEN RADIO. Our Government has already come to recognize what we offer in times of public peril. Our value to our Government will increase in direct proportion as our organization improves in detail. Pretty soon we shall be in the magazine section of some Sunday paper. Just watch, fellows, and see what happens during 1921 to this A.R.R.L. of ours.

### Get Down to 200 Meters!

MEN, we are laying ourselves open to serious trouble by our pretty wide failure to obey the wave length law. The law says that a general amateur station shall not use a wave length in excess of 200 meters. How many stations do you hear that you can say are obeying this law? How many do you hear by comparison who are disobeying it? Our observation is that there are all too few who are really complying with the law. It is a sad fact, that observation will show any of you, that the average general amateur tune is right around 240 meters.

This is bad medicine—except for parties who are looking for something to use against us amateurs, and it will provide them with just what they want. We wish to point out that by our carelessness in this respect we ourselves are creating a danger to our continued peaceful operation. The law gives no station authority to use 240 meters except by special license. It does not say, even, that the amateur wave shall be 200 meters—it defines 200 meters as the MAXIMUM that anybody shall use, and it certainly contemplates that many stations will be working at waves well below 200 meters. Show us some of them today!

If your wave length is 240 meters, you are violating Federal law. You are subject to prosecution and if action is taken against you, you won't have a leg to stand on. Reduce! If your wave length is 230 meters, or 220 meters, or 210 meters, you MUST NOT operate. Cut 'er down. It can be done, and good work accomplished. The A.R.R.L. does not feel that any individual whatsoever is entitled to disregard the law, and we view the present situation with concern. We ask every one of you, Fellow Amateurs, to do your part in eliminating this danger to Amateur Radio. It is a matter for every man to attend to individually. Obey the law—get down to 200 meters

### Getting Thru to Canada

**B**Y the time this is in print the wave length of the Canadian amateurs will, we hope, have been raised to 200 meters for the winter, as is customary in that country. Many Canadian stations, they tell us, are tuned up on 200 meters and have been waiting for the word to go, so that we can hope that very shortly in this, our second winter of co-operation with our Canadian friends, our mutual exchange of traffic will start in quantity.

There are certain American amateurs fortunately located who can permanently establish their names in A.R.R.L. affairs if they can succeed in connecting up with the Canadians near them so as to handle traffic. The trunk lines are not definitely formed yet, and we can promise these men that the lines will be flexed so as to run via their stations if they succeed in doing the work. Oh that Ye Ed could be free to operate a station some place where it would be the connecting link to a Canadian trunk line! Why, we'd make 5ZA's fame as a "missing link" look like a Lost Electron.

A little traffic has been moving right along, mainly via 2TF to 8BB, thence to Canadian 2BF; or via 1HAA to Canadian 2CI (formerly 3Z); and 1YB and some of the other college stations up that way are

capable of good work into Canada; and from Buffalo some traffic is moving steadily from the Ontario Division. It shouldn't be hard, as Mr. Lorimer advises us that QRM is practically unknown in Montreal after 10:30 p.m. and the U.S. stations come pounding in from all directions. The main essential is that the U.S. stations be close enough to hear the Canucks thru our own QRM.

Which leads us to inquire: What's the matter with Maine? Is everybody dead up there except Castner? You're the fellows we mean when we say that A.R.R.L. fame is waiting a Canadian relay. Where are the results of that convention? Does Brother Castner labor so hard among you in vain? We have visited you chaps, we have talked with you and seen your stations, and they are good stations, for we used to hear you last winter. Why, then, aren't you on the air—why aren't you trying these good nights to get thru to Canada? They can hear you if you'll only try. We know one of your stations owned by a well-versed amateur, equipped with everything a station desires and fully capable of stepping into this breach this very minute if its owner could be induced to turn on the power and step on 'er! Wake up, Maine, and get in the game.

### A Bad Situation

**T**HE Bureau of Standards report to us that over most of the country amateur stations showed a splendid co-operation with each other during the October Fading Tests, but that from the cities of Cleveland and Philadelphia not one single fading curve was received which was at the same time complete and reliable. The trouble was not in the ability of the recorders chosen, for they were excellent men; nor was it from lack of co-operation from the better class of local stations; it was due to wholesale QRM from a lawless element who know nothing of organization or our A.R.R.L., and which consisted mostly of unlicensed spark coil stations. The Bureau goes on to say that reports they have received lead them to the opinion that in these two cities there are more unlicensed transmitters than there are licensed!

The possibilities for trouble from such a situation are immediately obvious. It is capable of giving Amateur Radio a bad black eye, and it must be remedied at once. In Cleveland, we are happy to say, the status has been much improved since October. Cleveland is a large city which for many years was practically without radio organization, so that such a situation is not so surprising. Now they have an excellent club, the Cleveland Radio Association.

(Concluded on page 64)

# THE OPERATING DEPARTMENT

F. H. SCHNELL, 1MO  
61 Waverly Bldg., Hartford, Conn.  
TRAFFIC MANAGER



**T**RAFFIC conditions during the past month have improved greatly throughout all divisions. Particular attention is called to the consistency with which traffic is reaching the West Coast through the Southern and Central routes. Ordinarily it was quite a task to get messages across this part of the country. Just now it is only a question of which route should be used, as both seem quite capable of handling any amount, either east-bound or west-bound. The Northern route has not been as successful as the other two, chiefly because of scarcity of stations and the removal to some other part of the country of the ones which had been handling the traffic.

### Less QRM

A great number of the clubs have adopted divided working schedules, whereby they permit local work up to a certain hour in the evening, and all work after that time is confined to long distance. The other clubs are falling in line with this idea, and no doubt we will experience even less interference, because this will prevent local stations interfering with long distance stations, eliminating requests for QTA's, such requests always causing further interference, and so on down the line.

### Traffic on Schedule Time

The Operating Department is soliciting suggestions regarding DX stations working on schedule, and clearing all traffic in all directions at a specified time each day or night. If you have any suggestions for the furtherance of this plan, please let them come forward.

### New England Division

The Traffic Manager made a short trip to several stations in the New England Division and found that local atmospheric conditions or geographical location is one of the main handicaps we have to encounter in working short distances. It is difficult to work from Springfield, Mass., to Worcester, Mass., in the evening because of violent fading of signals between these two points, and because of the terrific interference from stations in the third and eighth districts. It is extremely interesting in view of the fact that the distance between these two cities is about sixty

miles and a 1 K.W. transformer with a two step amplifier is being used at the station in each of these cities at which tests were made. We tried for ten nights consecutively to put a message through from Bridgeport, Conn., to Portland, Maine, and while the message reached Portland over the long jumps, we were not successful in getting it past Springfield in short jumps. However we have not given up, nor will we until it is finally accomplished.

### SOS de Southern Stations

The Operating Department seeks the names and addresses of wireless amateurs who are located in Virginia, Georgia, Alabama, North and South Carolina. We would like to have some assistance in the way of locating good material for relay stations, and hereby issue an SOS to all members who know of stations that are located in any of these states, who are inactive for some reason or other. Just give us a tip on the prospects, and we will do the rest.

### Canadian—U. S. Calls

Considerable confusion in call letters is resulting in the operation between Canadian and United States stations on account of the similarity of call letters. In order that the nationality of both the calling station and the station called may be known, the following regulation is announced for the government of A.R.R.L. stations in both countries:

1. The distinction shall be in the signal used between the letters of the station called and those of the calling station.
2. A U.S. station calling and working a U.S. station shall continue to use "de" (— . .)
3. A U.S. station calling and working a Canadian station shall use the intermediate signal "aa" (— — —)
4. A Canadian station calling and working another Canadian station shall use the intermediate signal "v" ( . . — )
5. A Canadian station calling and working a U.S. station shall use the intermediate signal (— — — .)

Adopt these regulations at once and inform all amateurs in your vicinity of these changes.

### Daylight Relays

Daylight relays are coming more and more into favor, if we may judge from the

present enthusiasm shown in the actual operation of several routes mentioned in the division reports, which follow.

**NEW ENGLAND DIVISION**  
G. R. Entwistle, Mgr.

In spite of the plans developed at the Worcester Convention, the short jump relay chain from New York to Portland still exists only on paper. Breakdowns, both on apparatus and schedules, have resulted in keeping New England in its former condition. The Traffic Manager has made a pilgrimage himself and realizes from personal experience what the situation is. To use his own words—"one would not believe that with 1 K.W. it would be impossible to work sixty miles in certain sections at night". But such is apparently the case around the Worcester section. None of the test messages succeeded in breaking thru from 1FW, altho he was copied direct by 1HAA and 1CK. In fact, Vermilya followed the message as far as 1AW and 1JQ where it stopped. 1CK had copied the original message from 1FW and having followed its progress and seeing 1JQ unable to get it off, sent the same to Portland. There the test message struck a QRM barrage from commercial and naval ship stations.

Considerable development work has been going on, and the D. M. feels that by sticking to it long enough, we will finally break thru. He would like to spend the last 100 years of his life in peace. He has confidence in his A. D. M's.—Castner, Robinson and Mix. Surely if these men cannot push a message thru, it cannot be done. However, we refuse to believe that a message cannot be sent by short jumps from New York to Portland.

In view of the fact that Springfield and Worcester appear to be temporarily isolated, we have attempted to jump around them in an effort to clear traffic. 1GBC in Southbridge, Mass., 1BT in Framingham, and 1WR in Watertown are concentrating on a series of tests in this direction. Another possibility which will produce results if the stations can maintain the proper watch is as follows:

1AW, 1YB and 1OE to any of the following stations in Boston: 1CK, 1DR, 1WR.

One of the greatest difficulties to be overcome is having the men on the various links on at the same time. Outside stations trying to connect with Boston should use 1CK between 10 and 11 P.M., 1DY up to 12 o'clock and 1IS from 12 to 2 A.M., or any others which they may hear asking for traffic.

In order to eliminate some of the superfluous QRM which is greatly evidenced by anyone listening in, the following time schedule is submitted to the New England

Amateurs for their benefit:

- 8 A.M. to 7 P.M. —Free air. Fifteen minutes before and after 12 noon should be kept free from QRM on time signals. The hours from 12 noon to 2 P.M. should be kept free of QRM for daylight QRM tests. All tuning and adjusting of spark and C.W. apparatus should be done before 7 P.M.
- 7 P.M. to 8 P.M. —Short relays and collection of local traffic. No tuning or testing or QRM during this period.
- 8 P.M. to 10 P.M.—Period for general communication. Free air. No tuning or testing.
- 10 P.M. to 8 A.M.—Long distance relays of citizen radio messages.

This schedule has been recommended by First District Radio Inspector Charles C. Kolster. It was drawn up at the first meeting of the Executive Council of Greater Boston, at which representatives from all branches of citizen radio were present.

This time schedule has been sent thru the mail to all licensed amateur stations in New England.

The last period is the most sacred of all, and great care and judgment must be used from 10 P.M. on so as not to interfere with those having practical work to accomplish. C.W. work of all kinds is not stopped at any time of day or night, but owing to the increasing use of rectified A.C., it must give way to citizen relays after 10 P.M. Straight C.W. and voice modulation should cause no interference, and it is the general intention to live and let live provided serious QRM does not result from this kind of work. Care must be exercised in the use of buzzer modulation which produces damped wave trains.

Mr. P. J. Furlong, 1FF, has been appointed City Manager, replacing Mr. L. A. Pulley, whose work prevents his continuance in this capacity. Furlong is also Chairman of the Executive Committee of Greater Boston and gave considerable assistance in the drafting of the time schedule.

District Superintendent, Harold C. Bowen, 1AK, has found it necessary to withdraw from relay work, owing to the lack of time, and 1HAA, Vermilya, succeeds him.

Mr. H. C. Copland, A.R.R.L. Man, an ex-ham from Cambridge, flew into Framingham on his way from Hartford to Portland.

(P.S. Probably he had a bundle of messages from 1AW for delivery in

Boston.) Hi. Hi. We will get 'em thru some how.

The A.R.R.L. Organization co-operated splendidly with Mr. Copland, 1UQ having supplied him with a landing field at Old Orchard Air Port. Copland is on his way from Portland to Florida and we wish him luck.

1OE in Penacook, New Hampshire, looks like promising material, being able to work both 1HAA and 1AW. He is on the job from 10:30 P.M. to 3 A.M. every night.

Traffic seems to be moving satisfactorily west of Hartford.

1BV, L. G. Cumming, has been appointed Traffic Assistant to the D. M. Headquarters—Room 20, 18 Boylston St., Boston, Mass.

#### ATLANTIC DIVISION

C. H. Stewart, Mgr.

We have a very comprehensive report from the Northern Section of this Division, comprising the States of New York and New Jersey. Mr. John DiBlasi, Assistant Division Manager, reports as follows:

Conditions in the Northern Section of the Atlantic Division are slowly improving. Mr. Hornung has appointed Dr. E. Cyriax (2DI) as Asst. Dist. Supt. for Manhattan and Bronx. He will temporarily act instead of 2YM.

Dr. Cyriax reports that traffic handled by 2DI during the month of November has been comparatively light due to repairs to transmitter. We are in direct communication with mos' 3 and 8 stations, having cleared messages mostly from 1 stations. All traffic from Greater New York has been successfully relayed to different parts of the U.S. Due to the temporary shut down of 2YM, messages were given to 2ZL, Mr. J. O. Smith, of Valley Stream, who is known to be an efficient relayer. 2DI and 2YM will have a definite schedule of working hours.

Mr. Harry Collins, Supt. Long Island east of Jamaica, Babylon, L. I., reports that in addition to the old reliable three of the New England route, namely, 2ZL, 2FS and 2RL, new stations may be added. 2FD is ready. 2AJW has been on the map since spring and has handled considerable traffic, both local and L.D. 2GW at Sayville, and 2EL and 2OE at Freeport, L. I., are also open for relay work.

Station 2FS has been out most of the summer. 2ZL is on the air again with great force, at his new location, Valley Stream, L. I.

Mr. Collins, Babylon, L. I., will be pleased to hear from any stations in this section on matters pertaining to amateur radio furthering the best interests of the A.R.R.L.

Mr. A. H. Benzee, Jr., Acting Supt. Western New York, states that traffic is

beginning to come this way, and is being handled promptly. The District has three available routes into Rochester from Buffalo over which traffic can be handled day or night: Buffalo to Lockport, to Medina, to Rochester. Buffalo to Medina, to Rochester. Buffalo to Lancaster (NY), to Medina to Rochester. Traffic can also be handled with Rochester via Lockport or Lancaster direct. 8AJ, Redington, has been appointed official station for Waverly, N. Y., and vicinity. We have been endeavoring to get in touch with Waverly and also 8HJ, Young of Elmira. From November 1st to 16th, inclusive, the following traffic was handled in this part of the District: 8IL, Lockport, 4; 8FO, Lockport, 15; 8LB, Buffalo, 7; 8FE, 3. We wish to announce that the call 8FE was assigned to our station in October, and the old call 8AAN is now listed at Utica, N. Y.

Mr. Lester Spangenberg (2ZM) Supt. Northern New Jersey, states that the following stations are doing good work and have kept this District clear. 2OM, Ridgewood, N. J., has been clearing all traffic north and northeast. 2MP, Mr. A. A. Hebert, Nutley, N. J., is again on the firing line and has been a good help clearing traffic in and around Newark, N. J., and also in helping the younger ones to comply with the law. The last report is that he was going around to all the younger DX stations with a decimeter tuning up those that before were in danger of being closed down by the radio inspector. Thanks to Mr. Hebert. 2JZ, Elizabeth, N. J., has been most active in handling traffic south. For the traffic that has been well taken care of in and around Jersey City much credit is due 2DF, 2UE, and 2VA. Montclair vicinity has been taken care of by 2JN. In Paterson, Passaic and vicinity, the following stations have been taking care of the traffic; 2ZM, 2QE, and 2ALR. There is a station at Blair Academy (3PU), Blairstown, N. J., operated by Mr. Joel C. Wheeler. The following routes have been laid out for traffic out of this District, and it is requested that all traffic be routed as below:

1. Traffic west and northwest—2ZM
2. Traffic north and northeast—2OM
3. Traffic south and southwest—2JZ
4. Traffic east and southeast—2AIM and 2UE.

It is requested that all local stations QRT local work at 10:30 P.M.

Mr. Burton P. Williams, Traffic Ass't Western Pennsylvania District, states that the following traffic has been handled by official stations during the past month: 8DV—122; 8ZD—114; 8RQ—74. At New Castle, Pa., the Pennsylvania Wireless Man'g Co. station, operated by Mr. Rex Patch, call 8HA, is taking the place of

8ADF. We hope to have Mr. Patch's application for appointment, as well as that of the McNary Brothers in the near future. At Vandergrift, Pa., there is a new station, 8PN, operated by E. C. Espey, who has applied for appointment. This station is doing fine work and is handling a considerable amount of traffic.

8ZD and 8DV are working on schedule, the same as last season. 8CH is no longer heard in Pittsburgh, but is worked regularly by 8DV and 8HA. 8WY is taking care of the northern end of Branch Line No. 2 in fine style. 8MT at Uniontown, Pa., seems to be handling a number of messages. In view of the large number of messages handled so early in the season it is believed that the number will run well over 1500 per month during the coming three months. The traffic in this District is handled at a speed of 20 words per minute, and on account of short jumps on Branch Line No. 2 reports are seldom necessary. The QRM in Pittsburgh is getting worse, and mostly comes from licensed high power stations. There seems to be a number of amateurs in Pittsburgh who know nothing of "QST" or the A.R.R.L.

The Supt. for Central Pennsylvania, Mr. Walleze, at Milton, Pa., states that some improvement is noted in his District, and that station 3ABD at Danville, Pa., has handled a number of messages. 3ABD experiences trouble in unloading business to the eastward, and this emphasizes the necessity of handling messages by short jumps.

Mr. S. W. Place, Dist. Supt. Eastern Pennsylvania District, states that there is considerable inactivity in this end of the State. He reports that he understands that C. M. Jackson of Pottsville still expects to be active in the near future. Traffic Assistant Roy C. Ehrhardt reports no messages handled except locally with Wilkes-Barre. Mr. Ehrhardt would like to hear from station owners in his section of the State, and he should be addressed at 117 S. Blakely St., Dunmore, Pa.

Mr. C. S. Horn, Supt for Delaware, states that radio activity does not advance in Delaware as rapidly as in other parts of the country, and that he does not know of any stations on the "Eastern Shore" of Maryland with which stations in the southern part of Delaware might communicate. He advises that stations in Wilmington, Del., are making steady progress, particularly 3BE, and the 3BE has started to use buzzer modulated C.W. His own station 3PM at Rehoboth Beach has been in operation during the past two months.

As the Division Manager is not in receipt of reports from the Eastern Maryland District or from the District of Columbia

up to the present time he is unable to give any information on traffic conditions in these Districts. However, from observation at his own station, he knows that stations in Baltimore are working and stations 3HG and 2IY have been heard very well on several occasions, as well as 3KM and 3XF in Washington.

Total Messages 339.

#### ROANOKE DIVISION

W. T. Gravely, Mgr.

During the past month the Division Manager has been very much pleased at the traffic which has been handled in the Division.

As stated, definite working routes cannot be announced until the various District Superintendents have lashed their stations into shape.

There seems to be an inclination on the part of many operators to handle traffic over long ranges when the short relay method would prove much more effective, and at the same time, create considerable less QRM. There are instances when it is necessary to work at long range. For instance, the line from Danville to the South must be carried on at long range, and this state of affairs will be found to exist in many instances. Efforts are being made to overcome these obstacles. It is very slow work, but there is improvement to be noted each month, which shows that something is being accomplished.

3BZ has been clearing North Carolina traffic in the day with 4DM at Greensboro. Signals are much better in the day than at night, and in addition, no QRM (other than local Spark coils, which, by the way, are proving a serious nuisance, and which will have to be curbed), no QSS, and rarely ever any QRN. It has been demonstrated that traffic can be cleared with Lynchburg and Winston-Salem, N. C., in the day, and this is breaking up the so-called dead spots effectually. Tests have exceeded expectations.

The Manager had a nice visit this month from District Superintendent F. L. Bunker of Charlotte, N. C., and we have assurance that the old North State is active, and that Charlotte will bloom ere long. There will be good stations in Elizabeth City, Newbern, Wilmington, Greensboro, Winston and Charlotte. We are in need of a good one at Salisbury. (Salisbury please note—let us hear from you).

Our District Supt., Mr. Jno. F. Wohlford, 3CA, Roanoke, Va., is scoring the Manager this month for not saying more about the stations and the activities in his District, so we shall go a little more into detail this time, but let's hope there will be some "real" activities to report before the next issue of QST.

Mr. Wohlford promises a station at

Wytheville, one at Oldtown, and one at Salem and an additional station for Roanoke, 3RF. He also states that he is bending his efforts to interest the V.P.I. at Blackburg, the V.M.I., and Washington and Lee of Lexington in relay operations.

Nothing new from the Central Virginia District to report this month, and so far as the Manager is informed, the situation remains unchanged. Mr. Blair, 3HO, at Richmond, Dist. Supt., reports his station in working shape, and also reports one or two others in Richmond who have theirs operating.

City Manager, Norfolk District, White reports everything is going pretty well with the exception of the QRM from NAM which up to this writing remains unchanged. It is practically impossible either to get a message transmitted or to receive one until the wee hours of the morning. Until this menace to efficient l.d. relay work is remedied, our traffic handling will be limited.

Stations 3GO, 3FG and 3VV have handled most of the relay traffic in this territory. There is also another new station which has a range of possibly 200 miles which is located in Portsmouth, call 3ACE, and one in Norfolk, call 3ACT, which will possibly be able to help with relay matters.

