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THE AMERICAN RADIO RELAY LEAGUE, Inc.
HARTFORD, CONN.

THE AMERICAN RADIO RELAY LEAGUE

"A national non-commercial organization of radio amateurs, bonded for the more effective relaying of friendly messages between their stations, for legislative protection, and for scientific growth."

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QST
A Magazine Devoted Exclusively to Amateur Radio

Dangerous Legislation Confronts Us

THERE is at present lying inactive in the Senate Committee on Naval Affairs a bill introduced on March 8th last by Senator Poindexter, of the state of Washington, which is known as S-4038, and which represents another attempt at radio legislation on the part of the Navy Department. More than a year ago the Radio Sub-Committee of this committee held a hearing on the subject of a new radio bill, and at these hearings Messrs. F. H. Schnell, R. H. G. Mathews, C. D. Tuska, and K. B. Warner were present, as representatives of the A.R.R.L., on instructions from our Board of Direction. As the bill began to take shape, it was apparent that it was wholly un-American in many of its provisions and would provide us amateurs no assurance of continued operation. Our representatives, under instructions from our Board of Direction, got a hearing and formally protested against the iniquitous provisions of the bill, as did many of the commercial interests and others. Slight revisions in the bill were made as a result of the later hearings, but in its main provisions it was not changed at all. It has now been read twice in Committee and is ready for report.

In view of the fact that the International Communications Conference was to meet in Washington in October, and as the Poindexter Bill if passed would probably soon become obsolete by the action of this conference and the action of the next International Convention, and as the general sentiment seemed to be against the passage of the bill until the final radio policy was fixed by a new international convention, the Board of Direction of the A.R.R.L. were of the opinion that the Poindexter bill did not present a danger of such nature as would call for action on the part of the membership. That the provisions of this bill were iniquitous they were well aware, and on several occasions they were on the verge of bringing the matter before the membership, but refrained from any ill-timed action until such time as in their judgment the real danger might become more apparent. It has been thought that the Poindexter bill would die a natural and well-deserved death, but recently there has sprung up throughout the country an undercurrent of fear that the bill is about to be revived and put through with a rush during the short session of Congress which begins December 6th. Accordingly, Mr. Charles H. Stewart, our legislative representative, has again been in Washington, but he has not been able to unearth any tangible evidence of a plan to get action on the bill soon. We find that Navy men are quoted as saying the bill will go thru at this next session, and that many people who come into semi-official contact with radio matters are of the belief that the possibility exists of its being taken up then. Well we know that on its merits this bill can never become, law for it is un-American to the core, and the only way it could ever happen is that it be "railroaded" thru. There is the bare possibility that the advocates of this bill, knowing its hopelessness in a fair trial, have been lying low and greasing the way for getting quick action on it as soon as Congress opens. To the extent that this possibility can exist, the bill is a grave danger to us amateurs, and we feel that the time has come for us to get into action on it ourselves.

The Poindexter bill provides for the existence of eight classes of stations, and the several kinds of amateur stations are included. However, it does not in itself contain any technical regulations whatever regarding wave lengths, decrement, power, etc., as does the present law, but instead it provides for the formation of a "National Radio Commission" which shall be given authority to formulate and promulgate regulations for the operation of all classes of stations, and to change these regulations as they see fit—in fact, the bill reads that this Commission "shall have full power to regulate radio communication in the United States". It makes no provisions for hearing the claims of

interested classes of stations, and thruout is amazingly autocratic and contrary to the principles of American government. This will be understood when it is said that the bill, in the main, was got up by Naval officers who were abroad during the war and there acquired the "imperialistic" views of Europe on matters affecting communication. The Commission provided for in this bill would be composed of representatives from the Navy, War, Commerce, and Post Office Departments, but it also provides that the Secretary of the Commission shall be a Navy officer of the line, appointed by the Secretary of the Navy, thereby giving practical control of the Commission to the Navy Department. Thus at once it will be seen how militaristic this control can be. The Commission is further empowered to refuse a license to a station not already established at the time of the passage of the Act if the proposed station will interfere with the operation of existing stations or if such station "is not necessary for the good of the general public service." As the bill reads, this applies to amateur stations, without question. This grant of power is capable of being made the means of effectually preventing the entry of the generation now growing up into the privileges which we ourselves now enjoy as American citizens.

There are countless other objections to the bill, but just consider any of the above features. Such a Commission as provided for, controlled by the Navy and cherishing imperialistic and undemocratic ideas, could not be expected to be anything but hostile towards the amateur. In the twinkling of an eye they might announce that the amateur wave length should be two meters, the power one watt, the decrement .0001. They would be perfectly within their "rights", and we would have not one satisfactory avenue of appeal. The next day they might change our wave length to 200,000 meters and make all our "two meter" equipment worthless (—for we have no doubt that some of us would devise means for "reaching out" somewhere on even one watt!)

The un-American qualities of this bill reach a state of absolutely unqualified despotism. Probably no legislation was ever proposed in our country which would delegate such autocratic powers to a group of men. This National Radio Commission would have complete power over all classes of radio in this country, would be empowered to make any regulations that met its fancy, and none of the classes of citizen stations would have the opportunity of being heard on its own behalf. We fought the Revolutionary War for just that principle. By this proposed bill, amateur radio could be wiped off the map over night. This is a democratic country and we Americans expect to have laws that give us full and free hearings of our side of the story on all matters that affect our welfare. This bill does not give us a single guarantee of justice.

Such is the Poindexter Bill, S-4038. Now, fellows, let's get this bill definitely out of the way, whether or not an attempt is going to be made to railroad it thru this Congress. We want you to immediately write your Senators and Representatives telling them what this bill would do to you if passed, pointing out its brazenly autocratic provisions, and requesting them to vote against it in case it comes up for passage and to use their influence in every possible way against it. The following suggestion for a letter contains the facts that you should get before your Senator.

Senator ————————
Senate Office Building,
Washington, D. C.

Dear Sir:

Your attention is respectfully drawn to a very serious situation which confronts every American citizen interested in Amateur Wireless, and on which I, as one of your constituents, desire to be heard.

I refer to Senate Bill 4038, known as the Poindexter Bill. This bill gives into the hands of a Commission absolutely despotic power. It would enable this Commission to impose regulations which would banish Amateur Radio at a stroke of the pen, and all of this without the opportunity of being heard. The bill seems to entirely forget that it is utterly un-American to attempt to pass laws and regulations without giving the citizens an opportunity to be heard on their own behalf. It seems to forget that we amateurs number over 250,000 and that we spend upwards of five million dollars per year in the purchase of our equipment, and it would place our entire future as Radio Amateurs where we would have not one guarantee of our continued right to continue the pursuit of amateur wireless as American citizens, and would give us not one single chance to be heard on the matter ourselves.

I respectfully request that you vote against this bill if it comes up for passage, and that you use your influence in every possible way against it.

Yours truly,
(Signed).....

Do not leave this for the other fellow to do. Remember that it is only by each amateur making it his personal duty to write that the members of Congress may be informed of our opinion of the bill. The officers of the A.R.R.L. of course will

(Concluded on page 12)

Self-Rectifying C.W. Sets

WITHIN the past few months practical information has come to light on an entirely new idea in tube operation—their use on alternating current of whatever frequency is available, without rectifiers and without costly motor-generators, any desired voltage being obtained simply by stepping up with a transformer. This method still has its defects, and they are not inconsiderable, but QST feels that it definitely meets the motor-generator question and that the use of a.c. on the plates will promptly supersede the generator except in telephony and special cases. This is of the highest importance in the future of amateur C.W.—it removes the greatest single expense and will do much to popularize experimenting in this field.

There are two cases to be considered in the use of a.c.—the use of one half of the cycle (which is the case when but one oscillator is used), or the employment of both halves of the cycle (which requires double the number of oscillators).

I.C.W. with One Half of the Cycle

Station 8XK, as described in detail in QST for September, illustrates the first case, in which an audio current is impressed on the plate. The idea is shown in Fig. 1 This is not 8XK's oscillating circuit, instead being the Colpitts (which seems unquestionably the best circuit for all-around amateur work), but it conveys the idea. Imagine A to be a 500 cycle alternator, or even a source of 60-cycle current. The voltage is stepped up to whatever value is needed, by the transformer T. During the half cycle that the plate is positive, the amplitude of the output current is roughly proportional to the voltage, and it is zero for the succeeding

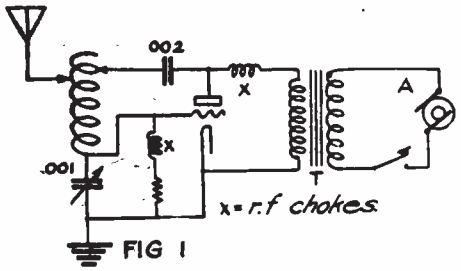


FIG 1

half cycle because of the valve action of the tube. It is herein that it does it own rectifying. Thus we have theoretically approximately sinusoidal modulation of the output, with the zero value obtaining during the half cycles that the plate is negative.

This idea is discussed at length and in practical fashion by Lewis M. Hull in the Bureau of Standards Scientific Paper No. 381, entitled "An Electron Tube Transmitter of Completely Modulated Waves." We would advise every interested amateur to obtain a copy of this paper, which may be done by sending five cents (no stamps) to the Superintendent of Documents, Government Printing Office, Washington. Mr. Hull describes such a set built at the Bureau, using one 250 watt P tube and a 500-cycle alternator. The Meissner circuit was chosen, with parallel power supply, and the filaments are also heated from the alternator supply. The construction of the set is described, but as it exceeds in power and wave lengths the sets we amateurs are interested in, it merely serves to give us an idea. However, some extremely valuable transmission and reception data for this kind of a transmitter are given. The general efficiency compares favorably with operation from a d.c. source. Being completely modulated, reception is possible with a non-oscillating detector, of course, and if such reception is desired the use of one side of the cycle as herein described will be found much superior to the use of both halves (as described below). The startling feature, however, is that by comparison with heterodyne reception this type of emission is not at all well suited to non-oscillating reception. With 5 amperes in a 50 foot aerial, signals with an audibility of 10,000 were received at 100 miles with an **autodyne** receptor and two-step amplifier, while the modulated note was received only over a limited range. It is true that the heterodyned note is not the clear flute-like note of straight CW, being rather "mushy", but is not at all bad, improves the signal-stray ratio, and very greatly increases the working range. Quoting this paper, on short waves "the voltage induced in a receiving antenna by a logarithmically modulated wave" (such as a spark set produces) "will give a response on the output side of the detector greater than that induced by a sinusoidally modulated wave train radiated from antennas in which the RMS antenna current is the same." The reason will be apparent by an inspection of Fig. 2 upon which are plotted **to the same scale** the envelopes of spark and sinusoidally modulated CW trains of the same antenna current and both operating at 500 cycles. Altho the logarithmically modulated train persists only about one twelfth as long as the sinusoidally modulated train, it rises to a peak value 13 times as great, which would undoubtedly

result in higher instantaneous values of voltage on the telephones in the case of the spark transmitter, as it is the **rate** at which energy is applied to the phone diaphragms that determines the response. Incidentally, this bears out the statements

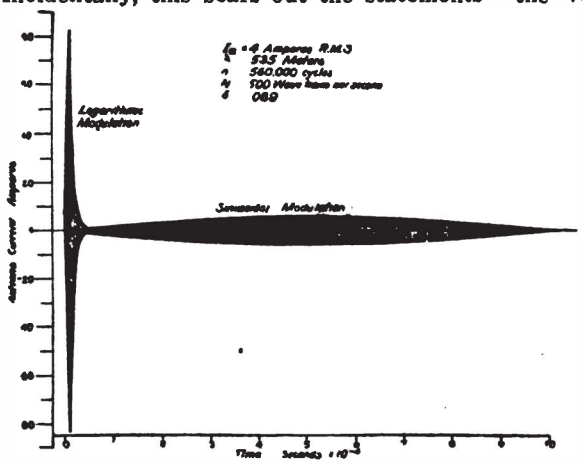


Fig. 2.

made in these colums by Mr. M. B. West anent the importance of adjusting the transmitter to a critical antenna voltage. We again point out, however, that such a sinusoidally modulated emission is well adapted for heterodyne reception and we repeat the statement in our November editorial that it is straight CW and not ICW to which we must now turn our attention.

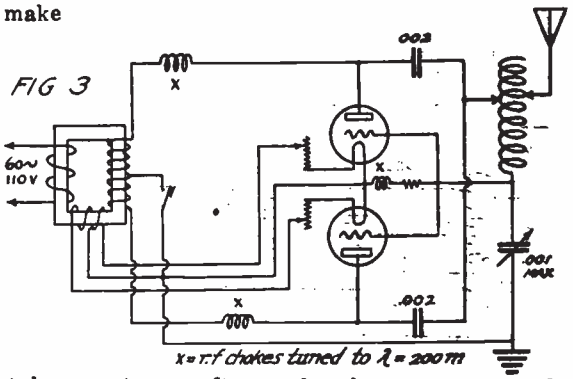
Both Halves of the Cycle

It will immediately occur to the reader that the use of another tube will make possible the utilization of the other half of the cycle and so double the output and greatly improve the characteristics for heterodyne reception. It will also double the note for audio reception, giving a 60 cycle note from 60 cycle supply whereas one tube alone will give but a 30 cycle note. If one is interested in modulated transmission the actual non-oscillating reception however, will be much more effective when but one tube is used, because the time interval between trains is not sufficient for the accumulated charge to leak off the grid even with but one tube, while in using both halves of the cycle the emitted energy is never quite modulated to a zero value. Such a 30 cycle note is not at all bad, being surprisingly staccato and never mushy in the least. The field for us amateurs, however, is in the use of both halves of the cycle and heterodyning it at the receiver.

All that is needed is a transformer having two secondaries, one for the high voltage for the plates and one of low voltage for lighting the filaments. The electrical dimensions will be governed by the voltages and currents necessary for the tubes used. For example, if a CW transformer of the type designed for use with rectifying tubes and a filter is available, it may be employed direct.

The two-tube circuit is shown in Fig. 3, where again the Editor presents the Colpitts circuit in the belief that it is better suited to 200 meter work on average aerials than any of the other circuits. This self-rectification scheme, however, can be used on any type of circuit and may be adapted to any arrangements of oscillating circuits that the experimenter may already have in operation. For example, Fig. 4 shows its use on the Hartley circuit, in which inductances L and L_1 may be helices or, to advantage, the outgrown spark set's pancake oscillation transformer, as in Fig. 5. It must be of low r.f. resistance and connected so the current flows in the same direction in both coils. The pancake O.T. if hinged will be very convenient in adjusting coupling. If considered too bulky, L may be a tube wound with No. 12 or larger wire, and L_1 a small tube revolving inside L and wound with about No. 28.

The circuit is really very simple and will be understood promptly. The tubes alternate in oscillating. Because a wave train will persist with the damping of the



antenna after each tube ceases to supply power to the antenna, the emission is continuous and never reaches zero by any means, so that for transmission to a non-oscillating detector one half of the cycle should be made blank. Using both and heterodyning, the note is "double", the 120 cycles still riding thru on the heterodyne, but not in displeasing fashion.

The condensers are merely for insulating and any capacity around .002 will serve, such as a Murdock moulded section or a homemade glass plate condenser. It should be able to withstand about 5000 volts. The chokes should be carefully made to have a low distributed capacity, and spaced turns of wire just sufficiently heavy to

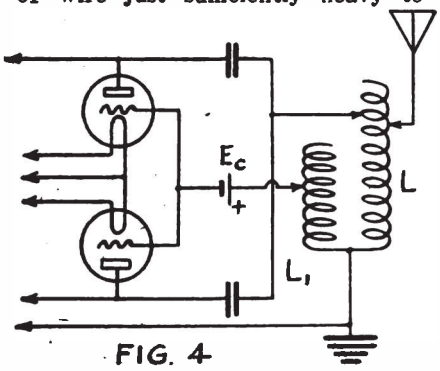


FIG. 4

carry the plate current, wound on an open frame instead of a tube, is suggested. The key is here shown in the h.t. lead, and so must be well insulated. If in the l.t supply it would interrupt the filament current also, which is unsatisfactory, but it may be so placed if a separate small transformer is used for the filaments. Or the key may be placed in the grid leak circuit. Both filament and h.t. windings are center-tapped so the circuit may be balanced, as with the old rectifying transformers.

For musical ICW we see no reason why this type of emission could not be chopped with a buzzer as we now do d.c.-operated sets. The abrupt break of the buzzer will give much better telephone response than modulated approaching the sinusoidal. It should also be possible to rig up two induction coils with good vibrators and a proper secondary voltage, each operating on 60 cycles thru step-down "toy" transformers. Two such coils are necessary because, it must be remembered, when the 60 cycle current reverses so will the apparently positive terminal of the induction coil secondary reverse. The potential should be all that the tubes will stand without breaking down, as it will be applied but a very short interval of time and so will not overheat. This seems the best possibility for obtaining a modulation envelope approaching the logarithmically damped spark envelope.

A 500-watt C.W. Transformer

The following specifications will serve as a guide for the construction of a transformer which will be sufficiently flexible to meet most experimental needs for a set of the type described, and will easily take care of as many as five 5-watt tubes on each side of the circuit.

General: A rectangular core carries three windings: a primary, a high voltage secondary, and a secondary for lighting the filaments.

Core: 1⅝" square cross section, of 29 ga. silicon steel, two legs 5.5" long, two legs 5 25" long, interlaced at corners. Wound ⅛" thick with Empire cloth or

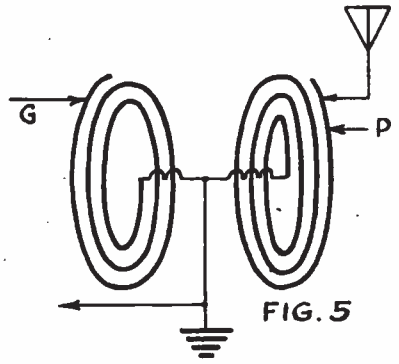


FIG. 5

Craft paper for winding insulation. Space figured for ⅛" fibre heads for all windings.

Primary: On one long leg, 268 turns of No. 15 D.C.C. wire, in 4⅓ layers of 62 turns each. This requires 360 ft., or 3.5 lbs. of wire. Designed for 60 cycle 110 volt input.

Filament Secondary: On one short leg, 38 turns of No. 11 D.C.C. wire, with center tap at 19th turn; in two layers of 19 turns each. Requires 25 ft. or 1.25 lbs. of wire. Each side of this winding is capable of delivering 12 amperes at 8 volts.

High Tension Secondary: On the second long leg, a total of 3046 turns of No. 24 enamel-covered wire in 18 layers of 170 turns each, with .003" paper between layers. Requires 2.75 lbs., or 2300 feet, of wire. Taps are brought out from the 351st, 703d, 1523d, 2343d, and 2695th turn. This secondary will deliver 650 volts between the center tap at the 1523d turn and each outside terminal; between the 1523d turn and the 351st and 2695th turn, 500 volts; between the 1523d turn and the 703d and 2343d turn, 350 volts;

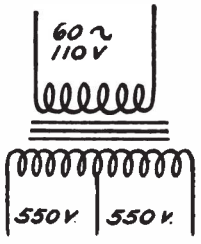


Fig. 6.

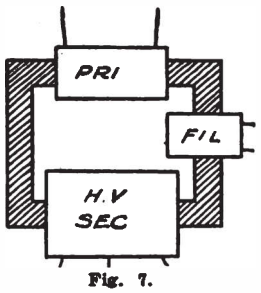


Fig. 7.

giving it output values suitable for almost any amateur purpose.

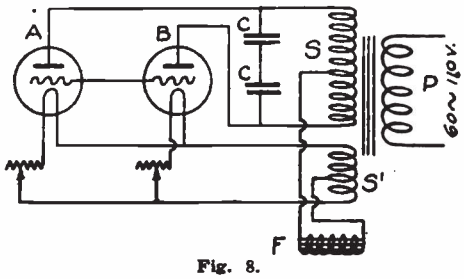


Fig. 8.

An A. C. Radiophone

Mr. J. G. Ruckelshaus, 2GF, Newark, N. J., very kindly describes to us experimental work he has done in this line resulting in a successful radio phone operating on a.c. without rectifiers, the high voltage being obtained from a step-up transformer as in Fig. 6. The arrangement of the windings is shown in Fig. 7: on a laminated core with a cross section of 17 sq. cms., wind 300 turns of No. 18 enameled wire for the primary; the secondary consists of 2400 turns of No. 32 d.c.c. with a tap at the 1200th turn; and the filament winding, on a short leg, has 22 turns of No. 14 enameled wire.

The high and low voltage circuits of the phone are shown in Fig. 8, where each end of the secondary goes to a plate, the center tap being connected to the center tap of the filament winding S' thru a choke coil M, of from 4 to 10 henries. With condensers C,C of 2 mfds., choke F is intended to form a filter for reducing the 60 cycle hum. The center taps of the two secondary windings serve as negative terminals, while the ends of both are alternately positive.

The complete circuit is shown in Fig. 9, and details of the inductances in Fig. 10. The circuit is the Meissner, and will be readily understood. The tube form is 3 inches diam. by 4½ inches long. The antenna winding consists of 10 turns of No. 18 D.C.C. wire, then a ¾ inch space, then 30 additional turns, the second part of the winding being tapped every fifth turn for wave length control. Over the 10-turn end a sheet of mica is rolled, and on this is wound the plate inductance of 40 turns of No. 24 S.C.C. In Fig. 10 the space between the windings and the mica has been purposely exaggerated. The grid coil has 50 turns of No. 24 S.C.C. on a 2-inch tube mounted to rotate in the space between the two sections of the aerial inductance.