We are pleased to state that Mr. Malcom Ferris, formerly V.P. of the P.A.R.A., Phila., Pa., is now an active member of the Hampton Roads Radio Assn.

We wish to thank Mr. Van Nostrand, R. Inspector, of the ports of Norfolk and Newport News thru this report in QST, for his earnest co-operation in all matters in this territory. He is with us in everything that is right and we are exceptionally fortunate in having such a fine man as our Inspector.

3BZ at Danville has handled a number of messages for all points of the compass. Traffic with the south is done through 5DA, 4BY and 4YB; that with the north through NSF, 3KM and the New York Stations, although the Washington Stations have been clearing some western traffic for 3BZ, and the western traffic is going through 8ZW and 8SP.

3AEV, Mr. Allan Clarke, Asst. Traffic Manager, Danville, is not yet ready with his transmitter.

In conclusion, there is a gradual improvement to be noted all over the Division, which is very gratifying. Any suggestions are always welcome, so you readers of QST who reside in the Roanoke Division, let them come forward. They may prove very helpful. Your Manager is trying to represent you faithfully, but he cannot do so unless he is kept informed. Therefore, let's have suggestions, and constructive criticisms.

#### DELTA DIVISION John M. Clayton, Mgr.

Mr. Greenlaw has been appointed Traffic Chief of the Division and it is requested that all stations in the Division forward to him each month by the TWENTY THIRD, a total of the number of messages RECEIVED and a total of the number of messages SENT thru their stations. It is highly important that Mr. Greenlaw be supplied with this information in order that he may compile his report.

Mr. deBen, Assistant Division Manager, reports as follows:

The prospects for several good stations in Tennessee look very encouraging. 5ER of Nashville, Tenn. is handling traffic for that city and seems to be reaching out O.K. now.

Mr. W. L. Barrow reports excellent conditions thruout Louisiana. At present there are stations doing long distance work at Shreveport, Houma, Baton Rouge, Franklinton and New Orleans. 5ZP at New Orleans still handles traffic for east and west down his way.

Mr. Francis Pullen, 5JE of Houma, is doing quite a bit of work now. He has been clearing his traffic to 5ZP.

Mr. Willie Anthony, 5ZS, of Shreveport, is back with us.

Prof. W. L. Kennon of the University of Mississippi, District Superintendent of Mississippi, has rounded 5YE into working shape again.

A Pan-American trunk line will shortly be inaugurated to Central America. Mr. deBen is handling the matter and reports that the arrangements have about been completed. By the time this report is published traffic will in all probability be going thru to Central America and Cuba.

On January first the test messages will start thru the Division. These messages will be somewhat on the order of the old pre-war Trunk Line tests but in this case will originate at 5DA and travel south thru every station doing DX work in the division, to 5YE. When they get to 5YE they will be QSL'ed back to their starting point. It is hoped that by working these tests one night a week for a month, we can get the proper "swing" thruout the division so that traffic coming into the Division and leaving it, may be passed on with the minimum amount of delay.

Correspondence is being had with the West Gulf Division Manager with reference to arranging some schedule for clearing traffic for Texas to his Division. 5ZC fades so at practically all the stations thruout the division that it is next to impossible to work him consistently. It is hoped that we can locate some alternate station so that traffic can be cleared with due despatch to the West Gulf Division.

5XA at Auburn, Alabama, is handling all the traffic coming from the southeast thru this Division. Arrangements are being made with the East Gulf Division Manager to try to extend the test messages into his division.

5YM and 5ZL have arranged a schedule, a QRM-less schedule, so all stations please note the following:

5YM will be on Monday, Wednesday and Friday nights from sundown to 12 midnight, and later.

5ZL will be on Tuesday, Thursday and Saturday nights at same hours. Sunday night will be an open night—both stations on the job. All traffic coming this way should be given to either of the above stations. If it is not cleared the same night received, it will be QSRed to the other station for clearance on the next night.

Even now it is possible to say that the Delta Division Fading Tests have been very successful. Particular credit for this is due to a few of the DX stations in the neighboring states who were so kind as to co-operate with us.

It was originally planned to attempt to run the tests without any pre-arranged request for a QRX by stations not acting as recorders, but it was evident from the very first night that all the transmitters in the tests were carrying well to distant stations, and the original plan was modified to include a number of stations at a considerable distance from the transmitters. In order to do anything at all in the way of recording, it was necessary that we try to reduce QRM to a minimum. That's why we asked the co-operation which we did get from quite a few stations. Thanks, fellows, all of you who stood by for us.

Total messages 368.

#### CENTRAL DIVISION R. H. G. Mathews, Mgr.

The following changes have been made in the operating department personnel in the Central Division during November. District of Illinois: Mr. Henry Klaus, 9AK, Eureka, Illinois, District Superintendent. Mr. Ivan Frane, 9AQW, Eureka, Illinois, Asst. District Superintendent. Mr. Stanley Byquist, 9ABH, Bloomington, Ill., Asst. District Supt. Mr. Lester Shaw, 9AHE, Streator, Illinois, Asst. District Supt.

In the District of Wisconsin the following stations have been appointed official relay stations: 9DP, E. H. Hartnell, Salem, Wisc.; 9XM, University of Wisconsin, Madison, Wisc.; SF, R. F. Laidlaw, Milwaukee, Wisc. (This station using two letter call while awaiting the arrival of a special license.)

Mr. L. A. Degner, former City Manager

of Milwaukee, has resigned because of the pressure of other business. A number of applications have been considered for this position and the new appointment will be announced in the next Central Division report. Conditions at Milwaukee have improved greatly during the past few months and for the first time the messages are being handled with regularity in and out of that city. Heretofore, although the Lake Shore Route has been functioning consistently, Milwaukee has been skipped because of the fact that no station capable of doing long distance work was located there. We now have 9AHO and several others who are handling our traffic in good shape and Milwaukee is an active member of the Lake Shore route. 9DP of Salem has proved to be a very valuable relay station between 9GP of Kenosha and 9MH of Milton, on the Madison branch. 9XM of Madison is on the job handling Madison and other traffic which completes and puts into operating condition the Madison branch. As an alternate to 9XM we now have 9QZ who is getting through in good shape. Station 9HQ has been re-appointed as relay station for Oshkosh, Wisc., inasmuch as this station is now operated by Mr. Becker, succeeding Mr. Lyman. Mr. Becker holds a commercial license.

A daylight route between Southern Illinois and Chicago is finally in operation, the final step to Chicago being accomplished by 9CA who has a noon schedule with Chicago stations. 9NQ at Galesburg is working with 9CA in the daytime. This daylight route is especially useful because of the heavy traffic between Chicago and St. Louis which may now be handled by this means.

Mr. Klaus, the new District Superintendent of Illinois is forming local routes to the colleges in Illinois and would like to hear from institutions who have not yet been placed on operating routes. He can be reached at Eureka, Illinois. Mr. Klaus reports that he has not had much response to his request on the subject of City Manager appointments. We wish to have a live radio man in every city of any size who will take charge of the A.R.R.L. organization work and who will handle relay work to and through his city. Radio men residing in cities in which no City Manager has yet been appointed are requested to communicate with the District Superintendent. This holds good for the entire Division as well as the District of Illinois, as we do not have as many City Managers in the Division as we should have. For the information of prospective applicants, the following is a list of the names and addresses of the various District Superintendents in this Division to whom applications should be submitted.

Toledo District (District of Northwest

(Ohio) Mr. K. A. Duerk, 1000 Wilhelm St., Defiance, Ohio; District of Eastern Ohio, Mr. A. J. Manning, 252 McKinley Ave., Salem, Ohio; District of Illinois, Mr. Henry Claus, Eureka, Illinois; District of Wisconsin, Mr. H. J. Burhop, 623 N. 4th St., Janitowoc, Wisc.; District of Southern Indiana, Mr. F. F. Hamilton, 117 S. Meridian St., Indianapolis, Ind.; District of Northern Indiana, Mr. H. H. Moore, 922 Madison St., Elkhart, Indiana; District of Michigan, Mr. C. E. Darr, 137 Hill Ave., Highland Park, Detroit, Michigan.

Previous appointments in the former District of Western Ohio have been cancelled and new appointments in the Toledo District have been made as follows:

Assistant District Superintendent, Mr. C. G. Preston, 81K, Ashland, Ohio; City Manager of Toledo, Mr. Earl Ensign, 8ZB. Trunk route appointments:

Cleveland Route: 8ZY, Defiance; 8VJ, Findlay, Ohio; 8GB, Marion, Ohio; 8ZR, Mansfield, Ohio; 8IK, Ashland, Ohio—to Cleveland.

Detroit Route: 8ZY, Defiance; 8ZB, Toledo; 8ZZ, Detroit.

Columbus Route: 8ZY, Defiance; 8KP, Lima, or 8VJ, Findlay; 8GB, Marion. Connecting with Miami District thru 8IB, 8EC or 8HG.

On the Cleveland route, stations 8ZR and 8IK will alternate. On the Columbus route, stations 8VJ and 8KP will alternate. In addition to these trunk routes, the following official stations for their respective towns have been appointed, 8DZ, Van Wert and 8HD, Spencerville, Ohio. These routes give quick, positive handling of traffic to Detroit, Toledo, Cleveland and Columbus. It is with pride that we can at last announce sure and speedy handling of traffic to Cleveland, Toledo and Detroit. All of these stations are very well equipped with the latest apparatus and are in charge of good operators.

Notice should be taken of the administrative appointments, particularly Mr. Ensign, City Manager of Toledo, it being his duty to organize the city for rapid distribution and collection of messages, and to secure the co-operation of all stations in Toledo.

Mr. K. G. Preston, appointed Assistant District Superintendent, will have charge of the appointment of branch stations in the eastern half of the district, namely the following counties: Ottawa, Sandusky, Seneca, Crawford, Morrow, Delaware, Licking, Knox, Richland, Ashland, Erie, Huron and Lorain. All stations in this territory desiring branch route appointments, communicate with Mr. Preston. The Trunk Route stations in this territory, will however continue under the supervision of the District Superintendent.

In the Miami Valley District of Ohio

appointments have been made by Mr. and Mrs. Candler as follows:

8DI, W. S. Burkhardt, Jr., City Manager of Cincinnati, Ohio; 8AFS, Elmer Davis, Assistant City Manager of Cincinnati, Ohio; 8EC, Mr. Fay McDowell; 8IB, Robert Higgy, and 8HG, Paul Breeze, have been appointed relay stations for Columbus and other points. 8FT, L. E. Farrow, Troy, Ohio; 8DC, Warren Wright; and 8IV, Thomas Ried, Springfield, Ohio; and 8AKV, Milton Turrell, Harrison, Ohio, have been appointed relay stations on Cincinnati Route.

Considerable increase of interest has manifested itself in this District during the past month over the summer months. 8FT, Troy, Ohio, 8AKV, Harrison, Ohio, and 8EC, Columbus, Ohio, all do excellent work in daytime. This assures daily communication with practically all parts of this district. 8FT also has been doing fine work with DX at night, being especially able to work western and southwestern stations.

Cincinnati is also coming to the front rapidly under the able guidance of 8DI, while Dayton is also developing some good stations. 8AEE and 8TN are both beginning to reach out. Springfield is handicapped in that its two principal stations are not working regularly.

Recently 8DI carried out a test as to what can be done in the early hours of the morning. He succeeded in keeping in communication with 2XF until 6:20 A.M. one morning and with 2TF until 5:50 A.M. another morning. The work with 2TF was conducted during warmer weather than that with 2SF. A similar test was made at 8ZL during the morning of November 25th. 8ZL communicated with 2SZ until 6:20 A.M. at which time 2SZ reported 8ZL becoming QRZ but sigs from 2SZ remained QSA at 8ZL. From 6:20 to 6:30 A.M. 8ZL and 9WB were in communication with sigs QSA at both stations during the entire time. After 6:30 a few sentences were exchanged with 8OJ, both being QSA with less QSS than is usual between 8ZL and Michigan stations. Practically all of this work was done during and after day-break. Only one step of amplification was used at 8ZL. These tests seem to indicate that very long distances can be covered during daylight hours with the proper equipment. In the afternoon of November 25th 9ZN came in so loud that some difficulty was experienced in reading local stations.

8DI, W. S. Burkhardt, and 8AFS, Elmer Davis together with other radio enthusiasts in Cincinnati and adjoining Kentucky towns have formed a radio club to be known as the Tri-State Association. Meetings are held in a club room of the Gibson Hotel. The membership at present, num-

bers 70 with a promise of 150. W. S. Burkhart was elected President and Elmer Davis Vice-President of the club. There is also an advisory board and a Board of Directors. Committees are also appointed to tune broad stations and to teach the beginner the essentials of radio. Stringent rules were adopted restricting QRM, the time to do local and DX work, and the method of calling CQ etc. We understand that this club has applied for affiliation with the A.R.R.L. Station 8DI has been doing excellent relay work. Station 8AFS promises to become prominent also. We predict great things from Cincinnati in the future. Quite a large portion of the southern traffic has been going over the Cincinnati route to Kentucky and other points in the south. With the help of the members of the Tri-State Radio Association QRM will be greatly reduced in Cincinnati and traffic can move through that section much more readily than heretofore.

In the District of Northern Indiana also the number of active stations is small, the spirit of co-operation is excellent and traffic work is being handled in spite of the difficulties, by 9FV, 9HR, 9FG, 9FS, 9ME, 9AKH, 9DF and others. A route has finally been worked out whereby Indiana traffic may reach Chicago. This also means a short distance route between the Ohio stations and Chicago which connects Ohio, in turn, with Wisconsin and Minnesota by means of the Lake Shore route which is also a daytime route. In this connection, the Division Manager wishes to call attention to the fact that at the present time messages can be handled over daytime routes from the south end of the Division, Southern Illinois, to the extreme north end, Northern Wisconsin, and from Chicago to the eastern edge of the Division, Eastern Ohio. We believe this to be considerable progress along the lines of short distance daylight communication and hope to carry on even more consistent work over these routes not only during the present long distance season but during the summer season which will follow.

Arrangements are being made for the transcontinental relays to be held in January. The Division Manager wishes to impress on all the participants in these relays the importance of establishing satisfactory communication before the regular message dates, by means of special tests with the stations which they are to work.

The Division Manager has not been receiving the suggestions and criticisms on the handling of the traffic work of the Central Division that he would like to receive. It is not possible that this Division is being handled to suit everybody and accordingly we would like very much to

hear from those who are dissatisfied. Criticisms and suggestions alike will be welcomed and we invite you to write us. There are undoubtedly many conditions which could be improved both with regard to traffic and organization work, but it is impossible for us to co-operate with you in making these improvements if we do not hear from you. Please consider this as a personal invitation.

Total Messages 2313.

#### DAKOTA DIVISION Boyd Phelps, Mgr.

Having been assured the co-operation of the District Superintendents, the new Division Manager hopes to successfully continue the good work started by Mr. Pray.

We also miss the spark of Mr. Pray's station, 9ZX. Just as the Northern Trunk Line "A" seemed to be working nicely it is a great hardship to have him drop out, and from reports received, 7IM has also left for California. These two stations were the ones that completed the missing link in this route and it will be hard to find their equal as there are not nearly as many good ones to choose from in this part of the country as compared to the other Divisions. With the coming of the Transcontinental Tests the need for efficient stations to fill the gap becomes more imperative. From reports from the direction of North Dakota it appears that all stations in the Twin Cities are received there with great irregularity, at times being very loud and at other time being inaudible, the stations farther off appear to work the Cities with ease. For this reason it is not deemed advisable to route the test messages thru the Twin Cities although this route would be the shorter. Unless conditions change, it is planned at this time to route the messages via 9ZL to "BQ" or 9AJI to 9ZC to 9WU or 9EE at Ellendale, N. D. There seem to be no stations in North Dakota except in the extreme eastern part so the jump will have to be made from there direct to the 7th district. The connection on the west is now being determined by a series of tests to find the reliability of the communication and at this time the prospects look best for connecting up with 7EX or 7ZG in Montana.

Mr. H. R. Hall, 9FC, 23 Merriam Place, St. Paul, Minn., has been appointed District Superintendent of Southern Minnesota. He was formerly Asst. Supt. and lately St. Paul City Manager. He is planning several branch distributing routes from the Twin Cities to all important towns nearby. If four or five good routes can be organized they will have as their city terminals the best A.R.R.L. stations now taking part in long distance relay traffic. Alternate nights may be arranged to accommodate more

stations and regular clearing times will be fixed as soon as more good stations become apparent in other parts of the District. This local distribution of relay traffic seems fairer where there are a large number of good stations close together.

Mr. John A. Hall, 9APV, 1016 Iglehart Ave., St. Paul, Minn., has been appointed City Manager of St. Paul. He reports that at present 9HM, 9DR, 9XI, and 9ZT seem to do most of the work to points outside of the Cities. The Twin City Executive Radio Council has made some rules that work out nicely. The hours between 4 and 6 P.M. are reserved for spark coil operation only; from 6 to 9 P.M. for all local work on power input not exceeding 250 watts; and from 9 P.M. to 7 A.M. for long distance relay traffic. We know that if we want the co-operation of everyone we must be fair to everyone. The only exception to the rules is in the case of C.W. and phone. Intercity traffic is now handled by radiophone thru 9ZT and 9APV or 9FC.

Mr. J. A. Gjelhaug, District Superintendent of Northern Minnesota, reports his station 9ZC is about the only one in that part of the state handling traffic regularly as he relays considerable traffic from 9ZL to 9WU. His Assistant, Mr. W. C. Bridges of Superior, reports that 9PN, FWK, and BQ in Superior, and 9AJI in Duluth are the only stations doing dependable work from those cities.

In the Dakotas 9AIG, 9PI, 9WU, and 9EE appear to be the most prominent in relay work. Branch routes are organized in the eastern part of North Dakota.

Mr. E. L. Leavenworth, 9WU, Ellendale, N. D. is Superintendent of North Dakota and Mr. Harold Larson, 9KG, Viborg, S. D. is Superintendent of South Dakota.

#### WEST GULF DIVISION

F. M. Corlett, Mgr.

Relay weather is with us. With only a few exceptions traffic is moving in a regular business-like manner, and the volume is ever increasing. The handling of messages seems to be one of our chief pleasures so let's see how many we can really handle EFFICIENTLY and ACCURATELY. And remember, a message might as well not have been relayed from station to station if the station at destination doesn't deliver it. By all means DELIVER the messages you receive promptly.

Asst. Div. Mgr. Raymond L. White is doing some excellent organization and detail work which should prove a great help in improving the efficiency of this division and the A.R.R.L. To him is due the credit for collecting the material for the monthly reports.

Mr. H. P. Heafer, 5AJ, newly appointed Dist. Supt. for Northern Texas reports

that his District will be second to none in radio activities and the efficient handling of traffic. In the Greenville Territory traffic is moving O.K. in all directions under the direction of Asst. Dist. Supt. C. F. Butcher, 5AL, 5DW and 5IS, Greenville, and 5HV, Commerce, are taking care of traffic in an efficient manner with 5DW in the lead with the number of messages handled. The same is true of the Dallas Territory, traffic moving through with little if any delay to speak of; 5CG, McKinney, 5IE, 5JG, 5ZG, 5EW and 5ZC, all of Dallas, handling the bulk of the traffic. 5ZC will probably lead in the number of messages handled. No report of traffic handled in the Amarillo Territory received, however. Mr. J. L. Martin, 5IF, is being heard. Max Pierce, 5AI, Corsicana Territory, states traffic is coming thru. Waco is the logical relay point for traffic South from Dallas, and in turn should work Austin or College Station. Clyde Mosteller, 5CD, A.D.S., of Pilot Point Territory regrets that he must give up his territory account his removal to Dallas. 5BI in Dublin, Texas, operated by Mr. T. C. House and Guy Neel, is doing some good relay work. A radio Club has been organized in Fort Worth. This is encouraging—we knew Fort Worth would come to the front soon. Now it will be a race between Dallas and Ft. Worth to see which can outdo the other.

Mr. W. H. Tilley, 5ZU, Dist. Supt. of Southern Texas District, is indeed a man of a hard task, in trying to get his District in a 100% condition. In Austin proper there are four relay stations working regularly—5EJ, 5BO, 5JA, and 5ZU, the District Headquarters station. Mr. Frank M. Rives, 5BO, has been appointed A.D.S. and is in charge of the Austin Territory. Houston and Austin are having difficulty in working due to QSS and QRM from broadly tuned stations. NAY is very QSA on 200 meters. (Ditto in Dallas too.) Mr. Ed. Nettleton, 5ZN, Eagle Pass Texas has been appointed A.D.S., and assigned the Eagle Pass Territory consisting of the Counties of Edwards, Real, Kinney, Uvalde, Maverick, Zavalla, Frio and Dimmitt. James L. Autry, 5ZX, has dismantled. He is a senior at Rice and lives on the campus. Among the interesting news of the Houston Club is the appearance of a bi-monthly, typed and illustrated periodical giving the interesting sidelights on the local operators, their equipment and outstanding characteristics.

Mr. Louis Falconi, 5ZA, Dist. Supt. New Mexico, reports weather conditions in New Mexico perfect for relay work. Traffic on the Southern Transcontinental Route is going thru regularly. At Douglas, Ariz., 6IG and 6GE are both effective stations, while 6ZH at Richfield, Utah, opens an-

other way West and Northwest, and 6JT at Salt Lake City further helps in the good work of making the Southern Route reliable. 5IF at Amarillo, Texas, has been heard and connection with him should be established soon. Mr. Goddard, A.D.S. of the LasCruces Territory, reports many improvements are being made at the State College Station.

M. C. Poor, 5EF, Asst. Dist. Supt. of Southeastern Oklahoma Territory, is anxious to get a line on all stations in his Territory. His address is 437 West Grand Ave., McAlester, Okla. A half K.W. station has been located at Krebs and will probably be ready to go before long. Mr. Poor has requested the newspapers to help him locate the amateurs in his Territory. Newspapers, as a rule, will assist by giving us a little publicity and are the means of reaching newcomers in the amateur game. No mention of traffic conditions was made in Mr. Poor's report.

Asst. Dist. Supt. C. M. Selby, 5BM, of Muskogee, in charge of the Northern Territory of Oklahoma, states that his station has not been completed.

5HL at Oklahoma City is being heard at Headquarters in Dallas now quite frequently.

Total messages 174.

#### ROCKY MOUNTAIN DIVISION

M. S. Andelin, Mgr.

This division is now in shape to handle transcontinental traffic over trunk line "B", which seems to be the shortest and most logical route from coast to coast. Since this division finally got to working after the summer dead spell it has already proven its worth and importance in handling traffic. Most of the messages go thru 6JI and 6ZH at Richfield, Utah. Stations East can be worked with more ease than western stations. Traffic going east has to go by way of 5ZA, Roswell, as we have found that to be the most reliable route. However, messages have been received with certainty from other stations. 9LR at Anthony has given us a fine direct route but on account of QRM in his vicinity it is impossible to transmit to him. A large number of messages has been received direct from 9AEG at ElDorado, Kans.; 9IF, Giltner, Neb.; and 9WU, North Dakota. The latter is received very QSA at Richfield and seems to be very reliable to work as he does not QSS as much as stations closer. However, QRM has to be contended with. 6WV at Denver has a 2 bulb transmitter and is making a record with his set and has proven very efficient in relaying traffic.

Western stations are very QSA and messages can be received with certainty but we find it very difficult to transmit to them as they have so much QRM that it is

impossible to work them continuously. Messages have been sent direct to Los Angeles. 6EJ at Sunnyvale and 6BQ at Reno appear to be the most reliable to work as they haven't as much QRM to contend with.

Mr. Glen Garner, 482 22d St., Ogden, Utah, is appointed District Superintendent for Northern Utah and Southern Wyoming. Mr. Garner has a DX station in Ogden with the call of 6RE, operated conjointly by Garner and Flygare.

Mr. Ira Kaar is back and puts Salt Lake City on the radio map.

Total Messages 108.

#### NORTHWESTERN DIVISION

John D. Hertz, Mgr.

Ever hear of "listening hours"? Well, we've got 'em. Between nine and ten P.M., Monday and Wednesday nights. What are they? Ever hear a station, very weak, calling some station two thousand or more miles away, and just as he was about to "sign" some local station within five or six hundred miles would suddenly "jam" the ether? Well, we have all heard such things, at least out on this coast, so we have "listening hours". Now all the "local" stations QRX for an hour twice a week, and everybody strains their ears to get the "sign" of these stations that may be in the Ninth, Fifth, or even Eighth district. To accomplish this, arrangements have been completed with the Pacific Division, thru Mr. Bessey, Manager, to have all stations in that part of the country, and all stations in the Northwestern Division QRX during the above mentioned hours.

Stations handling traffic in this Division have suddenly become scarce. This is due to the increased interest shown in things DX, and a resulting rebuilding and remodeling of stations.

East-bound traffic goes entirely via 7CC at Moscow, Idaho to stations in the ninth district. In order to facilitate the handling of traffic over this route it is requested that all stations to the south and west of station 7CC refrain from calling 7CC unless called by that station. This to apply from nine P.M. until eleven P.M. This will give him a chance to clear his business with the stations east of him at a time when they are on the job and can be worked. This is especially desirable while it is necessary for 7CC to work thru to the Ninth district, and do it regularly.

Traffic from this Division is handled from almost any station in the Division to "sixes" too numerous to mention.

#### Montana

H. E. Cutting, at Bozeman, says he will do all in his power to keep his end of the Division "well greased". He has applied  
(Continued on page 65)

**HUBERT E. DE BEN**

Mr. deBen's spark, 5ZP, is being heard far and wide, and we are glad to meet him in the pages of our QST. His organization work and A.R.R.L. boosting is a further reason for his nomination for the Hall of Fame.

Mr. deBen was born in 1900. He started in the radio game in 1915 and in the whole five years of his experience no mishap has befallen him, in spite of threats from neighbors whose lights blinked and who were kept awake until ungodly hours with the noise of his gap. He is now attending Tulane University, and for the last four years has gone to sea as a commercial operator during vacations.

Our readers will be surprised to know that 5ZP is but a half kilowatt station, as a glance at the "Calls Heard" column will show that he is being heard over most of  
(Concluded on page 66)

**JOHN D. HERTZ**

This introduces to QST readers Mr. John D. Hertz, 7ZB, Vancouver, Wash., Manager of our Northwestern Division.

Hertz has a darned good name for a radio man—he ought to make a go of it. He was born in Minneapolis in 1901, went west in 1907, and has since lived in or around Portland, Ore. Started in radio in 1914 and went the usual route, first breaking into long-distance receiving in 1916 when he made the acquaintance of an audion, but then living in a community without juice, the transmitter was a 1½ inch spark coil, known by the call 7MC.

For the past several summers he has held a berth as commercial operator at KXV, Nelson Lagoon, Alaska, and put in one winter between San Francisco and Honolulu, but his winters are now given to A.R.R.L. work and under his energetic  
(Concluded on page 66)



The A.R.R.L. announces with pleasure the completion of the affiliation of the following additional societies, dating from Nov. 20, 1920:

Montgomery County Radio Association,  
Montgomery County, Pa.  
Ridgewood Radio Club, Ridgewood, N. J.  
The Cleveland Radio Association,  
Cleveland, Ohio  
Worcester County Radio Association,  
Worcester County, Mass.  
Bath Radio Association, Bath Maine  
Jefferson City Radio Club,  
Jefferson City, Mo.  
Bridgeport Radio Club, Bridgeport, Conn.  
Brookline Radio Club, Brookline, Mass.  
"Y" Radio Club, Santa Barbara, Calif.  
Eureka Radio Club, Eureka, Ill.  
West Side Radio Club, Chicago, Ill.  
Radio Club of Mansfield, Mansfield, Ohio  
Manitowoc Radio Association,  
Manitowoc, Wisconsin  
Monterey Radio Association,  
Monterey, Calif.  
Wauwatosa Radio Club,  
Wauwatosa, Wisconsin  
Akron Radio Club, Akron, Ohio  
Radio Club of Central High School,  
Minneapolis, Minn.  
Y.M.C.A. Radio Club, Minneapolis, Minn.  
Radio Association of Western New York,  
Buffalo, N. Y.

#### Second District Executive Council

Recently seven prominent clubs in the Second District met at the Y.M.C.A. Radio Club, 153 E. 86th St., New York, and formed the Executive Radio Council of the Second District for the purpose of administering to traffic conditions in their territory. The Radio Inspector sits as Chairman, and the balance of the council is composed of a vice-chairman, secretary, and a trial board formed of two representatives from each affiliated club in the District. Mr. John DiBlasi has been elected Vice-Chairman.

Traffic regulations were adopted, providing for free air until 7 p.m., local traffic 7 to 9:30 p.m., long distance traffic 9:30 to 12 midnight, and free air after midnight. Each club is to appoint a traffic director for the zone covered by its activity and he is to be responsible for conditions in his zone.

This arrangement should result in a

speedy improvement in traffic conditions in the New York district.

#### Springfield Traffic Rules

At a meeting of the Springfield Radio Assn., Springfield, Mass., Nov. 2d, regulations were adopted declaring open air 6 a.m. to 7 p.m., local traffic 7 p.m. to 10 p.m., and DX relay work 10 p.m. to 6 a.m.

Newly elected officers for the next six months are: President, H. Dyson; Vice-Pres., J. Moauro; Sec., Geo. I. Pierce; and Treas., G. Marois.

#### New Club in Ft. Worth

On Nov. 10th amateurs of Ft. Worth, Tex., together with Division Manager F. M. Corlett and District Supt. Heafer, met and organized a radio club, electing for officers, Yewell Cornelius as president, R. L. Harris as vice-president, and K. E. Madden, of 3108 Hemphill Ave., as secretary and treasurer.

We are very glad to see a good club started in Ft. Worth, and wish the new organization every success. They now have an excellent start for a live, peppy club.

#### Central Michigan Radio Assn.

On Nov. 18th the Central Michigan Radio Assn., of Lansing, held its second annual banquet, at which new officers were installed as follows: President, Roy Saddler, 8QQ; Vice-Pres., Paul Touslev, 8JJ; Secretary, Maurice Pancost, 8ZF; Treasurer, Mr. Edgar Ferguson, 8QS.

After a good feed the program featured interesting talks, music, stunts, and an electrical show.

Michigan is on the map, all right. Many of the stations of this club are doing excellent work, particularly 8JJ and 8FI, who have been heard this season in 24 states.

#### Milwaukee Amateurs' Radio Club

The Milwaukee Amateurs' Radio Club has started the present radio season with the idea of one big radio club for the city of Milwaukee and has absorbed the Wisconsin Radio League and has extended its activities to the surrounding towns with the purpose in view of bring the amateurs into closer contact with each other.

A new meeting place has been secured through the courtesy of the School of Engineering of Milwaukee. The rooms

are located on the sixth floor of the Old Insurance Bldg., 373 Broadway. As usual the regular meetings are held weekly but on Monday evenings at 8 p.m. instead of Thursday. Of late the meetings have been devoted to discussions of QRM and its mitigation. The Club has adopted the "Chicago Plan" of control of traffic and a set of Traffic Rules and Regulations has been worked out and distributed throuthout the city. These rules are enforced by the A.R.R.L. City Manager and the Committee on Interference and Relays. A very noticeable improvement in traffic conditions has been the result. The Club wants every amateur in the city of Milwaukee to become a member of the organization and an invitation is hereby given to all parties concerned to attend the very next meeting of the Club that shall be convenient to them. There are several grades of membership open, making it possible for anyone that is interested in Radio at all to become a member. The dues are low in comparison to the benefits that are derived by the membership at large.

The Club is affiliated with the A.R.R.L. and is working in conjunction with their operating staff on relaying, QRM, and for the best interests of amateur radio communication. The Chicago Executive Council has asked the Club to become affiliated with them and this is now under consideration.

Address all communications to the club to 601 Enterprise Bldg., Milwaukee, Wis.

Traffic rules and regulations, as adopted, provide for free air 6 a.m. to 7 p.m., local traffic 7 p.m. to 10 p.m. and DX traffic only from 10 p.m. to 6 a.m. and on Sunday mornings from 6 a.m. to 11:30 a.m. The regulations define the manner of handling traffic and provide for the enforcement of the rules. Amateurs in Milwaukee vicinity who are not acquainted with these regulations should request a copy from the Club.

#### Troy Y.M.C.A. Radio Club

Troy's first radio club was organized in 1914 and was known as the Amateur Marconi Radio Assn. After a struggle for existence, this club united with the Y.M.C.A. in 1916 and became known as the Troy Y.M.C.A. Radio Club. Apparatus was purchased and a station erected, but the war depleted the ranks of the club's membership and no more meetings were held until the fall of 1919, when the club reorganized, re-erected and improved the station, and immediately started very good reception, copying 9EE and 9LR on a homemade regenerative set and one bulb. The station is situated on the third floor of the Y.M.C.A., hemmed in with tall buildings, and until recently was not able to do much in the way of transmitting. A counterpoise solved their trouble, however, and now 2SZ is reaching out, having been

QSO 9LM, 9JT, and several DX 8's and 2's lately.

Mr. F. Clifford Estey, President of the Essex County Radio Assn., was a recent visitor, and thru the enthusiasm he injected, a convention is planned for after the Xmas holidays of all radio men in Schenectady, Albany, Troy, and surrounding vicinity.

Meetings are held every second Monday evening in the club's own quarters, and if any DX men are ever in Troy, they are cordially invited to visit 2SZ. Communication with other clubs is desired, and should be addressed to the Secretary, J. D. MacKnight, Y.M.C.A., Radio Club, Troy, N. Y.

#### Radio Club of Brooklyn

Radio Club of Brooklyn, N. Y., announces that its meetings are now being held on the second and fourth Wednesdays of each month at its new headquarters, 2211 Bedford Ave.

The club has investigated traffic conditions in its vicinity and as a result is laying out local traffic lines thru Brooklyn connecting with 2RK thru the medium of a central traffic station, not yet appointed, for both incoming and outgoing traffic. Non-member stations are included as well as club stations, the routes being really an extension of the A.R.R.L. trunk lines, and all Brooklyn amateurs are asked to co-operate.

#### Southern California Radio Assn.

The above club, with headquarters at 510 Y.M.C.A. Bldg., Los Angeles, has commenced the publication of a club sheet, known as S.C.R.A.Q.R.M. It has the pep, and with the co-operation of its membership, we know that from its first small copy it can be developed into an organ that will be a thing of joy to the gang. Good idea.

#### Bay Counties Radio Club

QRM conditions in the Frisco district have become so serious that the above club, with headquarters in Oakland Calif., has proposed a time-division schedule which, with the co-operation of the rest of the amateurs, should gradually result in the elimination of unnecessary interference and a great improvement in general operating conditions. The schedule provides for free air and tuning, 6 a.m. to 6 p.m., local unimportant business 6 p.m. to 8:30 p.m., local business 8:30 p.m. to 10 p.m., and long distance work from 10 p.m. to 6 a.m.

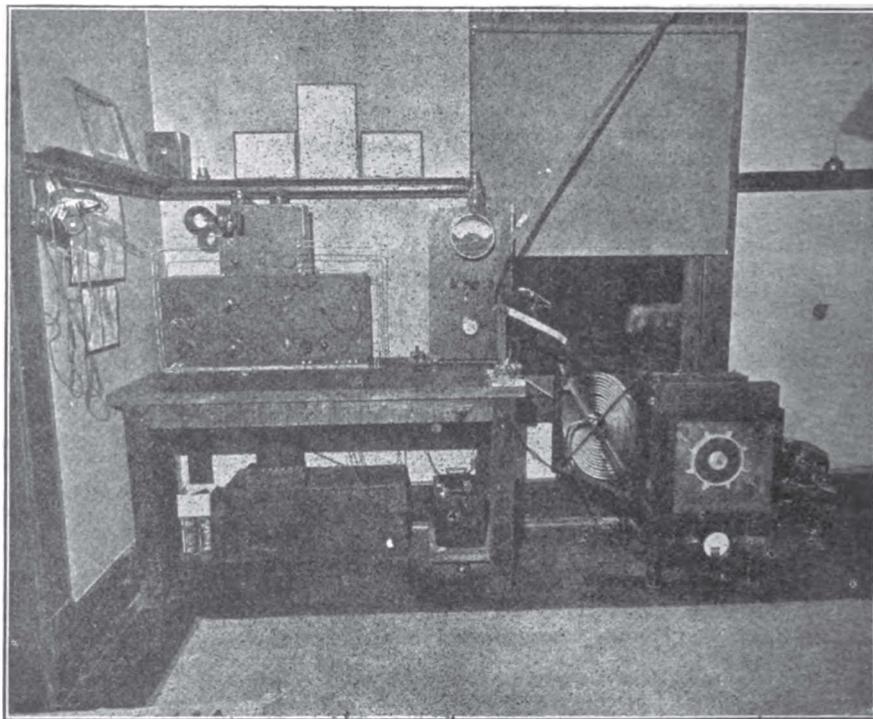
#### Springfield Radio Association

In the month of April, 1920, a little band of Springfield radio "hams" met in a small room in the First Highland Baptist Church. They drew up a constitution,

(Concluded on page 68)



**5ZA, ROSWELL, N.M.**



We published photographs of 5ZA last fall but here we have a much better picture of this excellent station, also showing some improvements which its owner, Mr. Louis Falconi, has since installed.

It is easy to see why 5ZA does good work—it's not all location; give the boy credit—he has an efficient station. Note the business-like arrangement of the transmitter. The transformer is a 1 K.W. Thordarson; the condenser is of glass plates immersed in oil; the oscillation transformer is of heavy ribbon, in pancakes, with the secondary hinged so as to swing, which makes coupling adjustments

very easy; the gap is an 8-point Hyrad enclosed in a glass-front case, belt-driven from the motor at the extreme right, and he also has an Amrad quenched gap. The transmitter is assembled as a compact unit, mounted on insulators on the floor. Note the open circuit leads of wide ribbon, providing plenty of surface for the high-frequency currents.

Falconi complains that his antenna current is low—"only" 4.1 amps with rotary and 5 with quenched. But that's because he has a real ammeter—a thermo-couple ammeter which reads correctly at any frequency. Most of the high readings we

read about exist only on the scale of an incorrect meter.

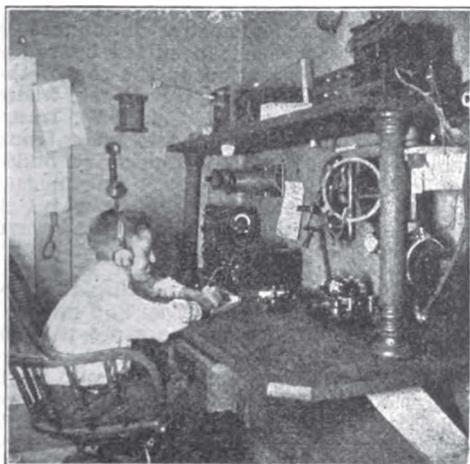
5ZA's relay receiver is a regenerative tuner, detector, and two steps enclosed in the good-looking-made cabinet shown. A honeycomb set is used for long waves, and may be plugged into the same tube equipment.

We compliment Mr. Falconi—his station is arranged as a real relay station should be. It is not surprising that 5ZA's signals have been reported QSA at 2RK, Brooklyn; 7CU, Vancouver, Wash.; and 9EE, Ellendale, N. D. Actual communication has been had with 7IM, 6ZH, 9EE, 6SK, etc. 5ZA continues our best route to the West Coast.

### 5JI, HOUSTON

This is the station of one of our younger A.R.R.L. members, Fred Mahaffey, 12 years old, 5JI, at Houston, who, in addition to belonging to our League, is a member of the Houston Radio Club, attends high school and the Y.M.C.A. radio school, is an accomplished violinist and an enthusiastic Boy Scout.

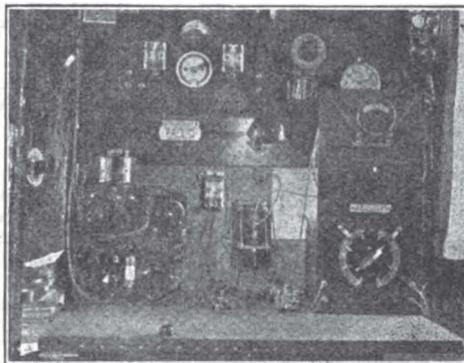
5JI has a half K.W. Thordarson, Dubilier



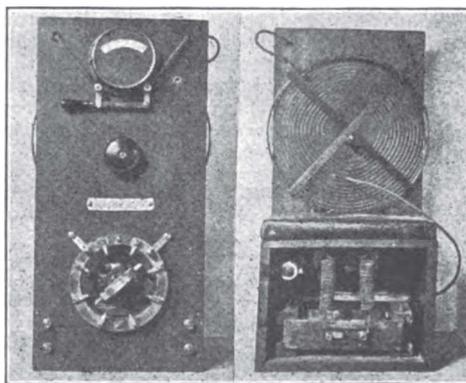
condenser, Murdock O.T., and rotary gap. We don't know what his tuner is, but the detector and two-step are Grebe make, and he hears the DX amateurs. 5JI has a nice looking station but we would point out to him that he could get a great big improvement in efficiency by rearranging his transmitting apparatus so the parts are closer together and the leads shorter. He should strive to reduce the total length of connecting leads between gap, O.T., and Dubilier to the very fewest possible inches. We think he might get an idea on this from the photograph of 5ZA in this issue.

### 7AD, SEATTLE

Here is the station of Mr. F. J. Brott, 7AD, Seattle, which will offer suggestions to the man who "makes his own", as almost all of this apparatus is home-made. The panel transmitter is the most interesting part, and the rear view of it is shown in our second photograph. The transformer and rotary are enclosed from the



rear, but the gap proper is mounted on the front of the panel, together with the aerial meter and knob for adjusting the closed circuit. This seems to be a simple pancake set, with the inductance mounted on the rear of the panel, and the condenser is on top of the compartment containing the transformer, and immediately below the pancake. That this arrangement is efficient for small sets is attested by the fact that,



while the input is but 180 watts, communication has been had with 6FE, 460 miles, 7CC, 200 miles, and 7ZB, 140 miles, with signals reported from other points up to 625 miles.



As Dr. Goldsmith says, "There is a discouraging decisiveness about the action of a vacuum tube when it burns out."

Mr. A. L. Groves advises us that the Lafayette station is using the call letters LY, instead of LAF as mentioned in last QST. The signals tune in using a Duo-Lateral 1500 as a secondary, shunted by a 43-plate condenser at 150 degrees; or with a Honeycomb 1500, at 164 degrees on the same condenser. This station has a press schedule beginning at 8:30 p.m. Eastern Standard Time (01:30 G.M.T.), with signal strength at least three times that of POZ or YN.

A U. S. Coast Guard cutter has been named after Frank J. Taylor, a well known Cambridge boy who lost his life during the war when the coast guard cutter Tampa was sunk by the enemy. Frank Taylor is well remembered by the older amateurs around Boston. A. C. Zwicker, of the Acme Apparatus Co., tells of the time when he (Zwicker) had the radio amateur fever and installed some apparatus, and, upon listening in one night, could get no signals. The next morning he found that his antenna lead-in had been disconnected and brought in thru the window of the apartment below, in which a new family had moved the day before. While standing around and wondering about this, Frank Taylor appeared and explained that he would like to borrow the use of the antenna for the previous night. From which we may know that he was a regular amateur.