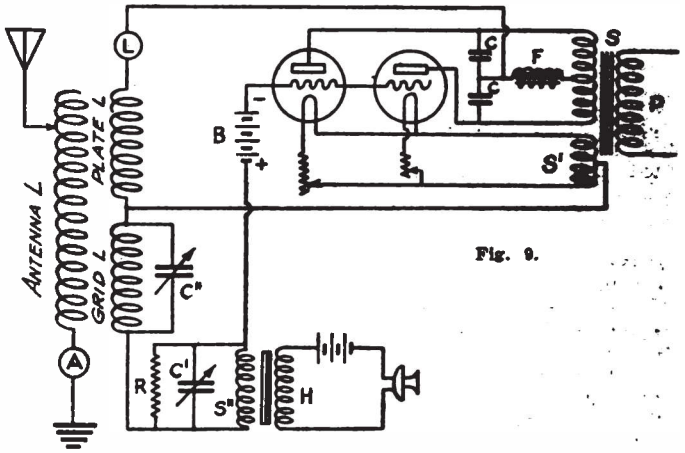


Fig. 9.

Grid leak modulation is used, with a home-made modulation transformer whose primary consists of 4 layers of No. 24 D.C.C. wire on the core of a ½ inch spark coil, the secondary consisting of the regular secondary of the coil. C' ' tunes

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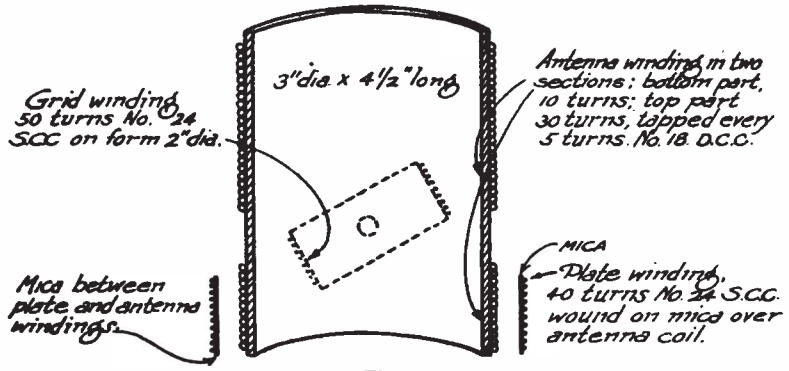


Fig. 10.

Rotten Epistles

By The Old Man

Just as we suspected, this Young Squirt stuff got a rise from the old gent. Here it is—for us to laugh over. "Gawdnose" what T.O.M. will say when we publish a third Young Squirt story we have just received!—Editor.

IF it was not for everybody having their sense blunted by a presidential political row the Young Squirt's remarks about me would be considered just cause for a duel or a suit for libel or a dose of castor oil. The young rascal called me a "Beezlebub" or something about as musical. Now if there is one thing I am not, it is a "Beezlebub." I am not quite sure I know what one is but I am more than sure I am not one. I may have been guilty of many dreadful things in my long and exciting past but I'll be dogwallowed if I ever did anything that justified being classed with the beezlebubs. If I ever get over east again I intend to look in at the QST factory and get the address of "The Young Squirt." When I have it down in my note book along with the other crazy hook-ups I will bide my time and when our paths cross the amateurs of the First and Second Districts, respectively, will know that something is doing in the air.

And by heck he called me "Old Beeswax". He imputed that I have melted and run. Now I may get heated up at some of the things that occur in amateur radio, and at the Radio Club the other night I got good and hot, but so help me Bob I never melted. The last time I remember melting was in the dim and distant past when I fell out of a canoe and lost a .22 calibre rifle I had borrowed from my father without his consent. I was young and I melted on that occasion, but by golly I didn't run. That is one thing your Uncle Dudley will not do unless it is to chase Young Squirts back into their holes. (I reckon that ought to hold the kid for a while, what?)

You know I think this political campaign business has got into people's blood. The Republicans spend hours thinking up names and things to call the Democrats and the Democrats sit up nights thinking up damaging remarks to hurl back, and we read them every day until we think things tame and slow when somebody is not calling somebody else a liar and a crook. If somebody is not lambasting the daylights out of somebody else's reputation, the story is dull and belongs in St. Nicholas. What in blazes "The Young Squirt" wants to pick on me for can be explained in no other way. As I have repeatedly affirmed upon many occasions, I am not a humorist. I am a reformer. I was sent here by an all-wise Providence to reform amateur radio, to preach tolerance, peace on earth and good will to men who do not cause QRM nor burn up the town's electric light station. I have been doing it for several moons. Who can say I have not pointed out many rotten things, including "The Young Squirt's" sense of humor? Who shall say me nay that amateur radio is not less rotten because of my having been born among you? Just think how rotten it would have been if I had not brought my estimable and gentle, not to say genteel, influence to bear upon the young and growing art. I have spoken always in moderation and with elegance. I never have hinted at violence—oh no—and no Sunday School Radio Club could carry on its duties without following the Christian precepts I have laid down from time to time. Why, for gawdsake, I never had a halo beats me, but so far nothing like one seems to be coming by insured parcel post with my name on it. All of which may go to explain the blood curdling yell that caused the little wife to slip off the rocking chair onto the floor, and the cat to adjourn to the woodshed, when I finished reading this last "Epistle to The Old Man" by the Young Squirt.

Every thing in amateur radio may not be rotten. I may be laboring under a prejudice at this time on account of the outcome of the presidential election, and my four months' hard labor trying to make a C.W. set work. I can imagine, in spite of these and several other things, that there may be one or two things that are fine in amateur radio. Mr. Schnell writes me lately from his new job in Hartford that he has noticed one or two details not entirely rotten up his way. Just the same, nobody has ever included among these fine, edifying and uplifting samples anything connected with radio humor. Of all the broken down specimens of humor I have ever seen the selections garnered from radio literature have the distinction of taking the rag off the bush. There was one poor idiot out here in the middle west in bygone years who wrote an article entitled "Liars". About nine inches down from the top, I came near cracking a smile in that article, and I have always thought it came the nearest to being funny of anything I ever read in radio print. Old Amateur No. 1, Vermilya, made a stab at being funny some years ago, and I suspect Kruse intended to be comic on

several occasions, but thought better of it. Several others have made a pass at the comedian stuff, but most of it has come out sob stuff instead. One poor misguided gink wrote me a letter once insinuating that one of my stories had been considered humorous by him. I knew it was not, but I thought I might be mistaken, and so I looked him up in Bradstreet's. It turned out that he had a job in a funny factory, and had no rating, and so I know I was right after all. It would be a terrible blow to think that all the good advice I had passed out to the young during my time should be considered as humorous.

I suppose "The Young Squirt" thinks his bundle of bunk aimed my way is humorous He should have seen the saddened face and the glassy eye of one of the chaps at the Radio Club a while ago, who was reading the "Second Epistle". When he finished he hove a heavy sigh, and I thought he was going to burst into tears. One of my own yarns was read in my presence by one of my friends who little suspects who THE OLD MAN really is, and I thought he was going to have a bad case of the blues. He seemed to be terribly depressed, and that particular yarn was intended to be light and airy.

Warner's "Strays" in QST are an example of a fine manly effort to keep amateur radio humor out of the undertaker or mortuary parlor class. Sometimes you can see Warner thinks he has been funny. But I watched a man read "Strays" the other day. He sat in stony silence during the entire operation. He never batted an eyelash, and the corners of his mouth never suggested the flicker of a passing smile, even of audibility 2. There was one "stray" about Mrs. 8ER that I thought verged on being funny. But ND. It was because I knew Mrs. 8ER that I had a suspicion about the funny business. He did not know her, and it looked to him about as funny as a grocery advertisement.

The Chicago fellows get out a little sheet which they call "Grid Leak". It is not entirely sad, but in spots it makes you chirk up and look to see if the sun is shining. But it is written all over the sheet in letters a foot high that somebody thinks something in the outfit is funny. I showed mine to the president of our Radio Club the other night, and he read it through, and returning it to me, very seriously remarked that it was "quite informative". Can you beat that, much?

Before I get through with my C.W. experimenting, I think I may have the ground work of something that might be construed by a drunken person as being humorous. I shall attempt to make it a classic. I have already certain details which I confidently expect will produce lockjaw in any one outside the radio fraternity. I shall arrange them in cascade, and if the effect of the whole is not considered humorous enough to draw a smile from the cast iron face of our radio club president, I shall take a crack at religious literature. After all, I wonder of that is not where "The Young Squirt", "VN", "The Old Man", Wolfe, Kruse and some of the rest of us belong.

T.O.M.

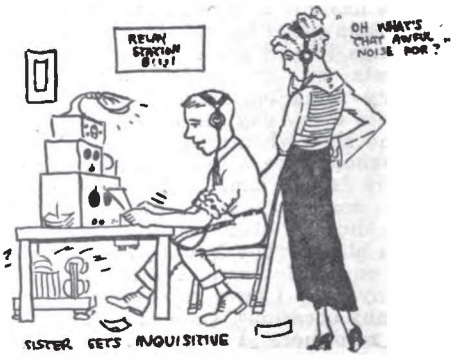
DANGEROUS LEGISLATION

(Concluded from page 6)

not be idle, but it is essential that we have your support to the limit. DON'T DELAY —WRITE TODAY!

Note. The membership of the Senate Committee on Naval Affairs, their states, and their political affiliations, are given below. The membership of the Sub-Committee on Radio, which at this writing has the actual bill in charge, is denoted by asterisks. Amateurs in these states thus can know that they are addressing the Senators directly connected with the matter, and can write their letters accordingly. If you don't know who your Senators or Representatives are, ask your post-master.

Republicans	
Carroll S. Page	Vermont
Boies Penrose	Penna.
Henry Cabot Lodge	Mass.
*Miles Poindexter	Washington
Frederick Hale	Maine
L. Heisler Ball	Delaware
*Medill McCormick	Illinois
*Truman H. Newberry	Michigan
Henry W. Keyes	New Hamp.
Democrats	
*Claude A. Swanson	Virginia
John Walter Smith	Maryland
James D. Phelan	California
Key Pittman	Nevada
Thomas J. Walsh	Montana
*Peter G. Gerry	Rhode Id.
Park Trammell	Florida
Wm. H. King	Utah



The Bureau of Standards---A.R.R.L. Tests of Short Wave Radio Signal Fading

By S. Kruse

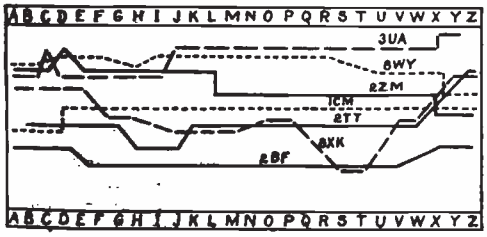
Assistant Electrical Engineer, Bureau of Standards

Presented at meeting of the Radio Club of America, Columbia University, September 24, 1920

PART II.