"The transmitting starts at 8 o'clock on a wave length of 425 miles."—Hartford Times. Almost an ocean by itself.

H. L. Owens, 9EL, asks us to QST the fact that his address is incorrectly shown in the Consolidated call book as Topeka, Kan. It should be 822 East Main St., Council Grove, Kan.

The Traffic Manager offers one-fourth inch from the filament of a burnt-out wooden audiotron to the man who invents an improvement on the salutation "Sa OM".

8TY reports a fellow over the other night who asked who the amateur with the

loud 500 cycle set was. We wonder how he gets down there, too. But cheer up, 8TY, maybe Santa Claus left NAM a wave meter.

There is a certain amateur aerial on the outskirts of a town near here of which we wish we could get a photograph for QST. It is fearfully and wonderfully made. Across the top of the town gas tank a flat-top of sorts is supported on two horribly rickety sticks, and from this imposing structure, high in the air, a lead is run thru thin air a distance of about three hundred feet, over the tops of intervening houses, to the roof of the station owner. It must be meant for a transmitting aerial, or it would not be multi-wire, and we would hate to be the company issuing the insurance on that gas tank.

The DeForest company announces a nightly news service transmitted by radio-telephone from their station on the top of the World's Tower Building, New York, where one of their type OT-201 1 K.W. transmitters has been connected to an antenna running to the top of a four-story building at 49th and Broadway. An unusual feature is the location of the apparatus at the top of the antenna. The licensed wave length is 1650 meters.

Have you heard NSF repeating the signals of MUU, POZ and YN on 250 meters? This is accomplished in the same manner as the repeating of the time signals from Arlington. We only hope NSF don't reach up and get some of the crazy atmospherics from the long waves and goof up 250 meters with some extra strays.

Newspapers recently chronicled the complete destruction by fire of the DeForest plant, with a loss of a half million dollars. Dr. DeForest advises us that this is far from the truth. The fire apparently started from crossed wires in the tube department, which was completely destroyed, but the rest of the plant suffered very little, the finished stock being practically undamaged. The loss totaled about \$40,000, fully covered by insurance.

2ABK suggests that a phonograph record used for a rotary disc should assist in securing a musical tone. This idea is

awarded the set of oilcloth diaframs.

**New Books Received:** The 1920 Year-Book of Telegraphy & Telephony, distributed by the Wireless Press, Inc., New York; price \$4.00 postpaid. The 1920 edition of the annual compendium of radio information, made famous by the Marconi company. A 1200-page book packed full of information of high value to amateur and engineer alike.

Rumor has it that on November 18th Mr. E. H. Armstrong sold his regenerative and oscillating audion patents to the Westinghouse company.

With deep regret we record the death on October 30th of Mr. James Murdock, of the firm of Wm. J. Murdock Co., Chelsea, Mass., makers of "Murdock 55's". James Murdock was a fine man, who had the interest of the amateur at heart; he was deeply interested in amateur and club work, and gave freely of his time. Amateur Radio will miss him.

What would you think of a chap who told you he was employing "two units of thermionic note magnification"? Would you yell for a Size 18 Wouff-Hong? Honestly, tho, that is the terribly precise term which our British confreres stick on a harmless two-step amplifier.

Dear Eddy—

Noting illustration of Doolittle decrement in last QST, "A" contends the brass cup is for water to dampen the wave, while "B" contends that this cup gathers the dampness from the damped waves and the scale measures the amount of damping like a rainfall gauge at the Weather Bureau. Who is right?

Oscillation Oscar.

Nothing doing—we don't pretend to be an authority on anything but C.W. Above is referred to the Advisory Technical Committee.—Ed.

Radio Testing Station, Binghamton, N. Y., announces its ability to receive orders for radio material via radio, thru its station, 8LI. Such orders in most cases can be shipped C.O.D. the following day.

"The way QST keeps growing, another six months and each copy will be delivered in a wheelbarrow."—R.T.A. Bulletin. Tnx, OM. You define our ambition. Incidentally, our own congratulations on your peppy little sheet.

2RK—the sleepless wonder; never eats, never sleeps; only "radios".—B. T. A. Bulletin.

Referring to our Editorial on "7HH", last month. Somebody is feeding 1HAA

a diet of phony calls. Who is the "4CM" he worked? It wasn't the real 4CM at Sewall's Point, Fla. Can it be possible there are two? Maybe "4AO" over in Jersey has changed his call? When all this business comes to light—Oh Boy!

#### Important Notice

Editor QST has received authority to announce two prizes offered by The Old Man for the best and the rottenest fist among A.R.R.L. DX men. All DX men are asked to send their votes to QST for count. Contest closes Jan. 31st. Come on.

S. Kruse has an interesting short article on operation on buried wires, in the November issue of the Washington Radio Bulletin, published by the Washington (D.C.) Radio Club. The article describes the reception and transmission results of 3HS, that city, who has been consistently copying 1AW, 8ZL, 8ZW, and a host of closer stations, on a single tube in a tickler feed-back circuit, using a ground wire of No. 22 D.C.C. buried four inches under sod. As the wire has been in place several months, the insulation may be neglected as having no effect. The buried wire has a total length of about 55 feet and instead of being straight it is run around three sides and part of the fourth of a rectangular yard, thus pretty well eliminating directional effect. A gas-pipe ground is used. Signal-static ratio is much improved, and a peculiarity is that nearby stations are received only a trifle stronger than distant ones. A series condenser is used in the ground lead; it tunes very broadly.

#### WOULDN'T IT BE WONDERFUL—

If some phone operators would turn mute, or would put a pebble in their mouth, or would spit out the mush, or something?

If we could send half as well on 250 meters when we try to, as NAM does when he is trying to use 952?

If the Bureau of Standards started to trail its missing VT-1's? (Ask Kruse—he knows.)

If 6FE had a decrement? (Hi!)

If DeForest would have a fire sale for the next ten years?

If 1XT could make a C?

If 3DH would get a key that wouldn't stick?

"If 25-cycle juice was at least 40 or 50 cycles, so that a sink gap would give a 'new' tone, instead of a rattle?", say the cunux.

If copper screen antennas would strain our wave and make it pure?

If 9ALG could discover an ice-proof condenser oil that wouldn't freeze?

(Concluded on page 67)

## CALLS HEARD

On account of the vast quantity of calls reported we must ask your co-operation in the following.

- (1) List the calls on a separate sheet of paper—do not embody them in a letter.
- (2) Arrange by districts from 1 to 9, and alphabetically thru each district; and run them across the page, not down a column.
- (3) Put parentheses around calls of stations also worked.
- (4) Omit initial or other unauthorized calls.
- (5) State the period covered by your report.

**HEARD BY M. B. LOWE, Operator on "KDF"**  
Oct. 30 and 31, 200 miles south of South Pass, La. (290 miles S. of New Orleans): 3VV, 4XC, 5AO, 5AL, 5EJ, 5XA, 5XB, 5XC, 5YA, 5YH, 5ZC, 5ZL, 5ZW, 9ABL, 9HT, 9JN, 9KO, 9LM, 9LR, 9OX, 9ZC.

Heard by same operator while lying at dock at Puerto Barrios, Guatemala, Nov. 3 and 4th: 2RK, 5EJ, 5FL, 5YH, 5ZA, 5ZC, 5ZL, 5ZP, 5ZU, 5ZZ, 5ARB, 5AEG, 5BW, 5LR, 5ZJ, 5ZL, NSF. 2RK loudest by several times.

**NSF, ANACOSTIA, D. C., Oct. 21—Dec. 5.**  
1AK, 1AW, 1BBL, 1BL, 1BM, 1CAY, 1CK, 1CM, 1CZ, 1DY, 1EAT, 1EAV, 1FQ, 1GB, 1GBT, 1GY, 1HAA, 1HO, 1JAP, 1JQ, 1JZ, 1KE, 1OE, 1PY, 1BY, 1RZ, 1TS, 1WR, 1XE, 1XT, 1XX, 2ACM, 2AEF, 2AER, 2AM, 2ARD, 2BB, 2BG, 2BK, 2BM, 2CT, 2DA, 2DN, 2DR, 2EL, 2GL, 2GR, 2HN, 2IL, 2JJ, 2JU, 2JZ, 2OA, 2OO, 2PL, 2RM, 2RK, 2SH, 2SZ, 2UE, 2VA, 2WB, 2WD, 2XJ, 2XQ, 2ZD, 2ZE, 2ZL, 2ZM, 3ABD, 3ACS, 3AFV, 3AHK, 3BE, 3BG, 3BZ, 3DH, 3DR, 3EH, 3FB, 3FG, 3GO, 3GX, 3HG, 3HJ, 3IY, 3OU, 3PU, 3VV, 3ZA, 3ZG, 3ZS, 4AG, 4AL, 4AO, 4BK, 4BQ, 4DM, 4XC, 4YB, 5AO, 5BC, 5DA, 5ER, 5FV, 5XA, 5YE, 5YH, 5YL, 5ZL, 5ZP, 5ZZ, 5ABG, 5ACF, 5ACJ, 5ADE, 5AGP, 5AHR, 5AL, 5AMQ, 5AMZ, 5ANO, 5AY, 5BP, 5BQ, 5CB, 5CG, 5CV, 5DC, 5BG, 5DI, 5DP, 5DR, 5DV, 5DZ, 5EC, 5ER, 5EV, 5EW, 5FD, 5FK, 5FP, 5FT, 5GL, 5GW, 5HA, 5HH, 5HI, 5HP, 5HY, 5IK, 5IL, 5IN, 5JF, 5JJ, 5JQ, 5JU, 5KE, 5KN, 5KK, 5LB, 5LF, 5LQ, 5ML, 5MNG, 5MZ, 5NI, 5NZ, 5OY, 5PN, 5RE, 5RQ, 5RW, 5SH, 5SP, 5TN, 5TT, 5WC, 5WY, 5XE, 5XK, 5XU, 5YV, 5ZA, 5ZB, 5ZD, 5ZL, 5ZN, 5ZE, 5ZV, 5ZW, 5ZX, 5ZY, 5ZZ, 9AAF, 9ACL, 9AD, 9AEG, 9AER, 9AJL, 9AK, 9AOJ, 9AP, 9AU, 9BW, 9CA, 9CF, 9DF, 9EL, 9EQ, 9ET, 9FG, 9FM, 9GN, 9GX, 9HN, 9HT, 9JN, 9JQ, 9KN, 9KV, 9LC, 9LM, 9LR, 9LQ, 9OE, 9PL, 9PV, 9SS, 9UH, 9UU, 9VA, 9XM, 9YB, 9ZJ, 9ZL, 9ZN, 9ZQ, 9ZV, 9ZX.

**F. H. SCHNELL, 1MO, HARTFORD, CONN.,**  
Nov. 10 to 30.  
1AZ, 1BM, 1CK, 1CZ, 1DY, 1GY, 1JQ, 1OE, 1FAQ, 1ACQ, 1CBQ, 1HAA, 1UAV, 2DN, 2EL, 2JJ, 2OK, 2RK, 2TF, 2XQ, 2ZD, 2ZL, 3BG, 3BQ, 3DH, 3DS, 3GO, 3HG, 3HJ, 3JJ, 3JQ, 3KM, 3KH, 3TU, 3VV, 3XF, 3AHK, 4DM, 4YB, 5DH, 5AB, 5AD, 5OV, 5DA, 5DI, 5DP, 5DR, 5DV, 5FK, 5FY, 5GB, 5GL, 5HJ, 5HP, 5HW, 5IK, 5JF, 5JS, 5JU, 5KM, 5KP, 5LB, 5LF, 5MT, 5NA, 5NI, 5OM, 5PI, 5PN, 5QJ, 5RQ, 5RW, 5SP, 5TC, 5TT, 5WY, 5XK, 5KU, 5ZA, 5ZB, 5ZD, 5ZE, 5ZL, 5ZR, 5ZV, 5ZW, 5ZY, 5AAW, 5ABG, 5ACF, 5ANG, 5ANJ, 9AU, 9AT, 9BP, 9CA, 9EL, 9GC, 9HN, 9HP, 9KV, 9LM, 9UU, 9ZL, 9ZN, 9ZV, 9AAV, NSF, WWV.

**9RR, KANSAS CITY, MO., Nov. 1—9.**

On indoor antenna twenty-five ft. high.  
1HAA, 2ADD, 2RK, 3DH, 3GO, 4AG, 5EJ, 5FL, 5YH, 5ZA, 5ZC, 5ZL, 5ZP, 5ZT, 5ZU, 5ZV, 5ZZ, 6WV, 7CC, 7IM, 8ABR, 8ABP, 8ER, 8FT, 8HA, 8LW, 8QJ, 8YV, 8ZY, 9ABL, 9AEG, 9AEO, 9AEU, 9AFX, 9AEY, 9AGN, 9AHL, 9AHZ, 9AIG, 9AJL, 9AKI, 9AKJ, (9ANQ), 9APC, 9AQR, 9CA, (9DU), 9EE, 9FB, 9EQ, 9FU, 9GN, 9GP, 9HN, 9JQ, 9KV, 9KU, 9LR, 9LC, 9MS, 9NX, 9OE, 9QM, 9TY, 9VR, 9WR, 9WU, 9WZ, 9XM, 9YN, (9ZH, 9ZJ, 9ZL, 9ZN, 9ZT, 9ZV, 9ZX, NSF, WWV.

**1AW, HARTFORD, CONN., Nov. 3—Dec. 3.**  
(1AK), (1AZ), (1BM), (1CK), 1CZ, (1CM), (1DY), (1FQ), 1GJ, (1GY), (1JQ), (1QN), (1UJ), 1YB, (1OE), (1FAQ), (1HAA), (1JAP), 1MAH, 1UAV, (1UAW), (2CS), (2DN), 2HX, 2JJ, 2JU, 2OA, 2OM, 2RK, 2SZ, (2TF), 2WB, (2XQ), 2ZD, (2ZL), 2ZM, 3BH, 3BG, 3BZ, 3CL, 3DS, 3DH, 3EH, 3FG, 3FV, (3GO), (3HJ), 3HG, 3HK, (3KM), 3MX, 3QW, (3VV), 3YV, 3ZE, 3ABC, 3ACI, (3ACM), 3ABH, 3AHK, 4AG, 4AL, 4BY, 4DM, (4YB), 5YE, 8AY, 8BF, 8CF, 8DC, 8DV, 8DL, (8DH), 8DY, (8ER), (8FJ), 8FL, 8FT, 8FP, 8GW, 8HY, 8HL, 8HA, 8II, 8IK, 8JF, 8JU, 8JJ, 8KP, 8LF, 8LG, 8ML, 8NF, 8NI, 8PP, 8QM, 8RW, 8SH, (8SP), (8TT), 8UH, 8UV, (8WY), 8XE, 8XU, (8XK), (8ZZ), 8ZX, 8ZV, 8ZE, (8ZY), 8ZB, (8ZD), (8ZL), 8ZR, 8ZA, 8ZW, 8ANP, 8ANJ, 8AMQ, 8AMZ, 8ACF, 9WR, 9LQ, 9XM, (9ZJ), (9ZL), 9ZN, (NSF), WWV.

**K. B. WARNER, HARTFORD, early November.**  
1FQ, 1JQ, 1OE, 1TS, 1XT, 1FAQ, 1HAA, 1GBO, 2DN, 2DA, 2BK, 2EN, 2GO, 2JJ, 2JZ, 2RK, 2TF, 2XQ, 2ZD, 2ZL, 2ACM, NSF, WWV, 3BG, 3BZ, 3DC, 3DH, 3GO, 3GX, 3HB, 3HH, 3HG, 3HJ, 3JJ, 3KM, 3OR, 3VV, 3ZS, 3ABD, 3AHK, 4AA, 4DM, 4YB, 5DA, 5YH, 5AH, 5AY, 5BF, 5DV, 5ER, 5FK, 5GW, 5HA, 5HP, 5JJ, 5JU, 5JS, 5LF, 5ML, 5MT, 5OJ, 5OM, 5PN, 5RQ, 5SF, 5WY, 5XK, 5ZA, 5ZB, 5ZD, 5ZE, 5ZL, 5ZR, 5ZV, 5ZW, 5ZY, 5ZZ, 9AU, 9HF, 9HN, 9KV, 9LC, 9LQ, 9UU, 9XM, 9ZC, 9ZJ, 9ZL, 9ZN.

**1TS, BRISTOL, CONN., November, one-stop.**  
(1AAT c.w.), 1AK, 1AN spk. & c.w., (1AW), 1BAB, (1BBL), 1BBO c.w., 1BM, (1CBX), 1GJ, (1CK), (1CM), 1CZ, 1DAP, 1DH c.w., 1DR, 1DT c.w., (1DY), (1EAS), 1EAV, 1EN, 1ER, 1FAQ, 1FBF, (1FQ spk., c.w. & fone), 1GAL, 1GBC, 1GJ, 1GY, 1HAA, 1HO, 1IAP, 1JAP, (1JAU), 1JD, (1JBF), 1JN, (1JQ), 1KAQ, (1KAY), (1KAZ spk. & c.w.), 1MX, (1NAQ), 1NO c.w. and fone, (1OE), 1OT, 1PAO, 1PAW, 1PG, 1PY, 1QN, (1RU spk. & c.w.), 1RZ, 1SAC c.w., (1TAZ), 1VAA, 1VAD, 1VG, 1WAP, 1WP, 1WR, 1XD fone, 1XE spk. & fone, (1XT), (1XV c.w. & fone), (1XX c.w.), (1YB), 2ACM, 2ADD, 2AER, 2AFZ, 2AJE c.w., 2AJW, 2AM, 2AZP, 2ASB, 2BAR, 2BB, 2BD, 2BK, 2CL, 2CS, (2CT), 2DA, 2DN, 2EL, 2HN, 2HX, 2HZ, 2JJ, 2JR, 2JU, 2JZ, 2KY c.w., 2MZ, (2NN), 2OA, 2OM, 2OX, 2PL, 2QE spk. c.w. & fone, 2QV c.w. and fone, 2QW, (2RK), 2RM, 2RV, 2SH, 2SZ, (2TF), 2UE, 2WB, 2WD c.w., 2WG, 2XF fone, 2XI c.w. & fone, 2XJ fone, 2XJ 4 fone, (2XQ c.w. & spk.), 2XX c.w. & fone, 2ZL c.w. & fone, 2ZM spk., c.w. & fone, 3AAP, 3ABD, 3ACM, 3ACS, 3AHK, 3BE, 3BZ, 3CC, 3CS, 3DH, 3DR, 3DS, 3FB, 3FR, 3GO, 3GX, 3HB, 3HG, 3HJ, 3HO, 3KM, 3OB, 3PM, 3PU, 3QW, 3SJ, 3SW, 3TJ, 3UC, 3VV, 3XF, 4AL, 4DM, 4XB c.w., 4YB, 5DA, 5YM, 5AN, 5ABG, 5ACF, 5AEE, 5AFB, 5AGZ c.w., 5AHP, 5AJW, 5AMQ, 5ANJ, 5AP, 5BP, 5CB, 5CG, 5CH, 5CV, 5DI, 5DP, 5DV, 5DY, 5DZ, 5ER, 5EV, 5EW, 5FB, 5FG, 5FK, 5FO, 5FT, 5GL, 5GY, 5HA, 5HF, 5HH, 5HI, 5ID, 5IL, 5IN, 5IV, 5JF, 5JJ, 5JS, 5JU, 5KE, 5KP, 5KZ, 5LF, 5LW, 5MH, 5ML, 5MP, 5MRG, 5MT, 5MZ, 5NI, 5NZ, 5OE, 5OJ, 5PI, 5PJ c.w., 5PN, 5PQ,

8QJ, 8QM, 8RI, 8RQ, 8RU, 8RW, 8SH, 8SJ, 8SP, 8TB, 8TT, 8VJ, 8VS c.w., 8VY, 8WD, 8WJ, 8WY, 8XC c.w., 8XE, 8XI, 8XK c.w. & tone, 8XU, 8YV, 8ZA, 8ZB, 8ZD, 8ZE, 8ZG spk. & c.w., 8ZL, 8ZS, 8ZV spk. & c.w., 8ZW spk. & c.w., 8ZY, 8ZZ, 9ABL, 9AD, 9AKF, 9AN, 9AO, 9AU, 9BP, 9CA, 9CG, 9DT, 9FV, 9GN, 9GP, 9GX, 9HI, 9HN, 9HM, 9HR, 9HY, 9JN, 9JQ, 9JT, 9KN, 9LM, 9LQ, 9ME, 9OE, 9QQ, 9UU, 9XM, 9YA, 9YI, 9ZJ, 9ZL, 9ZN, 9ZY.

**HEARD ON GALENA BY E. RAGERSE,**  
 Op., S/Y CASIANA.

Nov. 12th, 30 miles S.W. of Hatteras: 1AW, 1RZ, 1GBT, 2BM, 2EL, 2JZ, 2WB, 2BG, 2HJ, 2UO, 4AL, 4BY, 4CP, 5JA, 5ACF, 5AFB, 5DP, 5KP, 5SP, 5ZY, 9KV.  
 Nov. 13th off Jupiter Inlet, Fla.: 2WB and 8AY (QRN bad).  
 Nov. 14th 70 miles S.W. of Key West: 2JU, 3GO, 5ZK, 8ZL, 9LG.

**N. R. HOOD, 1022 S. ASH ST., CASPER, WYO.,**  
 Oct. 26-Dec. 5.

5CG, 5EL, 5HL, 5JI, 5SL, 5YH, 5ZC, 5ZL, 5ZZ, 6BJ, 6EJ, 6FE, 6HI, 6IG, 6ZA, 6ZH, 7CC, 7EG, 7EJ, 7FE, 7JM, 7IM, 7WM, 7ZQ, 8DQ, 8ZL, 9AK, 9AP, 9AT, 9AU, 9AX, 9BW, 9DE, 9EE, 9EO, 9EL, 9ET, 9EW, 9FL, 9GC, 9GN, 9HI, 9HT, 9IV, 9IF, 9JD, 9JN, 9KO, 9KN, 9KQ, 9KU, 9KV, 9LB, 9LV, 9MS, 9OE, 9PM, 9PL, 9QR, 9RU, 9SC, 9WI, 9WB, 9WT, 9WU, 9ZC, 9ZL, 9ZN, 9ZQ, 9ZU, 9ZV, 9ZX, 9ABX, 9AED, 9AEG, 9AEQ, 9AEU, 9AEY, 9AIG, 9AKC, 9ALG, 9ANB, 9ANQ, 9AOC, 9APC, 9ATL, 9AUP, 9IFX, NSF, FWK, 9AFX.

**5ZC, DALLAS, November.**

3GO, 4AL, (5AL), (5AO), (5AJ), (5AI), (5BI), (5BO), 5BV, 5CA, (5CG), (5CI), (5DW), 5ER, 5EF, (5ES), 5EA, (5EW), (5EJ), (5FL), 5FE, 5HF, (5HV), (5HL), (5IB), (5IE), 5JS, (5JT), 5JA, 5JY, (5KK), (5YH), 5YE, (5XA), 5XB, (5ZA), (5ZZ), (5ZL), 5ZF, (5ZU), 5ZAC, (5ZT), (5ZG), (5ZP), 5ZK, (5ZW), (5ZN), 7ZL, 8ZU, 8ZV, 8SK mod. CW, 8ZR, 8DW, 8KP, 8AN, 8ZY, 8HS, 9AC, 9AP, 9AY, (9AEG), 9ACN, 9ANQ, 9AIG, 9ACK, 9BW, 9DV, 9EE, (9EL), 9FU, 9FI, 9FL, 9GC, 9GK, 9HI, 9HN, 9JN, 9JI, 9JK, 9JU, 9JQ, 9KV, 9KO, (9LE), 9LC, 9OE, 9OG, 9OT, 9PI, 9PC, 9PU, 9TH, 9UQ, 9WV, 9XM, 9XT, 9XP, 9YI, 9YA, 9ZL, 9ZN, 9ZJ, 9ZT.

**9ZN, CHICAGO, Oct. 15 to Nov. 1.**

(1AW), 1HAA, 2BB, 2BM, 2CM, 2JZ, 2RM, (2RK), 2XC, 2ZL, (1CW), (3BZ), 3EB, (3DH), 3GO, (3KM), 3RY, 3VJ, 3XF, 3YB, 3ZA, 3XL, 4XC, 5CG, 5EL, 5ER, 5HA, 5XA, 5YB, (5YH), 5YM, 5ZC, (5ZL), (5ZZ), (5DV), (5HG), (5FT), (5DI), (5EE), (5ML), (5ZW spark and phone), (5HH), (5CB), 5GB, 5MZ, 5AW, (5XK spark, 1 CW and phone), 5TT, 5JJ, 5ZC, (5ZG spark and CW), (5ZD spark and phone), 5RO, 5AAP, (5IK), 5EC, 5DG, (5LF), 5WY, 5VX, 5DP, 5ZE, 5ZA, 5PW, 5XC, 5FK, (5DI), 5MM, 5XU, 5ACF, 5MR, 5MT, (5HA), 5FD, (5BP), 5OJ, 5ACF, 5LA, 5JS, 5AKV, (5DG), (5RW), (5JT), (5GP), (5KV), 9KO, 9LQ, 9AOJ, (9LR), 9AF, (9CA), 9NQ, 9HR, (9HM), 9CV, (9GN), 9AON, (9ZC), (9AOJ), (9AEQ), 9FU, (9ZX), 9CO, 9OE, 9AEG.

**POSSIBILITIES OF LOOP TRANS-MISSION**

(Concluded from page 30)

under consideration are only one tenth as large as in the case of the 10-meter antenna.

Based on the above, we can estimate that operation between the two loops we described can be carried on over one kilometer by merely making use of a vacuum tube detector, and 10 kilometer by the use of an amplifier.

9AMQ, 9AAP, 9AAF, 9PI, (9CS), (9LO), 9NP, 9QJ, 9FR, 9HY, 9WY, (9ZL), 9VL, 9LP, (9AJI), 9AIG, (9ZV), 9ZQ, 9FG, (9JN), 9ABL, (9WU), 9LX, 9QE, (9EE), 9ZR, 9JQ, (9EL), 9AJR, (9AUG), (9ZJ), 9YI, 9KQ, 9WZ, 9AKO, 9MS, 9AEY, 9AON, 9ACB, 9EQ, (NSF 1 CW and phone).

9HT, OMAHA, NEBR., Oct. 16 to Nov. 6.  
 (2RK), (5AL), (5CG), (5EJ), (5YH), (5ZA), (5ZU), (5ZZ), 8DL, (8ER), 8FK, 8WT, 8ZB, 8ZC, (9CA), 9EE, (9EL), 9ER, 9FG, 9FU, (9GC), (9GN), 9HL, 9HN, (9JN), (9KV), 9LM, (9LE), 9NQ, (9OE), 9PN, (9U), (9WU), 9XM, (9XT), 9ZC, (9ZH), (9ZL), 9ZN, 9ZQ, 9ZT, (9ZX), (9ABX), 9ACB, (9AEG), (9AEQ), (9AEU), (9AFX), 9AIG, 9AIM, (9AJI), (9AJS), 9ANQ, 9AON.

1BT, FRAMINGHAM, MASS., 10/1919-10/1920.  
 NSF, 1AW, 1BK, 1EM, 1CM, 1FM, 1IW, 1NO, 1QL, 1RZ, 1SZ, 1TS, 1YB, 1ZC, 1AAZ, 2AS, 2BB, 2BM, 2BO, 2CB, 2CC, 2CK, 2DA, 2DI, 2EL, 2GR, 2II, 2JU, 2JZ, 2LI, 2NB, 2NC, 2NF, 2OU, 2SH, 2TS, 2VD, 2XF, 2XJ (spk. and tone), 2XM (tone), 2ZC, 2ZL, 2ZM, 2ZN, 2ZS, 2AJW, 3BZ, 3CC, 3CM, 3CR, 3CT, 3DH, 3EN, 3KH, 3KM, 3LZ, 3NE, 3NC, 3NV, 3ZA, 3ZC, 3AA, 3AL, 3AH, 3BP, 3BU, 3CC, 3DA, 3DH, 3EN, 3ER, 3FW, 3HA, 3HG, 3HP, 3JS, 3JU, 3SH, 3TT, 3XK, 3XU, 3ZK, 3AS, 3MS, 9ZJ, 9ZN, Canadian 3Z.

Heard at 8AMQ, ROCHESTER, N. Y., Oct. 16-24th.  
 1AK, 1AW, 1HAA, 1XK (phone), 2BB, 2DH, 2ZB, (3DH), 5ER, 5FH, 5ZL, 5ZP, 8ABG, 8ACF, 8BP, 8CB, 8DV, 8ER, 8FO, 8FW, 8HH, 8ID, 8KE, 8KP, 8LA, 8MM, (8MT), 8OJ, 8QB, 8RW, 8SH, 8TT, 8XX (phone), 8XU, 8YV, 8ZA, 8ZD, 8ZP, 8ZG, 8ZW, 9EQ, 9AJ, 9FQ, 9GC, 9HK, 9KF, 9KM, 9KN, 9ZJ, 9ZL, 9ZN, 9ZQ, 9ZW, 9ZY, NSF.

**9MH, MILTON, WIS., Oct. 1-16.**

4XQ, 5CM, 5DW, 5YH, 5ZC, 5ZL, 5ZZ, 5ER, 5FT, 5HG, 5KP, 5MT, 5NL, 5QZ, 5TT, 5XK, 5ZB, 5ZG, 5ZW, 9AF, 9AAF, (9AFB), 9AJI, 9AJN, 9ACV, 9BW, 9CA, 9CS, 9DF, 9FI, 9FT, 9FU, 9GO, 9GP, 9HM, 9HR, 9JJ, (9JT), 9KV, 9LQ, 9LR, 9ME, 9NQ, 9PN, 9WZ, 9YA, 9ZK, 9ZL, 9ZN, 9ZV.

9OY, SOUTH BEND, IND., Sept. 13th to Oct. 16th.  
 1AG, 1AK, 1AW, 1DQ, 1EP, 1HA, 1XD, 1XJ, 1HAA, 2AO, 2BK, 2DN, 2EL, 2GR, 2II, 2JU, 2JZ, 2LM, 2LR, 2PU, 2PZ, 2RA, 2RK, 2RR, 2RV, 2XO, 2XX, 3AB, 3AE, 3BH, 3BL, 3BZ, 3DH, 3DS, 3EN, 3GO, 3HG, 3HJ, 3JK, 3KM, 3LP, 3NB, 3OG, 3VV, 4AE, 4AP, 4BG, 4BN, 4BQ, 4CC, 4CE, 4CP, 4DM, 4LB, 4XC, 4XK, 4YA, 5AL, 5AO, 5BA, 5CD, 5CG, 5DA, 5DW, 5ED, 5FV, 5IS, 5LW, 5ST, 5ZC, 5ZL, 5ZP, 5YH, 8AA, 8AF, 8AL, 8AM, 8AR, 8AX, 8BO, 8BV, 8CB, 8CD, 8CF, 8CI, 8CW, 8DC, 8DG, 8DI, 8DJ, 8DK, 8DN, 8DP, 8DR, 8DV, 8DZ, 8EF, 8EJ, 8EN, 8ER, 8EV, 8FA, 8FD, 8FG, 8FL, 8FS, 8FT, 8GC (QRA?), 8GS, 8HB, 8HG, 8HH, 8HR, 8HV, 8ID, 8II, 8IM, 8IN, 8IU, 8JF, 8JJ, 8JS, 8JV, 8KW, 8KE, 8KG, 8KP, 8LA, 8LF, 8LG, 8LK, 8LL, 8LW, 8MC, 8MI, 8MM, 8MO, 8MR, 8MT, 8NI, 8NL, 8NZ, 8OG, 8OI, 8OJ, 8ON, 8OZ, 8PE, 8PW, 8QJ, 8RT, 8RU, 8RW, 8SH, 8SP, 8TT, 8UD, 8UJ, 8UO, 8UF, 8VA, 8VJ, 8WP, 8WY, 8XB, 8XC, 8XD, 8XK, 8XH, 8ZA, 8ZB, 8ZC, 8ZD, 8ZG, 8ZW, 8ADE, 8ACF, 8ZB, 8ACU, 8AEA, 8AEY, 8AIO, 8AFS, 8ARY, 8EOO, 9AD, 9AF, 9AP, 9AN, 9AQ, 9AR, 9BY, 9AT, 9CI, 9AU, 9CF, 9AV, 9CS, 9CU, 9DF, 9DL, 9DV, 9EE, 9EL, 9EP, 9EQ, 9ER, 9EZ, 9FB, 9FD, 9FG, 9FL, 9FS, 9FT, 9FU, 9FV, 9GC, 9GJ, 9GN, 9GS, 9GX, 9HA, 9HM, 9HR, 9HW, 9HY, 9IB, 9IP, 9JR, 9KO, 9KV, 9KW, 9LA, 9LC, 9LG, 9LH, 9LM, 9LQ, 9LR, 9LZ, 9ME, 9MI, 9NI, 9NQ, 9OE, 9OJ, 9OB, 9OS, 9OX, 9PC, 9PD, 9PN, 9QM, 9RP, 9RT, 9RY, 9TT, 9US, 9UU, 9VA, 9VG, 9VL, 9VS, 9WC, 9WZ, 9XD, 9YQ, 9ZJ, 9ZL, 9ZN, 9ZQ, 9ZV, 9AAF, 9AAW, 9ABL, 9ABL, 9ABZ, 9ACB, 9ACM, 9AEC, 9ACV, 9ADO, 9AEG, 9AEQ, 9AIN, 9ALY, 9AMT, 9AFB, 9AIM, 9AEV, 9AJI, 9AON, 9AKH, 9MEP, 9API, 9ANK, 9AFX, 9ARD.

**3OU, BALTIMORE, Sept. 25 to Oct. 9.**

1AW, (1CK), 1EP, 1HAA, 1PY, 1SZ, 2BK, 2BM, 2CT, 2DF, 2DN, 2EL, 2HN, 2JU, (2RK), 2SH, 2UR, 2WB, 2ZL, 2BG, 2BZ, 2DC, 2EN, 2FG, 2BL,

8BA, 8HJ, 8KM, 8JK, 8VA 8VV 8ZW, 4CC, 5DA, 5AO, 8AC, 8BV, 8CB, 8DI, 8DR, 8DV, 8EN, 8ER, 8EV, 8HG, 8JS, 8KE, 8LA, (8NI), 8SP, 8SS, 8TT, 8WY, 8ZK, 8ZA, 8ZE, (8ACF), 8ICN, 9AP, 9ZN, 9HM.

#### 7ED, PORTLAND, ORE.

6AE, 6AK, 6AT, 6AV, 6BJ, 6BN, 6BQ, 6BR, 6CC, 6CD, 6CE, 6CO, 6CP, 6CS, 6CV, 6DK, 6DP, 6EA, 6EB, 6EJ, 6ER, 6EX, (6FE), 6FN, 6FS, 6FX, 6GK, 6JD, 6JI, 6JK, 6JM, 6JN, 6JQ, 6IM, 6UM, 6SK, 6QR, (6OH), 6AAT, 6AAW, (7AD), 7AN, (7BK), 7BH, 7BC, (7CE), 7CB, 7CC, (7CW), 7IN, 7IM, 7YB, (7YS), 7ZH.

#### 7GY, BOISE, IDAHO, Aug. 16 to Oct. 15.

6AK, 6AM, 6AN, 6AT, 6BB, 6BK, 6BJ, 6BQ, 6CO, 6CV, 6DP, 6EA, 6EB, 6EJ, 6EN, 6ER, 6EX, 6FE, 6FG, 6II, 6IF, 6IK, 6IU, 6ID, 6JI, 6JL, 6JM, 6JN, 6JR, 6KA, 6MZ, 6OH, 6PJ, 6QR, 6QM, 6DK, 6UM, 6ZE, 6ZG, 6AAW, 6ACR, 6AAT, (7AD), 7BH, 7BQ, 7CB, 7CC, 7CK, 7CR, 7CW, (7CU), 7DA, 7DS, 7FH, (7FM), 7FO, (7FT), 7FY, 7GQ, (7HG), (7HJ), 7HN, 7IM, 7IN, (7IV), 7XB, (7YA), 7YG, (7YS), 7ZH, 7ZI.

#### 8IZ, MILAN, OHIO.

1AW, 1BW, 1TS, 2BB, 2DX, 2VA, 3AB, 3CX, 3EI, 3KF, 3IK, 3GJ, 3JF, 3LE, 3ER, 3HH, 3MM, 3ADL, 3GX, 3OI, 3SP, 3ZA, 3CB, 3ZG, 3HA, 3HL, 3ZF, 3TP, 3JU, 3JQ, 3XK, 3XQ, 3AP, 3JH, 3HR, 3HS, 3ZN, 3US.

#### 6JD, LOS ANGELES.

5ZA, 6AH, 6AS, 6CV, (6OH), (6DP), (6QR), (6BQ), (6GE), (6PJ), (6II), (6BN), (6JN), (6EX), (6AN), (6ZE), (6JR), (6CO), (6OC), (6AT), (6QM), (6EJ), (6AK), (6EP), (6AE), (6AM), (6JI, 6ZB, 6MZ, daytime, San Diego), (7CU), (7ZI), (7DA), 9LR.

#### Heard at 9FD, LAFAYETTE, IND.

NSF, 1AW, 1WL, 2NC, 2RK, 2XX, 2ZL, 3DH, 3EN, 3ER, 3GN, 3NB, 3NC, 3NW, 3XH, 4AE, 4BQ, 4YA, 5BT, 5LL, 5XA, 5YE, 5ZL, 5ZW, 5ZZ, 8AC, 8BAT, 8BO, 8BP, 8BW, 8BX, 8CB, 8CP, 8DA, 8DG, 8DI, 8DK, 8DP, 8DR, 8DV, 8EJ, 8ER, 8FG, 8FT, 8GA, 8GN, 8GQ, 8HG, 8HH, 8HK, 8HP, 8ID, 8IK, 8JJ, 8LA, 8LH, 8LP, 8LW, 8MT, 8NEA, 8RQ, 8RY, 8WC, 8WR, 8XA, 8XK (phone), 8XY, 8ZA, 8ZF, 8ZG, 8ZD, 8ZJ, 8ZW, 8ZY, 9AA, 9ABE, 9ACE, 9AD, 9AEG, 9AG, 9AGA, 9AIG, 9AJI, 9AK, 9AP, 9AU, 9BK, 9CA, 9CD, 9CE, 9DF, 9DI, 9DL, 9EF, 9EG, 9ER, 9EN, 9GNT, 9GV, 9GX, 9HM, 9HR, 9HT, 9IJ, 9IP, 9JH, 9JJ, 9KN, 9KV, 9KX, 9LJ, 9LR, 9LQ, 9MO, 9NT, 9PI, 9PY, 9QJ, 9RA, 9RL, 9RP, 9RR, 9TT, 9VP, 9VS, 9WQ, 9WO, 9WP, 9WZ, 9XX, 9VB, 9ZC, 9ZJ, 9ZL, 9ZN, 9ZV.

1GG, SOMERVILLE, MASS., Oct. 17 to Oct. 24.  
1AW, 1SN, 1TS, 1HAA, 2BB, 2BK, 2BM, 2DN, 2EL, 2GR, 2KN, 2RK, 2TF, 2ZL, 3AB, 3AJ, 3BC, 3BG, 3DH, 3DK, 3FR, 3GB, 3HJ, 3JZ, 3KL, 3KM, 3ND, C.W. QRA?, 3PU, 3ZD, 3ZW, 8AY, 8CB, 8CH, 8CP, 8ER, 8HA, 8HR, 8HP, 8JS, 8ML, 8WR, 8XU, 8ZD.

#### 9FS, GOSHEN, IND., Sept. 6 to Oct. 15.

1AW, 1RK, 2GK, 2JF, 2RK, 2XX, 2XJ, 3BZ, 6DH, 8KM, 4BA, 4BG, 4XC, 4YA, 5AO, 5CD, 5CG, 5DA, 5DW, 5ER, 5FV, 5HA, 5IS, 5HA, 5XA, 5YA, 5YH, 5ZA, 5ZC, 5ZF, (5ZL), 5ZK, 5ZZ, 8AM, 8BV, 8CB, 8CF, (8DZ), 8DI, 8DJ, 8DR, 8DV, 8DZ, 8EN, 8ER, 8FT, 8GB, 8GS, 8HA, 8HB, 8HE, 8HG, 8HH, 8HR, 8ID, 8IK, 8JJ, 8JQ, 8KE, 8LA, 8NI, 8UR, 8OJ, 8RI, 8RQ, 8TU, (8TT), 8XK, 8VJ, (8ZA), (8ZD), 8ZV, 8ZW, 8ZG, 8YQ, 8YO, 8ACF, 8AFI, (8AP), 8BJ, 8BW, (8DF), 8DV, 8EE, 8EQ, 8FU, 8GA, 8GC, 8GN, 8GS, 8GX, 8HJ, 8HK, 8HM, 8HN, 8JN, 8JT, 8KO, 8KV, 8LC, 8LR, 8ME, 8MS, 8MY, 8NQ, 8OE, 8QJ, (8QM), 8QQ, 8RG, 8TT, 8VS, 8WZ, 8XM, 8YC, (8ZC), 8ZJ, 8ZL, 8ZN, 8ZQ, 8ZK, 8ZW, 8ZY, 9AAF, 9AAW, 9ABL, 9AJJ, 9AOJ, 9AEG, 9AEP, 9AMV, 9APB, 9AWI, 9AN, 9AX, NSF, Canadian 3DH.

2JM, NEW YORK CITY, N. Y., Aug. 1 to Sept. 25.  
1AJ, 1AK, 1AW, 1AZ, 1BB, 1BBL, 1BM, 1CK, 1DY, 1FAQ, 1FM, 1GY, 1HAA, 1IK, 1JA, 1NAQ,

1NO, 1QP (C.W.), 1RN, 1RZ, 1TS, 1XK (fone and C.W.), 1XD, 1XE, 1LAS, 2TF, (two's too numerous to mention), 3BE, 3BG, 3BS, 3CE, 3CV, 3DH, 3EO, 3FR, 3GX, 3HA, 3HJ, 3KM, 3NB, 3NC, 3OU, 3PM, 3VM, 3WZ, 3BV, 3CB, 3DA, 3DN, 3DV, 3DY, 3DI, 3DR, 3EN, 3ER, 3FO, 3FW, 3IK, 3NI, 3QM, 3SH, 3WY, 3XK, 3XU, 3ZW, 3ZY, 3ACF, 3ALS, 3AU, 9ZJ, 9ZN, NSF.