Results of Tests.

The test system began operations June 1, 1920. The results here given are, with few exceptions, those obtained on the test sheets of the last four weeks of the run, that is to say, from June 15 to July 17. The first three weeks of the test were run while winter conditions were gradually changing to summer ones and before the system had gotten properly under way. As three other tests are to be run during the other seasons it was thought best to consider the last part of this test which was run in summer weather. The additional information which could have been obtained from analysis of the first three weeks of the test would not at all have compensated for the additional men and labor involved. The results of transmission by station 9LC at St. Louis, Mo., were also eliminated as only a few records of any value were obtained. As has been explained, station 8ER at St. Marys, Ohio, was added to the transmission system and the records on this station are considered instead of those on 9LC.



Transmission by 9ZN July 8, 1920

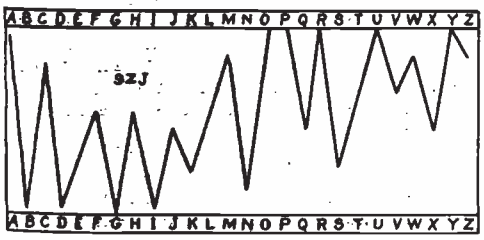
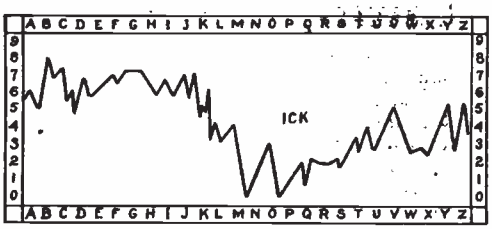


Fig. 12—Normal 9ZN curves.

During the entire first week, the curves that were received seemed to mean nothing. In Fig. 12 are shown representative curves for station 9ZN. Those in the upper half of the sheet which were secured by 3UA at Baltimore; 8WY at Cambridge Springs, Pa.; 2ZM at Clifton, N. J.; 1CM at Laconia, N. H.; 2TT at Yonkers, N. Y.; 8XK at Pittsburgh, Pa.; and 2BF at Montreal, Canada, are entirely representative curves for this station, which has the distinction of fading less than any other station in the system, its peculiarity being that it is, in general, heard steadily or else not at all. The curve below, which was secured at 9ZJ at Indianapolis, is a very unusual one for transmission from 9ZN and would lead to the suspicion that the receiving apparatus at 9ZJ was at fault, except for the fact that on this and other evenings normal curves were secured on all other stations at 9ZJ and almost without fail 9ZN swung violently. In Fig. 13 are shown some curves secured from transmission of 8XK at Pittsburgh, Pa. 8XK swung more rapidly than any other station in the test, often going from extremely



Transmission by 8XK – July 6, 1920.

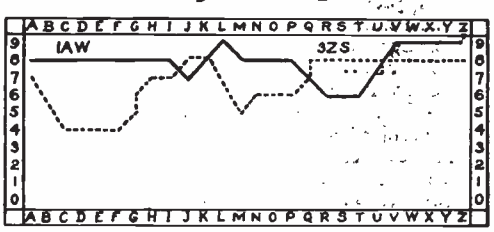
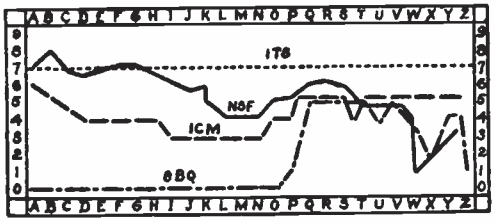


Fig. 13—Normal 8XK curves.



Transmission by 2JU July 15, 1920.

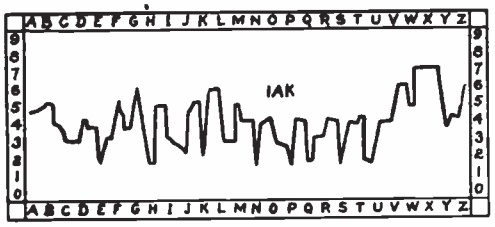
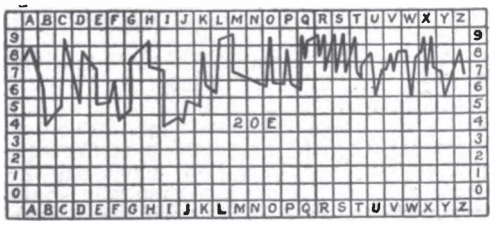


Fig. 14—Normal curves on 2JU.

loud to absolute silence in less time than is taken to sound one letter of the Continental alphabet. The sensation when receiving 8XK is exactly as if someone opened the antenna switch and instantly reclosed it. The intensity of signals does not vary slowly—letters simply drop out. The curve shown in the figure which was secured at 1CK, Braintree, Mass., is not a typical 8XK curve, as in this case the variations, while rapid, were gradual enough to form some sort of a curve. The curves shown below, which were secured at 3ZS in St. Davids, Pa., and at 1AW in Hartford, Conn., are not at all typical of 8XK, and, in fact, for this station amount to freaks. 2JU, 1AW, NSF, 8ER and 9LC lay between these limits, fading rapidly at times, slowly at others, and



Transmission by 1AW July 8, 1920.

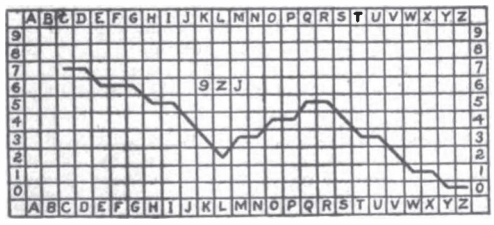
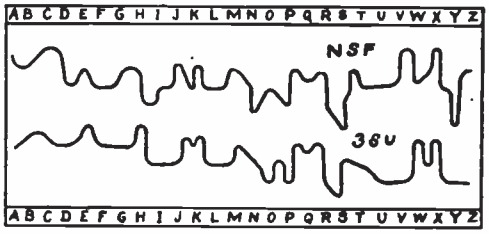


Fig. 15—1AW as copied on coast and inland.

seldom being as steady as 9ZN nor varying as violently as 8XK. Typical curves for 2JU are shown in Fig. 14 and for 1AW as copied on the coast and inland in Fig. 15.

Check Curves

The tests had not been in progress very long, however, before the first evidence began to appear that we were securing some sort of information. This evidence first appeared in the shape of similar curves from various receiving stations. At Washington there were four recording stations. Two of these, (3JR and WWV) are about one mile apart. The curves obtained at 3JR were generally checked with fair accuracy by WWV when that station was on watch, which unfortunately was not often. The curves at 3SU, about four miles southwest,



Transmission by 8XK - July 15, 1920.

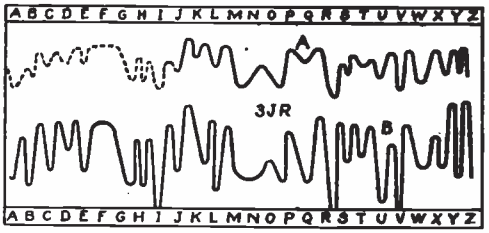


Fig. 16—Check by three stations.

could be depended upon to check the curves of 3JR and WWV with fair exactness about half the time. At other times only partial checks were secured or else the curves were of totally different shape. NSF, Naval Air Station, Anacostia, 5 miles south, was several times checked by 3SU and 3JR but not by WWV. We do not believe that this failure to check throughout the group was the fault of any of the observers, as at the same time that NSF failed to check with any other Washington observer it checked with 3NB at Vineland, N. J., while at the same time 3SU and 3JR checked each other. In several instances 3JR was checked by 3UA in Baltimore, 40 miles northeast. An excellent example of the group check is shown in Fig. 16. The first two curves, obtained by 3SU and NSF, are sufficiently alike, so that there is no doubt of their checking. The curve turned in by 3JR, labeled $3JR_b$, at first

sight has no resemblance to the other two; however, when it was redrawn with an amplitude the same as that of the other two curves, the resemblance at once appeared. This is the curve labeled 3JR.

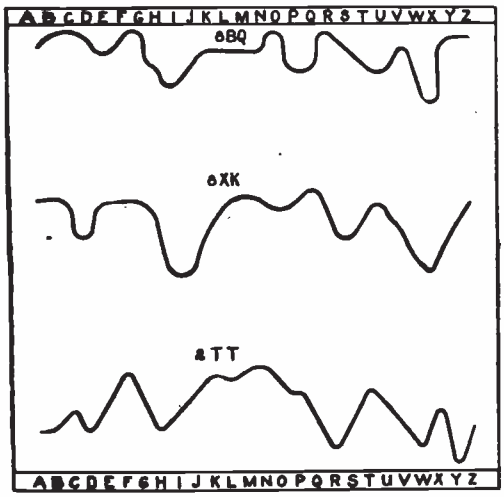


Fig. 17—Checks by distant stations.

It is believed that by this time there will be little doubt that the method is capable of securing results which indicate definitely in what manner the signals are varying at a given receiving station, so long as the signals do not vary with extreme rapidity, in which case audibility meters or any other device known at present for measuring signal intensity variation would be perfectly hopeless.

An example of check curves from stations some distance apart is shown in Fig. 17 on the transmission of NSF July 8. The recorders are 2TT in Yonkers, 8XK at Pittsburgh, and 8BQ at Milton, Pa.

Regional Characteristics.

In New England violent and rapid swinging seems to be the rule. This grows less severe as one goes south or southwest and at points in Pennsylvania, Ohio, Indiana, Illinois, and Michigan it is not even approximately as bad.

There seemed to be, roughly, three types of swing:

(a) a very rapid and very abrupt kind which sound as if the sender had simply omitted a letter or two. The length of the swinging cycle in this case is from ½ to 5 seconds.

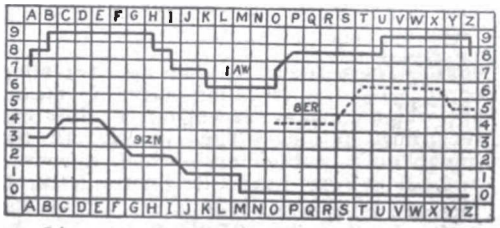
(b) a moderately rapid and more gradual type which gives curved lines almost entirely, the period being from ten seconds to five minutes. This is the commonest type of swinging.

(c) a very gradual slow "drift" of all stations in one direction from the recorder, a cycle taking anywhere from five minutes to several hours.

The first two types are both shown in the upper graph of Fig. 13, obtained at 1CK, Braintree, Mass., on the sending of 8XK, July 6.