8AAV, HUBBARD, OHIO, Sept. 20 to Oct. 15.  
1AW, 1HA, 1RZ, 2CT, 2BM, 2BB, 2DA, 2JU, 2RK, 2WB, 2ZL, 3BJ, 3BZ, 3FG, 3HJ, 3KM, 3VV, 4CC, 4XC, 5DA, 5ER, 5ADE, (5AEJ), 5AHA, 5BG, 5DC, 5DG, 5DI, 5DR, (5DV), 5EW, 5FD, 5FT, 5GB, 5GL, 5GK, 5HE, 5HG, 5HH, 5HM, 5ID, 5JJ, 5JU, 5MK, 5MT, 5NL, 5SH, 5SP, 5TG, 5TT, 5VK, (5YV), 5WJ, 5WY, 5XX, 5XU, 5ZA, 5ZC, 5ZD, 5ZW, 5KL, 9AA, 9AAF, 9AP, 9AU, 9CU, 9ER, 9FG, 9FN, 9FS, 9FT, 9GX, 9HH, 9HM, 9HR, 9KO, 9LR, 9MK, 9OE, 9RA, 9TT, 9EV, 9ZC, 9ZJ, 9ZN.

#### By K. GODFREY, WHITE PLAINS, N. Y.

1AK, 1HAA, 1VAA, 2AM, 2BB, 2BG, 2BK, 2BM, 2CT, 2DI, 2DJ, 2DK, 2DN, 2EL, 2GR, 2HJ, 2IR, 2JE, 2JJ, 2JU, 2KV, 2LH, 2OA, 2OM, 2QY, 2RK, 2UA, 2UE, 2VH, 2WG, 2WM, 2XX, 2ZE, 2ZL, 2ZM, 2AAD, 2AAM, 2ADM, 2AEP, 2AGA, 2AHU, 2AID, 2AII, 2AJQ, 2ANY, 2DR, 8WY, 8XU.

#### 2KF, IRVINGTON, N. J.

1AU, 1AW, 1BL, 1BM, 1CK, 1DQ, 1DY, 1FT, 1FW, 1HAA, 1VB, 1YB, 1XD, phone, 2AK, 2BM, 2DN, 2EF, 2FV, 2JJ, 2JL, 2JZ, 2MW, 2OM, 2QR, 2RK, 2TS, 2UR, 2VA, 2WB, 2WR, 2XJ, 2YM, 2ZL, 2ZM, 3BE, 3BH, 3BZ, 3CV, 3DH, 3EN, 3FB, 3FR, 3FN, 3FW, 3GA, 3GX, 3HJ, 3HR, 3HV, 3KM, 3NB, 3ND, 3UC, 3VV, 3ZA, 3ARI, 3CB, 3CF, 3CP, 3DA, 3DH, 3ER, 3FM, 3FR, 3HB, 3HH, 3MT, 3RS, 3SH, 3WY, 3XK, 3XU, 3XV, 3YV, 3ZS, 3ZW, 3ZY, NSF, 9AE, 9LE, 9NQ, 9PW, 9RM, 9VR, 9YP, 9ZJ, 9ZL, 9ZN, 9ZT, 9ZW.

#### 2TS, WEST BRIGHTON, S. I. N. Y.

1AE, 1AW, 1BM, 1CK, 1DY, 1HAA, 1TS, 1ZR, (2ANN), 2DA, (2DN), (2KL), (2QR, fone QSA v?), (2TF), 2XX, 2ZL, C.W., 2ZR, 3AW, 3BE, 3BG, 3CV, 3DS, (3DH), 3EN, 3EW, (3FB), 3GX, 3HJ, 3KM, 3NB, 3NV, 3OU, 3PM, 3UC, 3ZA, NSF, 3AG, 3ACU, 3BB, 3BF, 3BY, 3DA, 3EN, 3ER, 3HP, 3JS, 3LF, 3NI, 3PQ, 3WY, 3XU, 9ZN.

#### 6OC, SAN FRANCISCO, to Oct. 14.

6AK, 6AV, 6BQ, 6CT, 6CV, 6DP, 6EA, 6EB, (6EJ), 6ER, 6FE, 6FH, 6FS, 6FT, 6GE, 6HY, 6TF, 6IH, 6II, 6JD, 6JI, 6JM, 6KP, (6OH), 6PQ, 6QR, 6SK, 6TC, 6UM, 6AAK, 6AAT, 6ABG, 6ABT, 7BJ, 7CF, (7CU), 7CW, 7DA, 7ZL.

Heard by L. H. SKINNER at GROOSE ILE, MICH., below Detroit, on crystal and one wire 20 ft. high, July 25 to Sept. 9.

1AW, 3BB, 3BU, 3EH, 3ACN, 3ACV, 3AEA, 3AFL, 3AGF, 3AGJ, 3AGS, 3AIL, 3AM, 3AN, 3BO, 3BD, 3CB, 3CD, 3CF, 3CT, 3DA, 3DI, 3DT, 3DZ, 3EN, 3ER, 3FI, 3GA, 3AB, 3GS, 3GW, 3GY, 3IK, 3IN, 3JJ, 3JU, 3KC, 3LL, 3MC, 3MH, 3MI, 3ML, 3MO, 3MT, 3MY, 3NL, 3NI, 3OB, 3OH, 3OZ, 3QJ, 3SH, 3TIA, 3TII, 3VD, 3WA, 3WY, 3XA, 3XD, 3XK, 3XL, 3YV, 3ZN, 3ZW, 3ZX, 3ZY, 9AU, 9AFL, 9FG, 9GX, 9HR, 9ME, 9ZJ, 9ZN.

#### 2CT, BRONX, Sept. 18 to 20th.

(1DQ), 1BL, 1DV, 1XB, (1HAA), (1JAP), (3BZ), 3RE, (3EN), 3PC, (3FG), 3GX, 3HG, 3HJ, (3KM), 3TU, 3ZA, 4CC, 3CB, (3DR), 3EN, 3EQ, 3EV, 3FT, 3GI, 3HG, 3HH, 3IK, (3LA), (3LF), 3LD, 3OZ, 3ZD, (3ZW), 3ACF, 3AJW, 9AA, 9AD, 9AT, 9CA, 9HM, (9GN), 9ZL.

#### 2NF, LONG BRANCH, N. J., July 20 to Sept. 8.

(1AK), (1AOL), 1AS, (1AW), (1BM), 1BL, (1CXY), 1CK, 1CM, (1DQ), 1DY, 1FV, (1HAA), (1RZ), 3BG, (3BZ), 3DS, 3EN, 3FG, (3GX), (3HG), (3HJ), 3MK, 3OB, (3ZW), (3WV), NSF, 3BG, 3BU, (3BV), (3DA), (3DI), (3DV), (3EN), 3GY, 3HP, (3IK), 3JJ, 3ML, (3MT), (3NI), (3NO), 3OY, (3QM), 3RF, 3RW, (3SH), (3WY), (3XK), 3ZY, (3HR), 9ZN. (Second district stations too numerous.)

## QST'S DIRECTORY OF CALLS

**A**DOPTING the Department of Commerce's list of amateur stations as it standard, QST will publish each month the calls of new stations in each district commencing where the government book stops. To make this possible, amateurs are requested to report new or changed call letters to this office.

<b>FIRST DISTRICT</b>		
T. E. Norton	6 Bush St., Newport, R. I.	1EBA
Oscar A. Maynard	131 Massasoit St., Worcester, Mass.	1EBB
Laban Snow, Jr.	Harwichport, Mass.	1EBC
Sewell P. Wright	7 Oak Ave., Peaks Island, Me.	1EBD
G. M. Kaplan	75 Pearl St., Chelsea, Mass.	1EBE
Alfred J. Pote	18 Chestnut St., Chelsea, Mass.	1EBF
John F. Stack	36 Cottage St., Boston, Mass.	1EBG
L. H. Ciaburri	17 Jenney St., New Bedford, Mass.	1EBH
Nicholas R. Pratt	Main St., Hingham, Mass.	1EBI
Ed. F. Surette	Clematis Rd., Medford, Mass.	1EBJ
Douglas E. Dicey	Lyndeboro, N. H.	1EBK
Jos. A. Stevens	17 Ash St., Bar Harbor, Me.	1EBL
B. W. Bates	North Harwich, Mass.	1EBM
Worcester North Radio Ass'n	800 Water St., Fitchburg, Mass.	1EBN
John D. Babb	Elm St., Machias, Me.	1EBO
W. E. Courtois	125 Fourth St., Leominster, Mass.	1EBP
T. F. Kane	Front St., Marion, Mass.	1EBQ
Oscar S. Lucier	49 Hancock St., Salem, Mass.	1EBR
Wm. Bibby	15 Edison St., New Bedford, Mass.	1EBS
G. B. Davy	Main St., Hingham, Mass.	1EBT
L. S. Williams	13 Cherry St., Salem, Mass.	1EBU
Winthrop Crawford	60 Revere St., Bridgeport, Conn.	1EBV
R. J. Reid	302 Essex St., Salem, Mass.	1EBW
George T. Cheetham	42 Eighteenth St., Lowell, Mass.	1EBX
A. R. Rogowski	128 Prospect Ave., Shelton, Conn.	1EBY
Robert W. Lynch	148 Willow St., Lawrence, Mass.	1EBZ
Leslie M. Taylor	3 Riddell St., Greenfield, Mass.	1FBA
Elmer C. Hopfner	21 South Woodbine St., Hartford, Conn.	1FBB
Chas. H. Burnham	90 Court St., Machias, Me.	1FBC
Earl B. Ely	337 Windsor Ave., Hartford, Conn.	1FBD
David R. Dunigan	31 Tonawanda St., Dorchester, Mass.	1FBE
Levi G. Cushing	South Duxbury, Mass.	1FBF
Minton Cronkhite	North St., Greenwich, Conn.	1FBG
William L. Krause	6 Division St., Stamford, Conn.	1FBH
Frederick F. Spalding	Wilton, N. H.	1FBI
Albert Thebergo	223 Hampshire St., Lawrence, Mass.	1FBJ
Richard C. Barrett	195 Summer St., Bristol, Conn.	1FBK
Reginald R. Stebbins	46 Gilsam Rd., Keene, N. H.	1FBL
Raymond A. Colvin	33 St. Botolph St., Boston, Mass.	1FBM
Edward Gosselin	1073 South Water St., New Bedford, Mass.	1FBN
Phillips E. Strout	42 Garvan St., East Hartford, Conn.	1FBO
Arthur A. Bellavance	312 South First St., New Bedford, Mass.	1FBP
Rodney A. Merrill	31 Hayward St., Attleboro, Mass.	1FBQ
Fletcher King	1 Beach Rd., Gloucester, Mass.	1FBR
Frederick Buck, Jr.	Ft. Constitution, Portsmouth, N. H.	1FBS
Arthur L. Cummings	56 Pierce Ave., Houlton, Me.	1FBT
Harry F. Holland	100 Danforth St., Taunton, Mass.	1FBV
Fred A. Ficus	Quissett Ave., Woods Hole, Mass.	1FBW
Leon E. Randall	72 Beaver St., Keene, N. H.	1FBX
Edward N. Dingley	1151 Washington Ave., South Braintree, Mass.	1FBY
John F. Williams	113 Leighton St., Bangor, Me.	1FBZ
George L. Langreth	18 Garvan St., East Hartford, Conn.	1XQ
International Radio Tel. Co.	Rockland, Me.	1XR
International Radio Tel. Co.	Belfast, Me.	1XV
C. D. Tuska Co.	Hartford, Conn.	1YS
Mass. Radio & Telegraph School	Boston, Mass.	

<b>THIRD DISTRICT</b>		
Pennsylvania-Marconi Wireless School, Philadelphia, Pa.		3YF
Pohn V. Purcell	Bethesda, Md.	3ZF
Roy C. Corderman	Hagerstown, Md.	3ZI
Chas. H. Stewart	St. David's, Pa.	3ZS

<b>FOURTH DISTRICT</b>		
B. W. Benning	50 Whitford Ave., Atlanta, Ga., (Ex. 4BZ)	4XC
F. M. Laxton	Mecklenburg, N. C. (near Charlotte)	4XD

<b>FIFTH DISTRICT</b>		
Wm. C. Finlay	Troy, Ala.	5IA
Knights of Columbus	New Orleans, La.	5YJ
Edgar A. Sahn	New Braunfels, Tex.	5YK
Frank B. Beuhler	Alexandria, La.	5ZD
Henry M. Harris	Box 427, Waco, Tex.	5ZF

## SIXTH DISTRICT

P. F. Johnson	2940 Maiden Lane, Alitadena, Cal.	6ABA
Edw. Prosek	1085 Church St., San Francisco	6ABB
A. K. Aster	910 Chestnut St., Alameda, Cal.	6ABC
R. C. Thom	2625 53d St., Los Angeles, Cal.	6ABD
W. R. Dodson	924 A Ave., National City, Cal.	6ABE
C. S. Smith	3512 Parl Blvd., Oakland, Cal.	6ABF
J. E. Hopkinson	309 S. Flower St., Los Angeles, Cal.	6ABG
G. K. Spencer	1324 Weber St., Alameda, Cal.	6ABH
C. E. Cosgrove	716 E 22nd St., Oakland, Cal.	6ABI
E. R. Sharpe	Martinez, Cal.	6ABJ
G. Fensky	689 62nd St., Oakland, Cal.	6ABK
E. C. Reynolds	Paso Robles, Cal.	6ABL
S. March	98 Wilkes Circle, Santa Cruz, Cal.	6ABM
R. C. Saunders	1528 Cambria St., Los Angeles, Cal.	6ABN
E. E. Smith	537 N. Greenleaf Ave., Whittier, Cal.	6ABO
R. C. Anderson	1919 Lime Ave., Long Beach, Cal.	6ABP
C. Schneider	76 Caselli Ave., San Francisco, Cal.	6ABQ
S. Inselman	57 Douglas St., San Francisco, Cal.	6ABR
N. Ashima	1474 Nuuanu St., Honolulu T.H.	6ABS
J. D. Shea	5158 Birch St., Oakland, Cal.	6ABT
A. Stokes	2812 35th Ave., Oakland, Cal.	6ABU
E. J. Conroy	3850 Penniman Ave., Oakland, Cal.	6ABV
W. B. Donnewith	1235 Weber St., Sacramento, Cal.	6ABW
W. Huston	Woodland, Cal.	6ABX
G. S. Clark	127 N. H. St., Imperial, Cal.	6ABY
F. S. Hannah	Puente, Cal.	6ABZ

## SEVENTH DISTRICT

E. L. Crawford	1340 Court St., Salem, Ore.	7JA
Fred H. Stephens	822 Halsey St., Portland, Ore.	7JB
Keith Frazier	829 3rd Ave., Glasgow, Mont.	7JC
Francis McKee	Cambridge, Ida.	7JD
H. C. Boardman	112 West 5th St., Port Angeles, Wash.	7JE
Clude Anderson	5095 Washington St., Moscow, Idaho	7JF
H. R. Drinker	497 East 16th St. N., Portland, Ore.	7JG
J. D. Hertz	Route 3, Vancouver, Wash.	7JH
Albert McGuffin	346 First Ave. N., Glasgow, Mont.	7JI
Douglas Dix	Box 151, Gresham, Ore.	7JJ
Frank P. Bloss	792 East 34th St., Portland, Ore.	7JK
Waverly Miller	1704 East 14th Ave., Spokane, Wash.	7JL
O. R. Anderson	1114 East Market St., Portland, Ore.	7JM
Roy Rice	Wapanitia, Ore.	7JN
B. A. McMahan	5137 Willow St., Seattle, Wash.	7JO
P. W. Dann	Box 974, Astoria, Ore.	7JP
Theo. E. Olson	528 Market St., Portland, Ore.	7KR

## EIGHTH DISTRICT

(Following reissued calls; cancel assignments in Call Book.)

A. F. Krause & Co.	689 McDougall Ave., Detroit, Mich.	8CB
Harry J. Walsh	566 Beniteau Ave., Detroit, Mich.	8DX
Louis A. Weston	309 Lincoln Ave., Detroit, Mich.	8ER
Howard Bowman	431 Ashland Ave., Detroit, Mich.	8HH
Harry Terry	601 Paedena Ave., Detroit, Mich.	8LN
Alfred M. Martin	1327 Vermont Ave., Detroit, Mich.	8PM
Charles F. Hayek	3044 W. 44th St., Cleveland, Ohio	8PY
R. L. Osborne	547 McClellan Ave., Detroit, Mich.	8QY
R. M. Smith	139 McGraw Ave., Detroit, Mich.	8AFL
Robert Austin	38 Sterling Ave., Detroit, Mich.	8AHO
(Following are new calls.)		
Walter Holey	R. D. No. 3, Norwich, N. Y.	8AJA
Herbert M. Walleze	234 Vine St., Milton, Pa.	8AJB
Sherman R. Hawley	409 Prescott St., Toledo, Ohio	8AJC
Frank E. Holcomb	30 Burns St., Wyoming, Ohio	8AJD
Norman J. Bukey	430 S. Sandusky St., Delaware, Ohio	8AJE
A. C. Penfield	Conneautville, Ohio	8AJF
C. H. Kreighbaum	1256 E. 125th St., Cleveland, Ohio	8AJG
Warren Walker	Box 113, Marlette, Mich.	8AJH
Vern Harry Vance	R. R. No. 1 c/o Mrs. H. J. Britt, Bedford, Ohio	8AJI
Owen C. Thompson	3252 Kimball Ave., Toledo, Ohio	8AJJ
James A. Ulmer	208 S. Walnut St., Bucyrus, Ohio	8AJK
John D. Marsh	562 Mentor Ave., Painesville, Ohio	8AJL
Wilcox Laboratories	131 S. Fairview St., Lansing, Mich.	8XS
Cass Tech. High School	Detroit, Mich.	8YE
H. K. Dunn	Miami Univ., Oxford, Ohio	8YR
Chas. Candler	105 S. Ash St., St. Marys, Ohio	8ZL
Roy C. Ehrhardt	Dunmore, Pa.	8ZQ
C. C. Endley	Mansfield, Ohio	8ZR
Clyde E. Darr	137 Hill Ave., Highland Park, Detroit, Mich.	8ZZ
Tilden Tech. High School	Chicago, Ill.	9YE
Evanston High School	Evanston, Ill.	9YH
St. Louis University	St. Louis, Mo.	9YK
Armour Inst. of Technology	Chicago, Ill.	9YL
Culver Military Academy	Culver, Ind.	9YQ

## NINTH DISTRICT



### HONEYCOMB COILS

Providence, R. I.

Editor, QST:

Since honeycomb coils have been on the market some little time and have not suffered for want of advertising it seems safe to assume that at least some amateurs have tried them out, yet few amateurs have contributed any information on them based on personal experience. True, we have Mr. Groves' very interesting articles, but how many amateurs attain his skill or obtain such fortunate results? To hear Europe and Hawaii on "even the smallest aerial" and to copy Europe with no aerial at all and with only one bulb—well, if the chap next door dropped in and said he had just done it we all know what we'd say; but of course Mr. Groves is not the dub next door. So upon reading Mr. Groves' article and having at hand some honeycomb coils and feeling at least mildly excited at an opportunity of hearing POZ, not to mention that little near-by island of Hawaii, with any old aerial and possibly with none, we proceeded to follow directions by setting the secondary condenser and "tuning the primary coil", etc. We did so with no little trepidation since the "click" so necessary to locate may sometimes "be likened to lightning striking a phone wire at a little distance while you are talking" and although we could only imagine how lightning would sound under such circumstances we had no hankering to make the "dream come true". So we prepared to duck, dodge, jump and call the ear doctor if that click materialized as described. Well, we turned that primary condenser around and by and by heard a slight noise and looked around to see who could have dropped a pin, but seeing no one nor any pin, we finally concluded it must have been the celebrated click of which we were in search. Patient adjustment and change of coils eventually made the click an actual one, but it never reached the lightning stage nor ever promised to. Probably that is why we didn't hear all those European stations, let alone copy any of them. If we were only a Rockefeller or Morganbilt or even a little war-time profiteer we might import some one of Mr. Groves talent to tune our honeycombs for us, but our ambition being

bigger than our pocketbook we could only think of writing the makers of the coils requesting an exchange for a set like Mr. Groves. However, diligent search of their catalog revealed no claim that honeycomb coils would land European stations without any aerial, so we hesitated to put it up to them. And so we are right back where we started from which is pretty discouraging, especially as we shall doubtless read in the next QST that Mr. Groves has copied Mars and all on a single VT.

So by way of consolation we hope some one of less talent than Mr. Groves and whose grey matter is a trifle less grey will tell us what he has accomplished with honeycombs and how he did it—some one whose ears still feel the need of an aerial, however insignificant.

Meanwhile we venture to outline briefly our own limited experience with these coils and to mention a few troubles encountered en route. First as to the coils themselves. We soon found that there was a lack of uniformity in size both as to plugs and sockets so that one coil would slip on hard and another too easy, and although some margin of difference is doubtless necessary where anything is manufactured in quantities we think the margin allowed in the present case over-large, especially in the case of the sockets, since if a plug is spread or split enough to fit a large socket it is often impossible to slip another coil on to the mounting at all. However, the majority of coils were fortunately not so bad and could be interchanged without much difficulty. The next thing we noticed was that the straps about the coils which held them to the mounting plug often became loose and in some cases needed frequent attention and tightening. This was more or less of a bother.

However, these were minor troubles to what developed during the "dog-days" when heat and humidity raced for the championship. We first noticed that the coils were covered with beads of moisture, especially on the straps, and attempting to wipe these off we found the moisture to be somewhat sticky, so that all the coils had to be gone over carefully ere they could be used with any comfort. On a succeeding day we found the moisture collected again, but in such quantities as to have dripped from the coils upon the

apparatus beneath. So we cleaned up again and put the coils away, temporarily awaiting better weather. Upon digging them out again they had to be cleaned anew. Incidentally what effect such a collection of moisture had upon the capacity we won't venture to say. However, we are still using this type of inductance since it possesses certain manifest advantages in the way of compactness, etc., especially for long waves, and we do not wish to detract from its merits in the least.