The first type of swing is, as far as I have observed, purely a one-station phenomena. The second type also is not followed by other sending stations nearby, but when one sender is swinging in this manner, others near him seldom fail to swing at a similar rate though not in synchronism. This is the most aggravating type of fading as one station swings in while another is going out, so the station being copied is blanketed before it goes out of audibility.

In the long slow third type of swinging all sending stations near each other swing slowly together. Where the swing is unusually slow it is noticed that during the early part of the evening stations in one direction will be heard best while those in another are inaudible, the condition perhaps reversing later in the evening. This sort of swinging cannot be shown by short tests and usually does not cause much



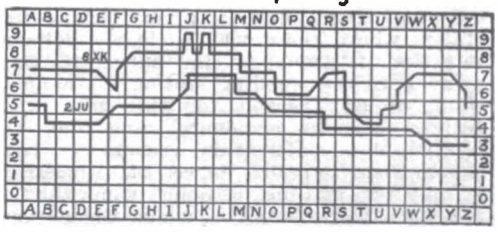


Fig. 18—Fading over water.

difficulty in handling traffic, since stations remain "swung out" long enough so that they do not have to work, or else "swung in" long enough to clear traffic. This type of swinging is especially characteristic of the Mississippi Valley.

Fading is not solely a land phenomenon. The curves obtained at 4AT, Ft. Pierce, Fla., on the transmission of 1AW and 2JU are normal although transmission is almost entirely over water. Fig. 18 shows

curves obtained on July 6 on board the U. S. S. Ohio, at that time 150 miles east of Cape May, N. J., by Mr. L. C. Young of NSF. These are similar to those turned in by Mr. Young from NSF, at Anacostia.

Traveling Curves.

Similar curves are not always simultaneous. There is such a thing as a traveling curve. By the traveling curve is meant one which appears successively at different recording stations. Thus in Fig. 19 the same "dip" in the curve which appeared at 2YM in New York City on the letter R reached 8AAN at Buffalo, N. Y., at the letter S, 3EN at Norfolk at U, 2JU at Woodhaven, L. I. and 2ZM at Clifton, N. J. at W. This phenomenon occurred many different times, and in almost every instance where there was a clearly defined direction of travel of the curve it was away from the sending station. I cannot think of any reason for this rule, and believe it to be accidental and due to limited data. For this reason, it was thought best to ignore curves that appeared at only two stations, although some thirty-two such were found in which the curves were beyond question the same. Of the type which passed through three or more stations, sixteen were found.

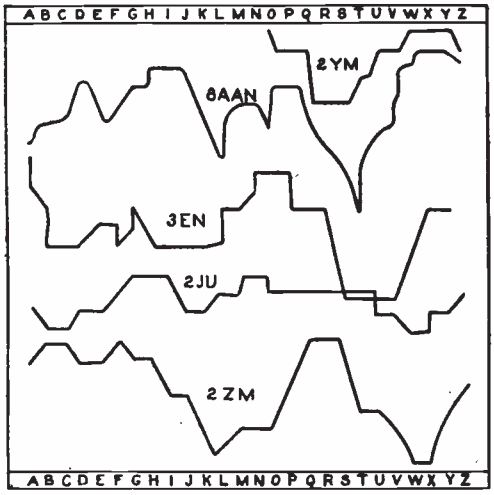


Fig. 19—Traveling curves.

No definite relation between the weather and either transmission or fading has been found nor has any relation between the weather and the direction of best transmission been found in a way that is at all convincing.

Explanation of Cause of Swinging.

Variations in the intensity and direction of received waves have been explained by a number of people as due to reflection and refraction of the waves before arriving at the receiving station. (See Scientific Paper of the Bureau of Standards, No. 353, "Variation in Direction of Propagation of Long Electromagnetic Waves," by A. H. Taylor, USNRF). The variations observed in these tests were actual changes in received power. A satisfactory explanation, based on reflection and refraction effects, involving the existence of interference bands such as are obtained with light, was suggested and discussed by various members of the conference of April 7. The results of the tests seem to bear out this explanation very well.

In Fig. 20 we have at S a source of monochromatic light (say red) from which rays of light travel to the receiving screen by two different paths, first along the straight line SA joining the source and the screen, and second along the line SA'A. Supposing the length of the path SA differs from that of the path SA'A by one wave length of red light, then the rays arriving at A by the two paths will be in phase and will add their amplitudes so that the result is more intense red light at A than would be obtained without the reflector. At another point B, however, the light arriving by the the path SB will not be in phase with that arriving by the path SB'B and hence they will not reinforce each other in the same manner. If the length of SB differs from that of SB'B by one-half a wave length of red light the two waves will differ 180 degrees in phase and hence will tend to cancel each other.

If the amplitudes are the same they will cancel so that complete darkness results. Thus there will be along the screen regions AAA, where the light is more intense than without the reflector, and between these, other regions BBB where there is almost complete darkness. If the reflector is tilted or moved in any direction except its own plane, these interference bands will move along the screen. Supposing the motion is in the direction of the arrow, the bands will move as shown by the arrow at the screen. Suppose now that

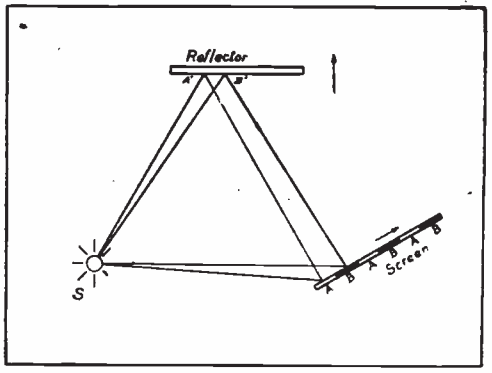


Fig. 20—How interference bands are formed.

we have at C an eye which is observing the light arriving at this point. This eye will see alternately red light and darkness.

If we consider the case of radio transmission, the source S becomes a sending station, the eye at B becomes a receiving station, and the waves electromagnetic waves. The whole phenomenon takes place on a much enlarged scale, consequently the reflector must also be of considerable size. It seems that a large cloud, fog bank, mass of fumes from an industrial plant, or perhaps the Heavyside layer may operate in this capacity. It is entirely probable that interference bands may also result from waves arriving over two paths, neither of which is direct. In this case movement of a reflecting or refracting member in either path may change the signal intensity. Where the waves have been repeatedly reflected before arriving the chances for violent and rapid swinging are much increased. If we accept the theory that fumes from smelters or steel mills may collect in sufficient masses to act as reflectors, this seems a plausible reason for the phenomenally rapid and erratic swinging of station 8XK which is located in a region of many such plants. It is just as well, however, to admit at once that other prominent stations in the same region, namely 8DA at Salem, Ohio, and 8ZW at Wheeling, W. Va., do not at all duplicate these rapid swings. The rapid swings of 8XK are, however, not due to the sending apparatus, as at the same time that one recorder will hear anywhere from 15 to 28 swings for 8XK, others will hear three or four. We have no record of 8XK being received without fading except by stations very close by. Reflecting need not necessarily be involved in the production of interference bands. Refraction will answer just as well to change the direction of the waves if we can find a mass of vapor whose dielectric constant differs from that of the normal atmosphere through which the waves are traveling. Neither the reflecting nor the refracting body need be at high altitudes. They may be at the elevation of the sending and recording stations and to one side of the line joining them.

Inverse Curves

Another type of curve may be designated as the inverse curve. The curve appearing at one station is found inverted at another. The upper part of Fig. 21 shows inverse curves received at 1TS, Bristol, Conn., and 8ER, Saint Marys, Ohio, from 2JU at Woodhaven, L. I. Singularly enough the cases of inverse curves are, without exception, simultaneous; that is to say, the positive peak of the curve appears at one station on the same letter for which the negative curve appears at the other; again, without exception, each case in which the curves are undoubtedly inverses is that of a very slow swing which lasted from 1 to 8 minutes. It is this simultaneous appearance of the curves which makes them difficult to explain, and leads to the suspicion that they are coincidences. A special case of inverse curves was that in which the positive curve was obtained at both station 3JR, Washington, and 3UA, Baltimore, while the negative curve was obtained at both 3BZ, Danville, Va., and 3BN, Norfolk, Va., giving complete check on the observations. The transmitting station was 2JU. It will be noted that the stations of a pair which obtained the same curves are at about the same distance from the sender, suggesting at once the thought that we have traveling curves, and the case is the special one in which the fading was sufficiently regular so that the fading curve which appeared at a particular station would be repeated

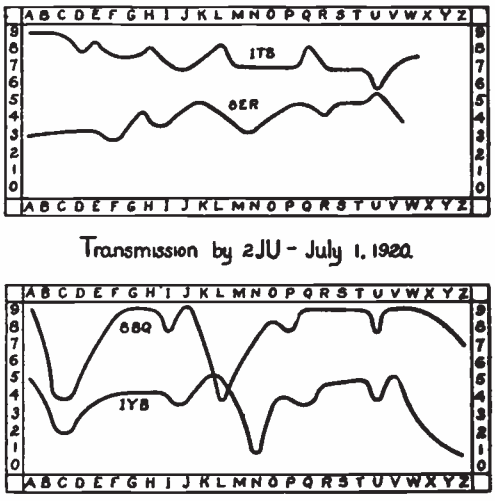


Fig. 21—Inverse check curves.

by others near it and the fading bands were spaced so regularly that it was possible to find further along the line of their travel other stations at which a dark band was appearing while a light one was crossing the first stations. With enough recorders it might be possible to trace in this manner with a fair degree of accuracy, the system of light and dark bands.

Clearly defined inverses are not frequent. Six inverses were found during the last four weeks which were fairly definite. One of these is shown in Fig. 21 for the transmission of 2JU on July 1 as received at 1TS, Bristol, Conn., and 8ER, St. Marys, Ohio. There does not seem to be any reason why stations so situated should obtain curves having any definite relation to each other. Perhaps

inverse curves are purely accidental. Certainly they would be more convincing if more numerous.

The other inverse curves obtained were as follows:

Date	Sender	Recorders	
7/3/20	8XK	8ER	1TS
7/6/20	8ER	9ZJ	3NB
7/8/20	1AW	1CM	8AAN
7/8/20	2JU	3BZ	8AAN
7/8/20	8ER	3BZ	3UA

A possible inverse curve system is shown in Fig. 22, for the sending of 2JU on June 1. 8IB is at Columbus, Ohio, 8DR at

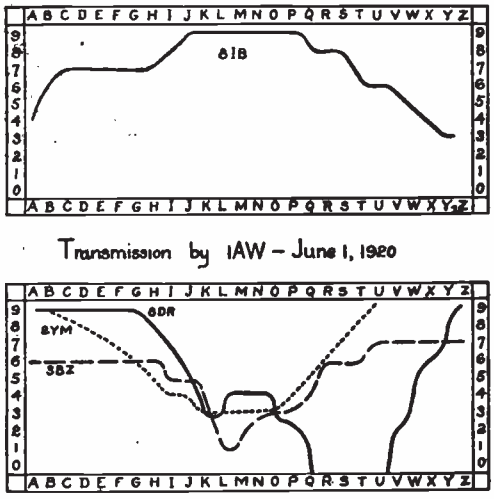


Fig. 22—Checks and inverses; also a doubtful traveling curve.

Detroit, 2YM in New York City. The curve at 3BZ (Danville, Va.) is possibly a traveling curve related to the one at 2YM.

Distance Effect

Fading is a long distance phenomenon. Repeated attempts were made at 1TS in Bristol, Conn., 12 miles removed from 1AW, to secure fading on 1AW by detuning the receiver or by dimming the tube filaments so as to decrease the signal intensity. The intensity remained perfectly uniform, however, and showed not the faintest tendency to fade. The same observations were made by 2YM and 2JE in New York, on the transmission of 2JU, Woodhaven, L. I., also by 3SU, 3JR and WWV in Washington on the transmission from NSF at Anacostia. This does not mean that there is a fixed distance below which fading does not occur. What it does mean is that fading does not occur until the distance is a considerable proportion of the normal transmission range of the station. In cases where transmission conditions are very bad, fading will occur at distances which are short. For instance, the distance from Washington to Baltimore is only 40 miles. It is almost impossible for stations in these two cities to work together on any wave length below 500 meters, as signals swing violently at all times. Similarly, the distance from Lawrence, Kansas, to St. Louis, Mo., is about 120 miles, a very short distance as radio transmission goes in this region. Yet, so far as I know, successful communication was never accomplished before the war by a St. Louis station with any station in Lawrence, Topeka, Leavenworth, Kansas City, or any of the surrounding towns! That the statement regarding ranges in the region is correct may be seen from the fact that any of the stations in the cities just mentioned could work over St. Louis to stations in Tennessee and Kentucky with perfect ease, while at the same time St. Louis stations could work over the state of Kansas, say, to Danver, without any difficulty at all. I am of the opinion also that fading does not occur in general within the daylight range of a station. This statement will not bear very close inspection, as in one of the cases just mentioned, that of transmission from Washington to Baltimore, the cities are within daylight range of each other. Signals do not fade in the daytime; on the contrary, in this particular case, they are stronger than at night. But, as stated, signals fade very badly at night.

Determination of Transmission Conditions.

In an attempt to connect fading with weather conditions and with normal transmission, it was desirable to establish some sort of a criterion as to the excellence of transmission on a particular date. No really good way of doing this was found. The method adopted can be best explained by example. In order to establish the normal intensity at which station 8XK at Pittsburgh was heard at 1CM, Laconia, N. H., the mean intensity of the signals of 8XK at 1CM for each day was first established by inspection of the curves obtained at 1CM on that date. The question then arose whether in averaging the intensities for the test period, those evenings should be considered on which 1CM had listened but failed to hear 8XK. If the failure was due to a defect in the apparatus, the results for the evening should, of course, be thrown out. It was decided however, that the operation of the stations was constant enough so it could safely be assumed that apparatus failures had not occurred. The mean intensity was accordingly obtained by averaging the intensities on all the evenings in which 1CM listended for 8XK, regardless of whether the station was heard or not. The mean intensity so obtained was then used in determining whether on a particular schedule, the reception of 8XK at 1CM was good, normal, or poor. No definite relation

between weather and transmission was found.

Almost without exception the recorders stated that they believed fading was not a variation in signal strength but a shift of wave lengths, as they could recover a station which had swung out by retuning the receiving set. We requested them not to attempt this since it would be impossible to tell whether the variations in received signal strength were due to a change in incoming power or due to mistuning. A laboratory check of this scheme showed conclusively that two observers could not get results that were even approximately alike if the receiving apparatus was retuned during the test. For this reason the QST call preceding transmission was made very long so that tuning might be finished before the test started. Subsequently it was found that when ICW signals were being received they could not be recovered by retuning when they had faded out. This observation was checked by several of our recorders at Pittsburgh, Chicago, and Hartford.

A possible explanation of this difference between spark signals and ICW signals, which also explains the apparent shift in wave length, may be given, following the ideas used by A. H. Taylor in explaining the difference between the variations of direction observed with damped and continuous waves. (Bureau of Standards Scientific Paper 353, already mentioned). Return to Fig. 20 and the formation of interference bands. Our source was monochromatic and a single set of interference bands, alternately red and black, resulted. An eye which could see only red light would then see alternate red light and darkness as the bands passed across it. Supposing the source of red light were replaced by one of white light. Interference bands of red light would still be produced and the red-seeing eye would still see alternate red light and darkness. If, however, another eye, a blue-seeing eye, were placed alongside of the red-seeing eye, it would see alternate blue light and darkness, and since the wave length of the two is not the same the interference bands would not be at the same places. Hence while one eye had darkness the other one would be out of phase with it and would have some light. Thus, by using the proper eye it would be possible at all times to see some light. The radio reception case is similar to the rather fanciful light system. The spark transmitting set emits not one wave but a band of wave lengths; the receiving set, however, can detect only one of these waves. Regenerative sets are notoriously very sharply tuned. If then the condition is such that a dark band for the particular wave length at which it is tuned is crossing the receiving station, it will detect no signals, although at the same time power is arriving on a slightly different wave length still within the band of wave lengths emitted by the sending apparatus. While there is some disagreement about this band, most of the recorders consulted agree that the wave length variation detected lies within the band of wave lengths normally emitted by the sending station.

With an ICW station we have the case of the monochromatic source. Only one wave length is being emitted. Hence when a dark band for that wave length crosses the receiver no signals can be found. At close range this does not hold true, since an ICW transmitter emits other wave lengths too weak to be detected at a distance which give the effect of a particular wave at close range.

An excellent example of this is NSF, which at first had great difficulty in initially "raising" distant stations although after they had tuned NSF in, the signals were reported as very loud. This is sufficient proof that NSF, at a distance, is very sharp. In Washington more difficulty by far is experienced in tuning out NSF than in tuning out 3KM, 3XF or 3JR, all of which are 1 K.W. spark transmitters nearer by.

The side frequencies of the ICW transmitter are those which differ from the main frequency by the tone frequency. Mr. Conrad of 8XK has suggested a possible means of avoiding QSS based on the double system of inverse bands presented above. His suggestion is the use of an ICW or CW transmitter emitting two waves some ten meters apart, and two independent receivers tuned to these two waves. It would be necessary to have these two receivers working into a common amplifier or perhaps into the two halves of a split head set. Mr. Conrad has attempted to operate an ICW transmitter in this manner but we do not know at present with what degree of success. It will be seen that an ICW transmitter is not the answer to the fading problem.

The statement made regarding the general opinion as to the rate of fading in various parts of the country was confirmed by the tests. Fading in the Mississippi Valley is of the type designated as "C". In the region around Pittsburgh all three types of fading are found, mainly "B" and "C", while in New England the "A" type of fading seems to be chronic, regardless of the location of the sending station. This seems remarkable since many of the New England records were those for 1AW, 2JU and NSF, all close to this region.

Summary

Test signals were transmitted three nights each week during June and July,

(Concluded on page 22)

Transcontinental Relay Tests in January

FELLOWS, we have not had a relay against time across the country for a long time, and we do not know how reliable our trunk lines are. Our Operating Department proposes to find out, by a series of test messages to be sent on the nights of January 14th, 15th, and 16th. There is nothing so thrilling in amateur radio work as a Transcontinental Test, and we know that this announcement will excite the sporting blood of our entire membership and get everyone up on their toes for the fateful nights.

The scheme at present is in purely tentative form, the actual routing of the messages being left to the Division Managers, in whose hands the matter has been placed. It is proposed to test the northern, the central, and the southern route to the West Coast, and every A.R.R.L. Division will participate. We may be sure that the stations which have been doing good work will all get a chance to chime in on these tests.

There will be three messages on each night, with a reply to each to be secured and transmitted back, making a total of eighteen messages. To make the relay a success the reply must be secured and returned to the point of origin of the original message on the same night. It will be remembered that the last time we tried this, before the war, the total elapsed time from New York to Los Angeles and return was an hour and twenty minutes. Let's try to beat that record.

While it must be understood that the plans are in extremely tentative form at this writing, and full details will not be available until the January issue of QST, it is proposed to send the messaages over something like the following routes:

No. 1 will start in Portland, Me., and end in Portland, Ore., via Boston, Hartford, Washington, Pittsburgh, St. Marys, Chicago, ???, Portland.

No. 2 will start in Hartford and end in Los Angeles, via New York, Wheeling, Danville, Va., Atlanta, Little Rock, Dallas, Roswell, ???, Los Angeles.

No. 3 will originate at San Francisco and be destined Boston, routing via Salt Lake City, Denver district, Anthony, Kan., St. Louis, Indianapolis, Columbus, Pittsburgh, Philadelphia, New York, Hartford, Boston.

The Division Managers will change these routes as they see fit, shortening distances when necessary, filling gaps, or arranging for alternates. Let your Division Manager hear from you.

On the nights of the relays we will ask a newspaper in the cities where the messages start to hand us a sealed message of about ten words, addressed to another newspaper located in the cities where the messages terminate. The messages will not be opened until ten minutes before the starting time, altho we expect to announce the names of the papers to whom the messages will be addressed so the terminal stations may make arrangements for soliciting the replies. Each message will bear a special prefix. On the night of the 14th the prefix will be "Transcon 14 official nr 1", and the reply to No. 1 will be "Transcon 14 reply to nr 1." The only difference on the other nights will be the change in dates.

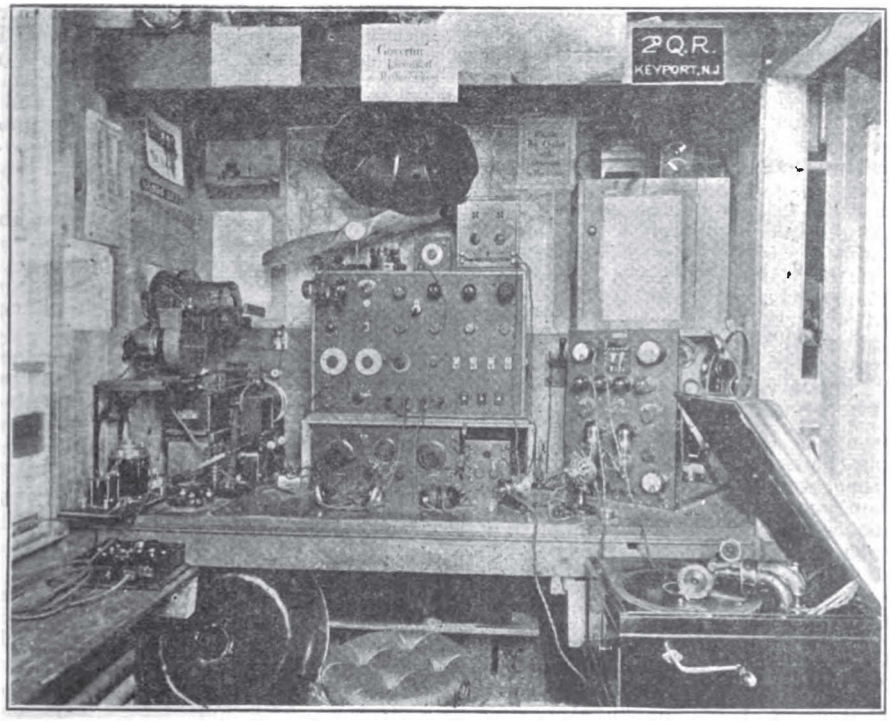
Now is our chance, fellows. We want the air to be absolutely quiet for these tests, so that we won't have to say that QRM is the cause for our trouble. Let us start right now to get the hearty cooperation of every amateur and ask him to do all in his power to eliminate interference on these nights. We have plenty of time to go after every problem involved, and there is no reason why we should not make a big success out of it, add to the glory of Amateur Radio, and get a whole lot of sport out of it for ourselves.