Second as to circuits. Being more of a novice than an amateur we hesitate to say much regarding circuits and results, lest we betray our novitiate too badly. But as "he who hesitates is lost" we push on. After suffering the usual vicissitudes of fortune (perhaps more truthfully the calamities of ignorance, to which any novice is heir), we at length, with the aid of a more experienced friend, tried out the single coil damped and undamped circuit as shown by the makers of the coils, also the three coil tickler circuit, and the tuned plate circuit as we understand it. With the first circuit good results were had with undamped waves but the spark stations were disappointing. The three coil tickler circuit gave good results on long waves but we fancy was not particularly efficient on anything less than "time" or NAA. We also found that the short waves required a proportionally larger tickler coil than the undamped and that the condition and adjustment of the "B" battery was also more vital. A 750 coil would "tickle" with 1500 in the secondary but 75 would not always work well with 100, and with 50 in the secondary we had to put 75 in the tickler. All in all we are inclined to think that for spark signals the old loose coupler is hard to beat, although no doubt within their limited range the Paragon and Grebe sets are the thing. In the not too distant future we hope to try out Mr. Groves single layer coils for short waves and although we have met but with scant or indifferent success using the tuned plate circuit it will doubtless be our own fault if we do not secure better results with his coils.

As for working without an aerial, etc., we have heard WSO, only about 35 miles away, without aerial or ground or any primary coil at all, and even without opening a window as a layman suggested. But it wasn't loud enough to frighten us or encourage the belief that we could hear much else with a like handicap. Adding ground connection and primary coil but no aerial, increased the signal strength appreciably.

Incidentally we think one of the chief advantages of the honeycomb and like inductances is the relative cheapness for the

great range covered. We might almost say that all wave lengths can be covered for a sum that most of us can "beg, borrow or steal", as the saying goes and as our professional instinct may best prompt.

Yours truly,  
A. Novice.

#### CAN ANYONE HELP?

Scranton, Pennsylvania,  
802 Woodlawn St.

Dear Mr. Warner:

During the last few meetings of the Electric City Radio Club, several of the members, in fact nearly all of them, have reported a very bad interference on wave lengths of from 200 to 600 meters. It is a harsh rasping noise sounding somewhat like a cross between a quenched gap that doesn't quench and a high tension leak. It started about three weeks ago and sounded about like a spark with a frequency of 325 per minute. It has since grown more steady and much worse.

Mr. Dawson, one of the men higher up in the Scranton Electric Company, has cooperated with us in trying to find it, but we have made no progress as yet.

At our club meeting last night, it was reported that the same condition was in existence at Wilkes Barre, a town about 20 miles away. The interference quite effectually stops signals on amateur wave lengths, except in the very few stations that don't get it. If it is atmospheric, why should it have such a definite range of wave lengths, yet if it is not, why does it cover so much territory?

Possibly you have had a similar interference or have heard of it, and anything you can tell us about getting around it will be greatly appreciated. Also, do other parts of the country have this same trouble at this time?

Thanking you for past favors, and hoping you can throw some light on our trouble, I am

Yours very truly,  
P. D. McFarland.

#### DESCRIPTION OF A C.W. SET

116 Polk St., Napa, Cal.

Editor, QST—

I have followed the C.W. Articles in your magazine for the past few months with a great deal of interest and consider your magazine as a whole of such high standard among radio magazines that I have already sent in my subscription.

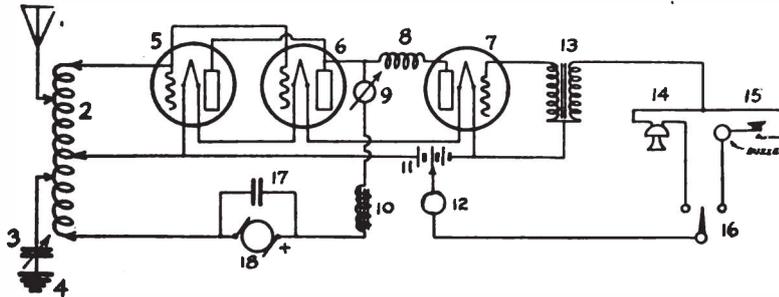
I have been experimenting with CW during the past three months and have reduced my set to one of extreme simplicity and efficiency. Using two 5-watt tubes in parallel and radiating 1.2 amps, I have several times worked 7ZI, 7CU and 6JD,

all three between 500 and 600 miles distant. All stations receive me with very good audibility and without the usual repeats experienced with spark transmission. Also fading is unknown. This work has been done with an antenna of three wires spaced 4 ft. apart with an overall length of 90 ft. and 35 ft. high. I am a firm believer in the future of CW on 200 meters, the great drawback being the difficulty experienced in calling, due to the extreme

approximately 3 turns in grid coil and 5 turns in plate coil are used.

In closing I wish to state that I am not located in San Diego as shown in the call book, but at Napa, Cal. This is for the benefit of those who have heard me and who sent cards to San Diego instead of to the correct address.

Yours very truly,  
J. J. Mahler, Jr.



sharpness of the emitted wave and the unwillingness on the part of the average amateur to use an oscillating audion.

To use the above set with buzzer or voice modulation, a third modulator tube and transformer are used. There follows below a diagram of my circuits, together with specifications for the various pieces of apparatus.

- 1—Antenna, 35 ft. high, 3 wires spaced 4 ft., 90 ft. long
- 2—Inductance, total of 40 turns, 6 in. diam., spaced ¼ in. apart, bare No. 12 copper wire
- 3—Variable condenser, approx. .0015 mfd.
- 4—Ground
- 5-6—5 watt power tubes, plates and grids in parallel
- 7—Modulator tube, 5 watt.
- 8—Air-core choke, 500 turns No. 28 wire
- 9—Milliammeter, 0-150
- 10—Iron core choke, 1200 turns No. 24 wire
- 11—24-volt storage battery, tapped for 6 volts for transmitter and buzzer
- 12—10-ohm rheostat
- 13—Modulation transformer
- 14-15—Telephone transmitter, buzzer and key
- 16—S.P.D.T. Switch
- 17—2-mfd. condenser
- 18—300-volt generator

In tuning the above set the antenna and ground must be connected at all times, as these form the oscillating circuit. The number of turns between the antenna and ground clips will vary according to the natural wave length of antenna but should be adjusted so as to include turns in both grid and plate circuits. For 200 meters

(Editor's Note—This is an interesting set but we wish to point out a probable improvement. It is not possible to properly modulate the output of two tubes by the use of one similar tube as a modulator. The principle of this system (known as the Heising constant-current method) is that when the microphone is idle, there shall be an even distribution of power between oscillator and modulator. This will obviously require an additional modulator. In practice, however, losses in the modulator are so much greater than in the oscillator that often we see sets with three modulators to modulate the output of two oscillators. The modulated range of this set would doubtless be increased thru the addition of another modulator in parallel to the one now used.)

THE LEGAL DEPARTMENT

Milwaukee, Wisconsin.

Editor, QST—

In reference to a communication by Mr. W. H. Kirwan, in the November QST, proposing a legal department assisting QST and its advertisers in patent matters, it may be profitable to consider a solution of the problem arrived at in a large American industry, where a condition prevailed at one time similar to that existing now among manufacturers of radio apparatus, which, as Mr. Kirwan intimates, is resulting most unfavorably to purchasing amateurs.

A number of manufacturers organized an association employing co-operative patent counsel who render service as suggested by Mr. Kirwan. A patentee charging infringement or demanding royalty of a member of this association is referred to the association counsel who

investigate the merits of his claims. If favorable a license is arranged which is extended to all members of the association who feel warranted in accepting it. A low royalty is quite acceptable to the patentee because of the large number of licensees. (The royalty is so low, in fact, that some members accept the license without any investigation as to infringement).

If the patentee is thought not entitled to make any demands the manufacturer is reliably informed of the fact and continues operations without fear of interruption.

Patents held by members are automatically licensed to all other members. This provision precludes any possibility of litigation between members. It would seem that this would operate to discourage individual effort in filing patent applications, but is not so among broadminded manufacturers, as evinced by numerous patents granted to them.

Complete files of all copies of patents which would be likely to interest the art are maintained and kept up-to-date, also literature relating to the art.

These facts are submitted as exemplifying methods employed in another art with good results. Though all the provisions indicated here may not be applicable to the present situation in the radio art, it is thought that they will offer suggestions to manufacturers.

Respectfully,  
C. L. Waal.

#### QUICK, GESCHNELL— THE RETTYSNITCH!

Dere Eddy:

Here ban a gude one I tink. Coplanites ago Im heerin OM 9ZL open up an giv msg for Duluth to 9ZC who ban 150 mebbly 200 mile farder beyon odder side way up on top of Minn. Den I place my ear close to ze brightly burning lanterns and listen intent for "BQ" who will get a liscence when he is sure he can copy ten words. All of a suddeness ze plate slips on its charcoalistic curve and spill over and make ze grid leak an ze bottle flicker like so many Aroaring Borneos in ze sky. By gar I ban Bumfozzeled. Den ze bright idee strike me. With my hanker, queek as flash, I wipe up ze damped waves that spilled over and proceed to read ze sigs by ze flickerings of ze lamp. I make out that 9JN alias Stenerson way down in Iowa is warking fren "BQ". Den by gar Im tink ZC get mad cause he dont hear BQ so he flip coin to see which foot he shall send with sos to call Stene. JN tell ZC "GA OM AYE TANK AYE QSR FOR U QSO BQ QRK QSA QRM QRN BUT QRK QRS QSZ QRV GA (etc) KKKK." Here come ze gude part OM. Stene takes msg an cant raise BQ again so vat u tink

he gives ze msg to 9ZL to QSR. Ouch!

Sa what ze traffic regulations say about ze number of times a station can take ze same msg? Some fine day I read on cover of QST, "9ZL HANDLES 6294 MSGS!" which is all bunk. Well Eddy, Im tink I taik lots time now but I like to ask your Traffic Menagerie about dis har law.

Yourn,  
R. E. Peat, Radio QTA.

#### BAD AMPLIFYING TRANSFORMERS

Room 1320 Republic Bldg.,  
Chicago, Ill.  
Nov. 12, 1920.

Editor, QST—

In regard your article under "Strays" on page 45 of Nov. QST about amplifying transformers going dead. Tell the boys in Houston that it is a factory fault and not theirs. It is due to the using of an acid flux in soldering the leads of the coils of the transformers. There has been considerable trouble in this respect. I personally had two go dead on me. I returned them to the factory who made good.

They evidently got a bad lot down that way.

Trust this will help them out.

Sincerely,  
Robt. J. Ritchie, 9ARN.

#### APPROPRIATION NEEDED

New Orleans, La.,  
Nov. 12-20.

Editor, QST—

Mr. E. T. Jones' suggestion in November QST for a female "Radio Stenographer" is an excellent one, and no one who has not seen Mr. Jones trying to dictate a radio letter to some fair, gum-chewing damsel will ever know what prompted said E. T. J. to make his thoughts public. But talking from a purely selfish amateur standpoint, do we not need more assistant radio inspectors at present than radio stenographers? Would not QRM and unlicensed "hamming" be reduced with proper radio inspection?

The reason we have not proper inspection is the same reason why E. T. J. cannot get a female helper versed in radio, and every inspector in the country will tell you that it is, "No appropriation from the government". It seems as tho it must take a special act of Congress, or an amendment to the Constitution, to get help for the radio inspectors. The inspectors themselves very often have to get help (of another kind) in order to live, thru interesting themselves in some radio school,—and still the letters continue to roll into Washington, saying, "SOS, immediately, or this district goes to pieces", and surer than an echo, the answer comes back from those in the Capitol City,

"There are no appropriations". Ye Gods! where is the Old Man, and his "Wouff Hong".

Sincerely,

H. P. Roberts.

(It is a sad fact that the appropriation for the Radio Service of the Bureau of Navigation has in the past been cut to a figure where their activity has had to be curtailed to a minimum. If any of our readers have friends on the Appropriation Committee they could do Amateur Radio a good turn by urging that the Radio Service be given sufficient funds to carry on its work efficiently.—Editor.)

#### THE PRICE OF EQUIPMENT

Brooklyn, New York,  
November 16th, 1920.

Editor, QST—

The A.R.R.L. being an organization of, by and for the amateurs, does it not behoove us to protest collectively against the high, and generally increasing prices of raw materials and completed apparatus? It can be readily ascertained that the number of radio concerns making upwards of 300% is legion. Where do we, upon whom they depend for their market, get off? When one considers that even paying retail prices for raw materials, and allowing liberal compensation for time, instruments may be constructed about one quarter of the usual market price, it looks as though something is wrong. A large number of one-horse concerns, offering mediocre apparatus, are making money hand over fist. How do they do it? Not by quantity production nor quality apparatus, but, seemingly, by concerted gypping.

Drastic price reductions have been made in a good many other lines and it is about time the radio people followed suit. Slackening public demand was the prime factor in lowering prices—prices tumbled because the public did not buy. If we withhold our purchases for a time, radio prices should drop to a reasonable figure and the mushroom profiteers would drop out, leaving the field to the reliable manufacturers who deserve our support.

Would like to see expressions of opinion from both buyers and sellers.

Yours,

Albert R. Heydon,  
Fred C. W. Thiede.

#### CALLS HEARD AT SEA

S. S. Lake Forsby,  
Houston, Texas, Nov. 16th.

Editor, QST—

Just was reading Mr. Braidwood's letter in the November QST concerning commercial operators listening down on short waves, and it has reminded me of the fact

that last trip I have been copying some amateurs on short waves after PX.

Going from Phila. to Houston, Texas, the station which showed up the best was 2RK, he being QSA every night until 100 miles east of Galveston. 3DH was copied down as far as Key West, and at that time he was chewing the rag with 2RK about the election. NSF telephone was heard when in the Gulf, working 5YH, but he faded very badly. The receiving set consisted of short wave Navy tuner type SE-148 and two step amplifier. I think I could hear 2RK over in England if I had my Paragon along with me, as this Navy tuner is not very efficient on short waves.

Below is a list of stations copied between Oct. 30th and Nov. 8th, from Hatteras to Galveston Bar.

1AW, 1HAA, 2JZ, 2RK, 2AAV, 2EL, 2ZL, 2AJW, 3GO, 3BZ, 3VV, 3HJ, 3OB, 3HX, 3UQ, 3LG, 3AS, 3BA, 3PM, 3DH, 3SX, 3HG, 3EH, 4DW, 4YB, 4BY, 4AG, 4BQ, 4XC, 5AO, 5ZC, 5CD, 5HA, 5ZW, 5YH, 5ZP, 5ZZ, 5ZL, 5DA, 5XA, 6ZN, 8ER, 8ZY, 8ZX, 8DJ, 8AY, 8CB, 8NI, 8ACF (QSA 220 miles south NAT), 8ZD, 8JU, 8SH, 8XK, 8QM, 8QJ, 8ZL, 8HT, 8MT, 9GN, 9LR, 9ACN, 9AIQ, 9UU, 9AEG, 9AEB, 9BW, 9ZJ, 9HM, 9EL, 9ZV, 9VA, 9QJ, 9RU, 9ZL, 9OE, 9KV, 9AAC, 9CQ.

Anybody hearing the signals of 3EV, will they please let me know. I only work 3EV when home in Phila. and would be thankful if anybody over 500 miles would drop me a postal.

Sincerely,

M. H. Mandelkern, (3EV)

#### 2RK PARTNERSHIP

Brooklyn, N. Y.,  
Nov. 13th, 1920.

Editor, QST—

We beg to announce in your next issue of QST that stations 2RK and 2RV have been combined. The station call will be 2RK.

Mr. J. K. Hewitt and myself will operate the station. Arrangements are being made to find another good man, so a continuous watch may be kept. Our signs will be "KH" and "RV", respectively.

Yours truly,

James V. Candido.

#### A SUGGESTION ON QRM.

531 River St.,  
Hoboken, N. J.

Editor, QST—

In New York recently the representatives of several Radio Amateur Clubs met to discuss elimination of interference in the Radio Amateur field. Many plans were discussed. The point of all of them was the arrangement of a schedule to regulate traffic to local distance points. There are many things to recommend this plan. The principal drawback, however, is that a complete organization is required to perfect the system.

(Continued on page 64)



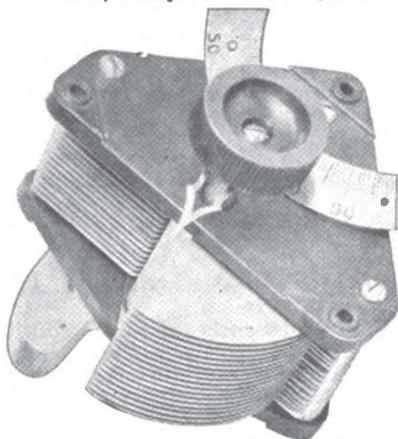
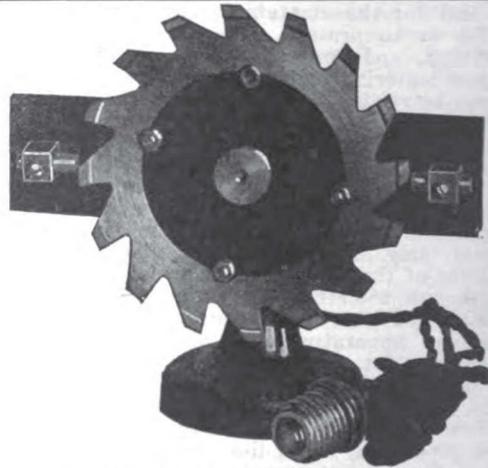
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FOR CHRISTMAS**  
SHOW THEM THIS AD  
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**ROTARY GAP NO. YM-1**

A new development in the rotary line has been made expressly for Young & McCombs. Improvements on the well known saw tooth rotary wheel make this gap the equal in tone and efficiency to any selling for twice the money. It is the only gap on the market which will run smoothly and reliably in either a horizontal or vertical position. Can be run in a vertical position while screwed to the wall. Rotor is machined cast aluminum with formica center. Has liberal sparking space and is drilled for either 1/4 or 3/8 shaft. Variable motor speed switch in base.

Price, complete - - \$16.00



**PANEL MOUNT CONDENSERS  
CAT. NO. YM-10**

The condenser here illustrated, is, at the price quoted, the best panel mount variable now obtainable by the amateur trade. It is a 43-plate condenser, of sufficient capacity, for use in either primary or secondary circuits. A handsome nickeled scale and pointer, with large rubber knob, is supplied with each condenser. The rigid and rugged construction is an outstanding feature.

Price - - - \$4.50

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## THE "BIG MIDGET"

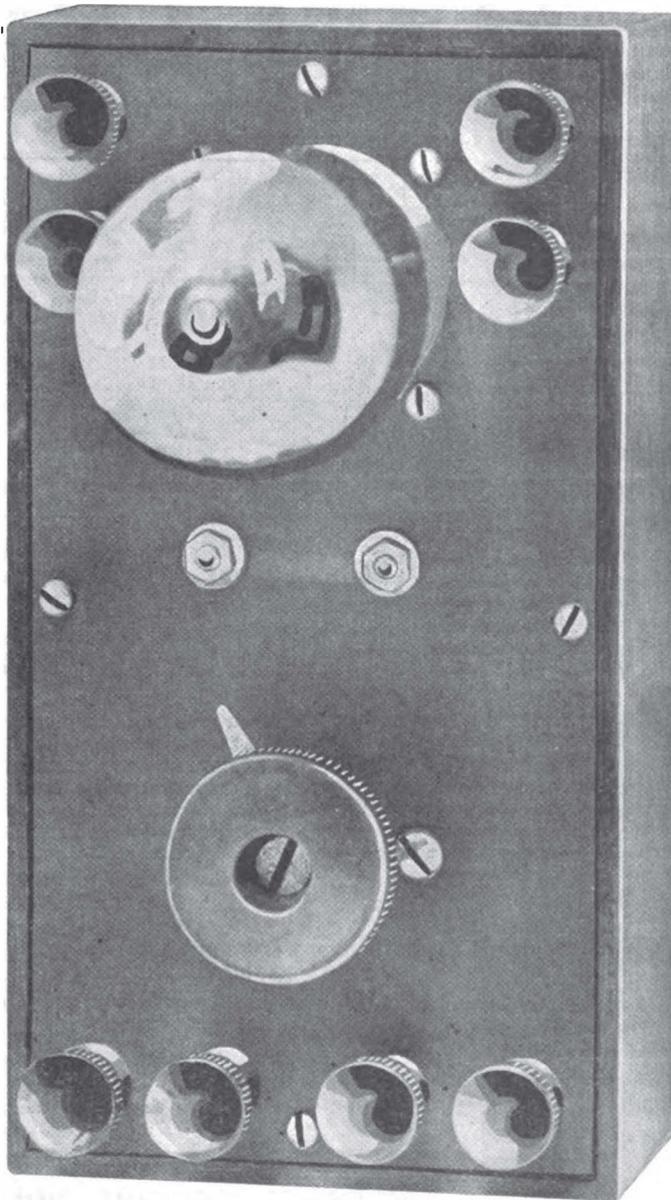
Vacuum Valve Detector Cabinet—Cat. No. YM-8

Actual Size

ined .....\$4.50  
 and ..... 2.50  
 In- ..... .40  
 neck ..... 2.75  
 fying ..... 5.00  
 sible ..... 1.75  
 Con- ..... 1.30  
 Con- ..... .30  
 mpli-mer . 4.50  
 attery ..... .36  
 row ..... .65  
 row ..... .40  
 row ..... .60  
 VT ..... 1.50  
 Ohm. .... 3.00  
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 Por- ..... .50  
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 y Gap ..... 2.00  
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 eled ..... .04  
 Binding ..... .05  
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 d Leak. .75  
 er Key ..... .20  
 umb ..... .10  
 lephone ..... 1.20  
 lephone ..... 1.20  
 ronse ..... .72  
 ed Grid ..... 1.00  
 itch Arm ..... .60  
 oval End ..... 2.00  
 Wireless ..... 1.00

The "Big Midget" is the smallest audion cabinet, to our knowledge, which is now being offered on the market. All parts of this cabinet are of standard type, and assembled to make up the ideal audion for amateur use. The illustration herewith shows the instrument in its actual size. The cabinet has a depth of two and one-half inches. Finished in "Early English" quarter-sawed oak, it presents an appearance that will make a welcome addition to any station. It is furnished without "B" or "A" battery, and any of the modern type bulbs may be used. It includes a rheostat of the smoothest running quality obtainable, a fixed mica condenser, a variable grid leak, standard VT socket, hard rubber binding posts, oak cabinet, and grained bakelite panel.