Bear in mind that all of the above is tentative, and the Traffic Manager cordially invites further suggestions.

2QR Heard in Scotland?

THERE is every indication that a new record for amateur transmission was established on October 6th when the signals of 2QR, an A.R.R.L. station operated by Messrs. Harold and Hugh Robinson, Keyport, N. J., were reported heard in Scotland.

2QR was described in the May QST, but the new photograph reproduced here shows some later equipment and illustrates the station as it was on the date of this record. Considerable work has been done



with the small DeForest radiophone shown, the input to which is about 100 watts. In its transmissions 2QR has often asked for reports of its signals, and this has brought replies from Ohio, Illinois, and particularly from Napanee, Ont., a distance of about 1150 miles, all of which are surprising for this small set. The transatlantic record is reported in the following letter received by Mr. Robinson:

Denmill Cottage, Peterculter,
Aberdeenshire, Scotland.
12th, Oct. 20.

Dear Mr. Robinson:

I write to say that my friend and I received your transmission on Oct. 6th to your friend. I could not be sure of this gentleman's name, but we heard the record "Roamin' in the Gloamin'", by Harry Lauder, and the other tune, very clearly; also that your power at the time was 100 watts. I write you this as no doubt you will be interested to learn that you can be heard over here with so small a power. I was using 3 valves. I would be greatly obliged if you could transmit again (radio phone) say 3 weeks after you mail your letter to me, as the letters take some time to reach here. As regards time, two hours after the transmission referred to above would suit, hoping you will manage to cooperate in our tests.

Your transmission was received here at about 6 P.M., G.M.T., so if you could transmit 2 hours later than the time you transmitted on Oct. 6th it would suit me nicely as this would be about 8 P.M., G.M.T. As I do not know how long your time is after ours, this is the only way we could arrange anything definite.

Yours faithfully,
(Signed) Geo. W. G. Benzie.

We congratulate Mr. Robinson as, if true, this is a most amazing record, even

for the ultra-efficient Continuous Wave. QST does not regard it as at all impossible, and Mr. Robinson informs us that the reported data concerning the time, the speech, and the records played, coincide with the facts, so that it looks "real". Mr. Robinson, however, is conservative and seriously doubts it, and has written for more substantial details.

There is one possibility that occurs to us: 2QR's signals might have been picked up at some transatlantic station like NFF and used to modulate the emission of the latter. For example, of late most of us have been hearing the time signals nightly from NSF on 250 meters. The note is unmistakably Arlington's, and generally the actual signature, "NAA", comes thru. This is accomplished by the reception of NAA's signals at NSF, the latter station then feeding the received signal acoustically to the microphone of its radiophone transmitter and so repeating it on NSF's own power and wave length. While very interesting QST sincerely hopes that the practice will not become a general one among radio telephone stations, for it will result in untold confusion in the identity of station calls and wave lengths. We particularly want to point out that it in effect amounts to the signing of incorrect call letters and so is illegal. Further investigation will be necessary before it is apparent whether Mr. Benzie heard the actual signals from 2QR, or repeated signals from some station of higher power.

This opens discussion on a new idea in relaying which has been proposed by Mr. Ben Emerson, 5ZG, Dallas, Texas. Mr. Emerson suggests that if a route of CW stations with independent receiving and transmitting aerials were arranged across the continent, with the signal picked up on the receiving aerial and fed into the transmitter operating simultaneously on the transmitting aerial at another wave length, the delay now incident to intermediate relays would be completely eliminated and New York speech or signals could be received practically instantaneously in California. In other words, it involves simply a chain of repeaters acting as NSF does in the case of NAA's time signals.

This would be automatic relaying and would remove all the fun from the game except the scientific interest of the performance, but it would result in a speed of relaying never before attained, and would make it possible for one station to address the whole country, as all the receiving stations surrounding each transmitter could of course listen in on the transmission. Who knows but that someday our A.R.R.L. may have Transcontinental Super-Routes fashioned on this scheme?

A.R.R.L.—B. S. FADING TESTS

(Concluded from page 19)

1920, by six sending stations operating at 250 meters wave length and observations of the intensity of the signals were made by fifty recording stations. An average of twenty-eight recorders listened for the test schedules on each of twenty-one evenings, obtaining 1260 curves of signal intensity variation.

Frequent checks between curves at adjacent and sometimes distant receiving stations were found. Traveling curves, appearing successively at various recording stations, were found. No definite connection between weather and transmission was found. Inverse curves were found but infrequently and are not considered as other than chance variations. Three types of fading were observed, a rapid and very abrupt type, appearing mainly in New England, a less rapid and less abrupt type found in all parts of the test territory, and a very slow type covering large territories and affecting all sending stations in the region alike.

There is no marked difference in the manner of fading for various types of sending sets. However, a damped wave that has faded out can often be recovered by retuning, which cannot be done for continuous waves.

The tests furnish good evidence in support of the belief that radio signal variations such as fading and swinging are caused by varying reflection and refraction of the waves.

SELF-RECTIFYING C.W. SETS

(Concluded from page 10)

the grid circuit, and both it and C' are of .001 mfd. max. A grid biasing battery, B, is used, the value depending on the tubes. 22.5 volts being about correct for E's, T's, and Moorheads. Grid leak R has a value of about 10,000 ohms for these tubes also.

L is a 3 or 6 volt battery lamp, used to indicate the flow of plate current in lieu of a meter.

Mr. Ruckelshaus states that this circuit is very critical in adjustment and will require some patience before satisfactory results are obtained, the grid coupling in particular requiring careful adjustment. It is possible that the Colpitts circuit would be found superior in performance, as well as much simpler.

This A. C. Radio Phone propagates a 60 cycle hum but not over the distance to which the speech will reach nor in any case, when properly adjusted, of the same order of audibility as the speech. And so it seems likely to find a ready reception among amateurs.

Duo-Laterals, and More on Tuning

By A. L. Groves

HAVING written considerable about the Honeycomb coils in previous issues of QST and received many requests to give some data on the new Duo-Lateral Coils in comparison with the Honeycombs, I will endeavor to give the readers my opinion of these coils as I found them after a thorough trial, covering a period of several weeks.

First of all let me say that for ordinary tuning there is no great difference between the two types of coils in actual signal strength received. The Duo-Laterals are somewhat better made, present a better appearance, and taken as a whole give a little better results than the Honeycombs, as they stand up better under condenser capacity, which is a decided advantage, especially in working through interference. There is, too, a more uniform graduation between the different size coils, which gives them a little advantage in tuning over the complete scale of waves.

Like the Honeycombs, their greatest advantage over the old style apparatus is on the long wave lengths and they are not at all suited to short wave work, especially below 500 or 600 meters, and the difference between the Duo-Laterals and Honeycombs on the short waves is practically nil. Delicate instruments would most likely detect a considerable difference in them but this difference is not apparent in actual audibility as detected by the ear.

The accompanying Table I gives the range of waves over which all coils from US-500 to US-1500 inclusive will tune when used in the secondary circuit and shunted by a 23 plate condenser. It will be seen that the maximum wave possible with the US-1500 coil with this size condenser is a little over 18,000 meters, which is about 1,000 meters more than the corresponding Honeycomb coil will give.

If you are using a 43 plate condenser the condenser reading for a given wave will be approximately one-half of those given here. For instance, if you wish to tune to 11,000 meters with a 43 plate condenser, the readings would be about 32 degrees for US-1500, 45 degrees for US-1250, 76 degrees for US-1000, and US-750 would then tune to 11,000 meters also, with the condenser at about maximum capacity. However, I recommend a 23 plate condenser for use in the secondary because better tuning can be done with a condenser of this size, since a movement of two degrees only effects the tuning approximately the same as a movement of one degree with the larger condenser. Also the minimum capacity is much less with the small condenser, which is a very important consideration if the set is to be used on short waves.

Tuning with these coils is done in the same manner as with the Honeycombs as explained in Sept. QST. Tables have appeared from time to time giving the approximate wave that the different stations use, so when you want to try to hear a certain station you will refer to some of these tables and find the wave used, then refer to this table and note the coil and condenser capacity required in secondary circuit. After selecting these, balance out the plate and primary as previously described and you will be very close to the wave desired, remembering the greatest signal strength is had from any certain wave by using the largest coil listed with the smallest amount of condenser, but greater selectivity is obtained by using a smaller coil with a corresponding increase of condenser capacity.

TABLE I

Reading of Illinois 23-plate condenser.

US-500	US-600	US-750	US-1000	US-1250	US-1500	Secondary Wave Length
12						1,500
22	0					2,000
33	17					2,500
44	32	8				3,000
66	47	18				3,500
90	62	28	10			4,000
114	70	43	19			4,500
148	104	60	27	0		5,000
180	128	74	35	9		5,500
	150	90	45	16	0	6,000
	170	106	53	23	8	6,500
		123	62	29	14	7,000
		138	71	37	20	7,500
		156	80	46	26	8,000
		172	92	53	32	8,500
			105	61	39	9,000
			130	76	51	10,000
			153	90	64	11,000
			180	108	78	12,000
				131	92	13,000
				162	108	14,000
					123	15,000
					138	16,000
					154	17,000
					172	18,000

For short wave work I will mention that the US-50 coil is the correct value for amateur waves in the secondary, responding to about 225 meters with the secondary condenser at 30 degrees.

For 600 meter work coil US-150 is correct for the secondary and will respond to this wave with condenser about 20 degrees. The Radio Compass wave of 800 meters is best tuned to with coil US-200 in secondary.

It has come to my attention that notwithstanding the numerous articles written in regards to tuning with the Honeycombs (which includes the Duo-Laterals as well), there are a great many who do not quite understand the value of tuning the **primary** or the importance of having the correct size **primary** condenser for their particular aerial. This is of the greatest importance and good results are impossible on all waves unless the primary is properly tuned.