**\$12.50**  
 Without bulb or "A" and "B" battery.



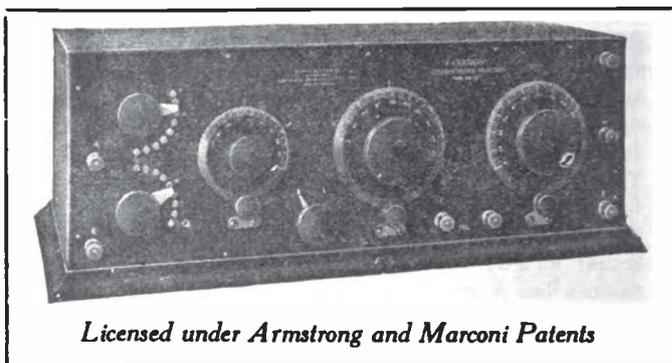
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**T**ESTS show that it is 24% more sensitive and selective than even the Paragon R. A. 6. It embodies the most advanced standards of Radio engineering in every detail, but a few of the outstanding features are:

Wave length, 160 to 1000 meters.	Vernier attachments on all controls.
Amplification, 100 times.	Change of spark tone eliminated.
No dead end losses whatever.	Cou-ling has scale of 180.

Guaranteed for two years.

**PRICE, EIGHTY-FIVE DOLLARS**

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**T**HOSE who demand the utmost effectiveness in their radio equipment, will not be satisfied with less than the Paragon R. A. Ten. It is as far ahead of the R. A. 6 as that was ahead of all the others.

Surely you will want to get a Paragon just as soon as you possibly can! For quick service use the coupon below. You don't need the coupon— it's just there for your convenience. Remit by check, Post Office Money Order, Cash, or any way you choose.

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PRINTING TO ADVERTISERS

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In the commercial field the same difficulty with interference is encountered to a far greater degree. At various times commercial companies have tried to arrange schedules by which interference would be eliminated. These schedules have met with varying degrees of success. At the present time a different method is being tried out. The new plan is taken from the Naval procedure.

The idea is based on a change of wave length. A designated wave is fixed on which all calling shall be done. Other wave lengths are arranged so that once having established communication, it is a simple matter to shift to a wave length on which there is no interference. Most of the transatlantic vessels are now equipped with 400, 600, 800, and 1800 meter waves for spark transmission and with 3000 meters for undamped work.

The amateur is limited to 200 meters. During the war the Navy used a wave of 52 meters for short distance work. Amateurs whose power did not exceed  $\frac{1}{4}$  K.W. could use 100 meters or less without a very appreciable decrease in range. They would then be free from jamming by higher powered amateur stations.

Each higher powered station should be carefully tuned to a slightly different wave under 200. It would not be difficult to have these waves published in the call books.

Under these circumstances a common calling wave would not be necessary. Shifting of sending waves requires a mechanically complicated hook-up. An amateur who did not know the exact wave of a station with whom he desired to work could easily arrange a "stand by" hook-up.

There are many minor points of this plan that would require adjustment. A special case could be arranged to care for C.W. apparatus. The help of government inspectors would be needed to regulate the wave lengths. They have already volunteered their aid to the representatives who met in New York. Wave meters would become an important part of every amateur's equipment.

But, on the whole, clear air would more than compensate for the work required to change to the new system.

F. B. Llewellyn.

#### RECTIFIERS FOR C.W.

2637 Garfield N.W.,  
Washington, D. C.

Editor, QST—

In regard to Mr. A. K. Ransom's note "D.C. for C.W. Tubes" on page 49 of November QST.

I would like to call attention to the fact that an X-ray machine with synchronous

disc rectifier usually jams nearby radio stations unmercifully, quite regardless of wave length, and in spite of the fact that there is no definite radiating system.

It is reasonable to suppose that part of the surges causing these effects could be eliminated by using contact brushes rather than spark points.

At best, however, the output of the disc is not D.C., but pulsating, and if used as delivered by the disc it will cause the note to be a heavy 60 cycle growl. Should true C.W. or voice or buzzer modulated transmission be desired, it will be necessary to design a smoothing-out system to operate at high voltage, tho having sufficiently large values of inductance and capacity to filter out a strong 60 cycle component. Such a filter is expensive. The system has promise, however.

Another suggestion. The small transformer-rectifier systems now for sale are of too limited power to be of much interest to most of us. Larger sets of the same type may be made if Kenotron (General Electric high voltage rectifier) tubes are used or if tubes just like those to be driven are used. In the second case the grids of the power tubes used as rectifiers are connected to the plates to prevent blocking by a "dead" grid. The transformer requires two secondary sections, each with about double the voltage required at the power tube since about half the drop is thru the rectifier tubes. Obviously this is an emergency device of low efficiency.

S. Kruse.

#### EDITORIALS

(Concluded from page 32)

ation, affiliated with the League, and this society is doing good work in untangling the situation. In Philadelphia we have the P.A.R.A., a strong and hustling organization, and we are sure that the report from the Bureau that unlicensed QRM resulted in an absolute zero score for their city in the October tests will awaken them to action which will clear up this blot on their 'scutcheon.

We suggest the appointment by each club of a strong Investigation Committee, charged with the duty of digging out these offenders. Wouff-Hong tactics should not be used at first, as without doubt many of these men do not know that they are violating a Federal law, and a spirit of friendly co-operation and assistance in enlightening them and helping them to secure licenses will result in more good stations, more members for the clubs, and the conversion of a dangerous situation into a local organization of which any club may be proud.

### THE OPERATING DEPARTMENT (Continued from page 42)

for a license and will use a 1 K.W. set on 300 meters. He reports: "Things are beginning to liven up in this part of the division in the last month. The following stations have been heard here and should make good relay stations: 9AEG, 9BW, 9LR, 9WU, 7EG, 7IM, 7CC, and 6OH; all of them very QSA."

"Mr. E. L. Wharton, 7EX, at Glasgow, has been appointed District Superintendent for Northern Montana. (According to a letter received, 7EX should be heard on around 300 meters)."

Mr. F. F. Gray, 7FL, President of the Puget Sound Radio Club, and District Superintendent for that locality is now on the job with a 1 K.W. Thordarson set, and will be on shortly with a 50 watt radio telephone and C.W. set.

Mr. Slauson, 7ZG, Bear Creak, has just completed rebuilding his new station.

Stanley, 7DJ, at Helena, is in a bad fix. He reports that the only stations outside of Helena that they have worked are at Great Falls. And that as far as they now, no stations have ever heard 7DJ or any other Helena stations with the exception of Great Falls stations, and once 7ZB. Sure in a tough "hole". D.M.)

#### Idaho

Jack Woodworth, 7CC, is doing excellent work at Moscow in keeping the Northern route open almost unaided at the present time. His spark roars in both east and west. He says: "Development along trunk line 'A' is not progressing as rapidly as could be expected, notwithstanding the fact that all messages have been going thru regularly. All east-bound messages handled by 7CC have been given direct to stations in the ninth district, and the majority of those to 9WU, at Ellendale, N. Dak. The distance is about 850 miles over some of the roughest country in the United States. While 9WU's signals have been copied here regularly QSA, the need of an intermediate station is easily apparent, for it will be an impossibility to clear 9WU every night. 7IM has not been heard here for several weeks."

"Boise has come to life. Two stations, 7YA, and 7GY have been worked QSA."

C. N. Teed, 7FT, Dist. Supt. for Southern Idaho reports there is good prospect of four relay stations in southern Idaho: 7YA, 7GY, 7FT, and the station of the Martin Bros. at Nampa. 7GY is using ¾ K.W., and the rest 1 K.W. During the past month receiving conditions have greatly improved.

#### Washington

Mason at Seattle reports that, "If it

wasn't for 7AD, we would be off of the map entirely. There is a lot of small town stuff going on here, and as it is easier to do than to work long distance, the majority of the fellows prefer the former.

"Very little relay traffic is being handled in or out of Seattle at present. As the situation now stands, 7AD is the only station here handling A.R.R.L. traffic. The route to Portland via 7YS does not seem to be working at it should. We would like to suggest here that some one try and persuade 7YS to come down to 200 meters for a calling wave, then shift to 375 meters for working, similar to the way 6ZK does. This would be a great help in working thru QRM, and still we would know when we are being called without having to listen on 375 meters. 7DA, 7ZI, and especially 7BP are all good here, but 7AD has trouble working them. 7IN comes roaring in, and takes traffic without trouble."

"7FV and 7FO, both of Everett, can be heard working six stations, but their signals seem to carry over our heads for they are always QRZ. No one else north of Seattle has been heard here during the past month."

"Quite a bit of local work is being done, and 7AS and 7IU, both of Seattle have succeeded in working 6FE. 7AD has put business thru to six stations quite regularly, and in this connection 6EJ should be recommended for his good receiving."

Miss 7CB, of Tacoma, reports: "7CE is doing all within his power to put Tacoma, and in fact the whole Northwest on the map. He says, 'we'll show those eastern 'birds' what we can do'. Messages may now be transmitted east from here in almost Western Union time and reliability."

"We are glad to hear the old familiar flat of 7CC again."

"At 7YS business has been picking up wonderfully. He reports having heard 9OE and 9LR, also having heard by both of these stations. 7YS has been assisting in conducting tests with the radio-phone stations at Camp Lewis."

7BQ, one of our eastern Washington stations in the 7CC district writes the following interesting information: "This station will broadcast the final reports on all athletic contests that take place at the Washington State College here. These notices will be sent in the form of QSTs at nine P.M. of the evening on which the contest takes place."

In Vancouver, station 7ZK is holding down the ether all by his lonesome. 7ZK is the latest addition to our list of specials. This makes the fourth and last special license to be granted in Portland and Vancouver, two adjoining cities. They are 7ZB, 7ZI, 7ZJ, 7ZK. All of these are LD stations of note. 7ZK will use 375 almost entirely. He also is tuned to 220, 270,

and 300 meters. 7CU is still rebuilding, as is 7BJ. They both claim that it takes a lot longer to rebuild a station than one would imagine.

#### Oregon

Getting down to the home state, we can say that fewer centralized stations are handling traffic than in a long time, the traffic still continues to move with little delay. In Portland 7ZI and 7BP are doing the greater part of the work, also 7BR. 7DA is laid up for repairs. 7DS reports that he is no longer in the game on the transmitting end until he can get a new location. The D.M.'s station 7ZB, has just been completed and will be on regularly. A new location has been secured.

Astoria has not been very active during the past month because of the fact that its lone station, 7JP, has been conducting some receiving experiments for the Naval Department on the site of the new Tongue Point Naval Base. 7JP reports: "Results with the sixes are satisfactory, but sigs to and from Portland fade badly. Stations on the Sound are seldom heard at all. Best results are only on very wet or rainy nights. Very few six stations fade here.

"Am getting the local radio organization started again, and before long we will have more stations here. Have a line on 7HD at Seaside, also a couple of stations at Warrenton."

7CW and 7IN at Silverton continue active, and together with 7BH at Salem, succeed in working thru south, also north.

7GQ at Eugene has a spark that carries well.

#### ONTARIO DIVISION

A. H. K. Russell, Mgr.

Relay work has started in the Ontario Division. The C.W. station of the Manager, using a few watts, has succeeded in establishing reliable day or night communication with 8ANJ, in Niagara Falls, N. Y. The first step toward establishing a through chain throughout Ontario has been achieved. The stations 3AB, 3CZ and 3BP are equipped with C.W. sets.

At present all messages for the Toronto district should be routed thru 8LB at Buffalo, or 8ANJ Niagara Falls, and for western Ontario to 3AA or 3DH at Windsor.

#### JOHN D. HERTZ

(Concluded from page 43)

management the Northwestern Division is becoming better every day. We know that the Northwest can be depended upon to give a good account of itself in the coming Transcontinental Tests.

#### HUBERT E. DE BEN

(Concluded from page 43)

the country. 5ZP is probably the best DX station in Louisiana at this time and handles the bulk of the traffic for Louisiana and Mississippi.

Mr. deBen was the first Secretary-Treasurer of the Nola Radio Club of New Orleans. Organization comes first in his mind, and, secondly, assistance to beginners. This has gone a long way towards making him one of the most popular amateurs in Louisiana.

## The Sacredness of Amateur Radio

By Francis Frazee Hamilton, E.E., 9ZJ, Director

**I**N the beginning of time when man first became conscious of himself and his surroundings there developed ideas that, if you injure me or mine, I have the right to do likewise to you. From a few simple rules, rules developed until the household was a lawful unit and what was possessed by one man was contained within that household. Possessions were guarded with knife and spear from all intruders; household against household. Finally the lord and master of his household was called to help guard his belongings and his loved ones from some intruding neighbor from a distant forest who was on a rampage for spoil. This condition gradually developed organized bands of households. As these grew and grew into greater and

greater human centers there became a time when the guarding of groups of households were cared for by groups of men elected or chosen for that purpose. In all probability these guards were chosen by the grouped households for their brave deeds or size of stature. The strong man of great visage and muscle was the chosen hero and was worshipped by all. Who has not studied of Goliath?

Now as time went on men became aware that after all a man that goes out and shoots his neighbor should be punished and the new order of things took place with the theory "live and let live". As man began to use that mass of matter known as his mind, the strong man was gradually subdued by reason from the mind of the weaker man, until mind and brawn became

contestants for the leadership of the newly constituted body known as the clan.

As the clans grew in size and number learning was taught to the younger and the mind once and for all became the leading factor in human progress.

Today the mind rules all things. We live by our minds, are fed by great organizations of men who transport our food from foreign lands, and our clothing may come from the other side of the globe. Our new policy of mind rule is that we rule ourselves. Just as in the clan the chieftan ruled his clan because he had been chosen to rule, so today we choose to be ruled and elect someone else to protect our rights that we might be content and happy to pursue whatever course our mind rules that we do. Or as we choose to put it today, "government by the people and for the people".

Our league can be favorably compared to a clan of men and young men, all citizens of these great United States, who are of a mind to do a thing that is honorable, upright, and a help to other citizens who are not of our mind.

Our league represents a great training school which ultimately is a frat school for the benefit, after all, of travel by sea. This travel becomes necessary because you and I choose to get some of our food from distant lands.

Radio telegraphy really has its greatest benefits to mankind in that man may be protected at sea by some sort of communication in order to safeguard life. On land man has little danger as compared to dangers at sea. It was many centuries before man's mind overcame the sea perils and allowed the discovery of our land, America.

In our league we have chosen seventeen men from our group for a two year period who form our Board of Direction. From this board we get our President, Secretary and Editor of our mind-organ QST. Now, QST is our mind, the mind of the whole league, and within its covers is contained the thoughts of the members of the league. This is necessary because our clan is scattered to all parts of this country and in order that you and I may know what each other think, QST is published for all and by all. Our Board of Direction is our lawful mind whereby rules and regulations may be made which are transmitted to each member's mind by QST.

What a fine thing is QST and the organization behind—the Board of Direction with its president and secretary, and behind all this comes thousands of active citizens, the best America has, bent upon a single purpose: the betterment of, first, myself, second, my neighbor, and, third, my country.

Wonderful, isn't it, that we citizens all

of this great land can have the privilege of exchanging our ideas one with another through God's eternal ether? Who else has this privilege? Ah, yes, many have. Men of a different mind than ours have come up who are contesting with us for our rights. Yes, men from a neighboring clan in the woods who are slipping out by night with great pillars of golden fire trying by their dazzling ire to quell our unselfish endeavors for the benefit of mankind in order that their coffers might be filled from the fat of the land.

Our unselfishness is underrated and their selfishness covered up by gold. Gold have we none but we offer our white hands as a sacrifice and they are clean.

Citizens and members of the A.R.R.L., I appeal to you to watch by day and by night and allow no man nor selfish clan of men to take from us that which is rightfully ours for our development both in mind and body which is gain for every man both selfish and unselfish.

Our citizen radio telegraphy, our experimentation, our message traffic, are sacred to us and by them we train ourselves for national emergency. Who asked our president for men at the beginning of the last great war? Why, the Government of the U.S. Did we supply them? Yes, all we had, and they proved to be of the best mettle, tried and true. If not for them my story would not have been written. Inform yourself of the past achievements of our members and the A.R.R.L., the one great patriotic clan of citizens who are ready any time to contest the rights of this great country against any that may attack.

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#### "STRAYS"

(Concluded from page 49)

WOULDN'T IT BE WONDERFUL—

If hens laid audions?

If QST wouldn't print such rubbish as this?—Ed.

If Geo. T. Head of Newton Centre, Mass., got a license?

If in the January QSS tests 5XA would do a little recording between CQ calls?

If Eddy could find a decimeter with a scale long enuf to find out how broad 8XU's wave is?

✓ If 2ZL found out what an awful lot of QRM a CW set can make if run continuously?

If a few phone sets came within hailing distance of the legal wave length?

If NSF would cut out relaying transatlantic stuff on our over-worked amateur wave lengths!

---

Gee, it must be great to live in the Northwest Division. The hams there get 2000 meters, or so page 30 of September QST says.

### WITH THE AFFILIATED CLUBS

(Concluded from page 45)

made by-laws, and elected officers, a board of directors and a finance committee. Everyone was some sort of an officer but that made no difference. After a few weeks, new members began coming in. The tiny room became inadequate to contain the members. At once a search for new club-rooms was started. An ideal spot was found at 19 Orleans Street. Within a month, an aerial was erected; before another had passed, a complete receiving set was installed and working. WSE, Seagate, N. Y. was the first station heard. Before getting into the big transmitting game, the club decided to see what other clubs were doing. Nothing loth, on August fifteenth, a delegation led by their instructor, Mr. Creaser, made a pilgrimage to Hartford, where they paid a visit to the station of Mr. Maxim (1AW). That settled it as far as getting into the game was concerned. An application for affiliation with the A.R.R.L. was dropped thru the mail-box of the QST office. There are now more than thirty members in the association and by the first of January, a complete 1 K.W. transmitter will be doing relay work, as every member will have a first class license by Christmas. Before next winter, a C.W. transmitter will be installed. Mr. Mix, Asst. Division Manager, ITS, said recently that he had been looking for something "live" in Springfield. How about it, Mr. Mix? Have you found it? We'll say you have.

At one of our recent meetings a class in code practice was copying from the Marconi-Victor records when Mr. Isaiah Creaser, the inspector, conceived the idea of using the phonograph in conjunction with the ordinary buzzer for code practice.

It has been in the past the practice of every member of the association to bring their head phones with them for code work. This practice has been eliminated by the use of the buzzer and reproducer of the phonograph. By placing the needle of the reproducer in a prick punch hole, upon the armature of the buzzer, the vibrations of the buzzer are greatly amplified. By making several prick punch holes in the armature, about  $\frac{1}{8}$  of an inch apart, different tones can be obtained.

Mr. Creaser has also tried placing the reproducer needle upon the diaphragm of the receiver for incoming signals, and the same idea has worked, and stations have been heard very loudly.

These ideas may be of interest to other associations. Try them.

#### Essex County Radio Assn.

This association has a paid membership ten times as large as a year ago and has

sections in almost every large city in the county. The County President and president of the Lynn Section, George H. Garvey, went to Lawrence and formed a section there with twenty eight members the first night; elected officers and voted to affiliate with the A.R.R.L. through the Essex County Association.

The Lynn Section holds meetings every week and is increasing its membership at every meeting. It has a bunch of real live wires for officers and about fifty five licensed stations. Traffic cannot be handled until very late at night and the QRM condition is the hardest problem for the section. A. V. Johnson has been appointed District Supt. of the A.R.R.L. and the section hopes to have his co-operation in regulating QRM. All messages for the county can be handled by 1DY, 1IS or 1SAS.

The Salem Section has secured a room for instruction and meeting two nights a week from the school department. This room will seat about 150 and is on the first floor of the administration building. Every station using a transmitter, whether a buzzer, spark coil or transformer, is now licensed in this section. Five transformer stations are ready to handle messages and a schedule will be arranged.

The Beverly Section has secured buzzer apparatus from the School department and with the co-operation of the Y.M.C.A. has arranged a schedule of instruction for the winter.

Gloucester and Haverhill are yet to get together and form their outline for the coming season.

The greatest asset the Essex County Association has is the hearty support of the Salem Evening News. The News has taken great interest in the association and, through publicity given to its events and its position of showing the value of the amateur radio men to its readers, has greatly aided the association.

### QRM & QRN REDUCTION

(Concluded from page 17)

nection with other energy gathering units; roughly, the use of many small contributing elements which provide for close tuning and little static absorption.

As to the concrete success of my system, it is hard to say anything as regards QRM that would indicate the circuit's selectivity, but I have been able to copy very faint signals through the transmission of a nearby powerful navy station—wave lengths not differing much either. As far as QRN goes—well I have copied messages that a navy station here could not get, sent at ten words a minute, each word repeated three times!