The smaller the aerial the smaller the primary condenser that is necessary to shunt the coils in the primary to make them "overlap" so as to make a progressive increase in wave length from one size coil to the next larger size coil. This is due to the increased capacity of the larger aerials and, consequently, shunting the coils with a certain size condenser does not produce as great an effective wave length increase.

In this connection I have made some experiments with various length aerials and have deduced the following tables as a range of wave lengths to which the various coils will respond when used as a primary inductance on a SINGLE WIRE aerial with a 43 plate (.001 mfd.) condenser **in shunt.**

It will be seen from Table II that there are a lot of waves to which one cannot possibly tune the primary circuit with a .001 Mfd. condenser when used in shunt. For instance, take the 200 foot aerial. Waves between 375 and 475 meters cannot be tuned, waves between 950 and 1300 meters cannot be tuned, waves between 1500 and 1600 cannot be tuned, waves between 2200 and 2300 cannot be tuned, and waves between 2900 and 3000 cannot be tuned. Referring to the whole table, if the maximum wave of one coil is smaller than the minimum wave of the next size coil, then the waves between these cannot be tuned. On the long waves, with large coils, most waves overlap enough to tune without a break. The two noticeable exceptions with the aerials above are waves between 13,800 and 14,000 meters with the 400 foot aerial, and waves between 14,200 and 16,500 meters with the 500 foot aerial. To tune between 14,200 and 16,500 meters with this aerial the writer used coil L-750, with L-600 as a loading coil, and found this arrangement to respond to waves between 14,000 and 16,500 meters, which was just right.

TABLE II

L, LL, or US	50′ Aerial Min.	50′ Aerial Max.	100′ Aerial Min.	100′ Aerial Max.	200′ Aerial Min.	200′ Aerial Max.	400′ Aerial Min.	400′ Aerial Max.	500′ Aerial Min.	500′ Aerial Max.
25	120	325	185	340	325	375	375	400	425	450
35	170	485	275	510	475	600	500	625	550	650
50	235	650	375	685	600	750	675	775	700	800
75	475	900	550	925	625	950	800	975	900	1000
100	550	1250	750	1275	1300	1500	1400	1600	1500	1650
150	850	1825	1100	2050	1600	2200	1900	2600	2000	2900
200	1100	2600	1500	2700	2300	2900	2600	3300	2900	3800
250	1425	3400	1950	3600	3000	4000	3300	4200	3800	4500
300	1800	4100	2500	4400	3500	5000	3900	5500	4500	5900
400	2300	6500	3200	6700	5000	7000	5500	7500	5900	8000
500	3000	7500	4200	8000	6700	9200	7000	9500	8000	10000
600	4000	8700	6000	9500	8000	11000	9000	11500	9200	12000
750	4700	10000	6400	10100	9800	12000	11000	13800	11800	14200
1000	6800	14000	8700	15000	13000	17400	14000	18000	16500	19000
1250	8400	17000	10000	17500	16000	22000	15500	24000	——	——
1000	9500	20000	12800	20300	19600	26000	——	——	——	——

As you can see from the above table, if your aerial has an effective capacity not greater than that of the single wire 100 feet long you will need nothing larger than a 43 plate condenser for the primary, as all waves overlap.

However, as most aerials have a greater effective capacity than a single wire aerial 100 feet long, a larger primary condenser is necessary, especially on the short waves; but it is possible to tune to all of the shorter waves with a 43 plate condenser, with somewhat less efficiency, if the primary condenser is used in series instead of parallel, and it is mainly for this purpose that the series-parallel switch is necessary on my own set.

Table III gives the advisable working wave length range of the various coils when used in the primary with the 43 plate condenser **in series.**

TABLE III

L, LL, or US	Single Wire 400' Aerial Min.	Max.	Single Wire 500' Aerial Min.	Max.
25	190	200	190	210
35	200	225	200	250
50	300	400	300	500
75	500	600	500	700
100	550	700	600	800
150	600	1000	600	1200
200	1000	1600	1000	1800
250	1500	1700	1600	2000
300	1500	2800	1500	2900
400	2500	3700	2500	3800
500	3000	4500	3000	4600
600	4000	5500	3000	5800
750	5500	6900	5500	7000
1000	6500	9800	6500	10000
1250	8000	11000	8000	11200
1500	10000	13500	10000	14000

It will be seen that for a given wave a much larger coil has to be used with the condenser in series than when in parallel. Also, a given coil will respond over a much wider range of waves and it requires less changes of coils in primary, and all waves can be tuned to. This is done at a somewhat lower signal strength, but the fact that all waves can be tuned to and the ease of tuning with the condenser in series makes it often very desirable to use the series method, even at a sacrifice in signal strength.

Notwithstanding the above, it is very desirable to use a large condenser in the primary circuit as its large capacity will give better results for all around work, as it gives a wider range of waves for each coil, allows smaller coils to be used with the series method, and makes frequent changes of coils unnecessary. In his regular work the writer uses one of 115 plates and even this is not large enough with extra long aerials.

The above may serve to explain why there is so much of a howl being set up by amateurs that their coils refuse to "oscillate" on various waves, where it is not the fault of the coils at all but the fault of the set not being properly balanced out to suit the coils, or lack of patience on the part of the operator in not going over each coil and balancing out by the click method as previously explained. If your coils are balanced out as explained, you can very easily tell then what waves you are missing through your condenser being too small. If you get the clicks over the entire range of waves your condenser is large enough; if not, it is too small.

Flicker Balances Without Current Waste

*By R. U. Clark, III**

DUE to the lively discussion appearing in recent numbers of this magazine on the above mentioned subject a few real workable ideas that will save time, money, and perhaps a bit of temper, are submitted which ought to settle the question for good and all.

Resonance in the transmitting set will reduce flickering, but under usual conditions cannot entirely eliminate it. The only other solution of any account is found in the use of some sort of a current-consuming balance which will, by operating when the transformer is idle, keep the line current consumption constant. This may of course slightly dim the lights on the same circuit, but all flickering can be cut out.

Almost any instrument which draws current can be used as a balance, but care must be taken to see that whatever is employed for this purpose really does balance the consumption of the transmitter. In addition to this the balance should use and not waste current.

Four or five very interesting applications of common devices which can be used as current balances will be outlined. It should of course be understood at the start that

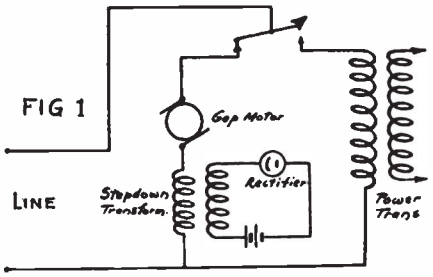


FIG 1

these arrangements require the use of a double contact key. It is a very simple matter to mount a second set of contacts on almost any key in such a manner that opening one circuit closes the other at the same time, or near enough so for practical use.

A very simple circuit for use with either a gap motor or a battery charging balance is shown in Fig. 1. In this sketch a rotary gap motor and a small battery charging step-down transformer are connected in

series, both being used at once to balance the transmitter. Until the key is pressed both motor and charger are in constant operation, but as soon as the circuit through these devices is broken about the same amount of current is sent through the primary of the transformer or coil. In this way, when the key adjustments are set fairly close, the current consumption is practically unbroken. The gap motor will not be reduced greatly in speed unless the key is held down for some time. This last fact will remove the temptation to keep the key depressed.

The simple devices mentioned so far need little explaining. It might be well to state here that the gap rotor and motor armature should be designed so that they will possess considerable momentum at speed. This is necessary to keep the pitch of the spark note up to the desired point during breaks in the circuit of the motor.

By making the current consumption of the balancing devices as near equal as possible to the load imposed by the transmitter excellent results can be obtained by the method outlined, and if a good double break key, properly adjusted, is used, complete satisfaction will be obtained. The operator can of course make use of any other desired combination for the balance—these are merely examples.

In connection with the system just mentioned some new ideas on obtaining high notes for quenched gap work, by the use of a special kind of balance, should be of interest. Several methods of doing this, all involving the same apparatus, will be given here for use with varying types of transmitters.

BALANCE SUBSTITUTING TRANSFORMER PRIMARY WINDING FOR FIELD COIL ALTERNATELY WITH EACH KEY DEPRESSION. SERIES MOTOR. ARMATURE RESISTANCE LIMITING POWER.

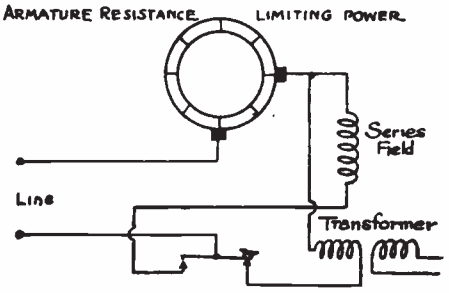
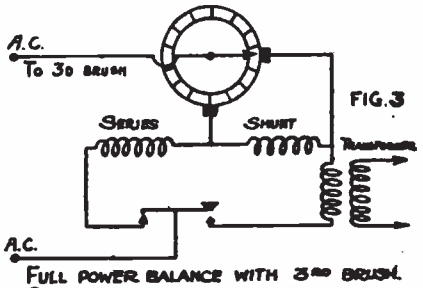


FIG. 2

A simple explanation of the operation of the scheme for obtaining a high spark note with alternating current can be summed up as follows. The commutator of a high speed motor, specially prepared, is connected in series with the coil or transformer primary. By varying the speed of this motor a wide range of spark notes can be obtained in the transmitter. By the use of a double-contact key to open the path to the motor COILS during key depression, and allowing varying portions of the current to pass through the commutator alone, almost any amount of power and nearly any desired pitch can be had under proper conditions. A third brush connection will be necessary to get full power through the commutator, but this is easily arranged.



FULL POWER BALANCE WITH 3RD BRUSH. COMPOUND WOUND MOTOR SHOWN.

For example, those who use small coils which they would like to run off the "city current" and get a high spark note from, can do so by connecting the coil primary in series with a commutator motor of the series type, as shown in Fig. 2. In order to get any appreciable amount of current through in this manner a motor of fairly large size must be used. If only direct current is available the outer edge of the commutator can be filed at each slot, one brush removed and a vibrating brush fitted to work on the notched end of the commutator, and a brush bridging condenser can be fitted to cut down local sparking. This scheme is intended for use where only a very small amount of power is needed, and a high note rather than distance transmission is the object sought. The motor will act as an impedance coil and prevent flickering more or less, but in the simple form just described will not act as a balance. The idea here has been only to show how a high note is obtained by breaking up the primary circuit with a series motor.

A pure balancing and full power scheme for use with larger coils or transformers is shown in Fig. 3. By attaching a third brush in line with one of the original brushes, and using a double break key, the "juice" can be alternately chopped by the commutator alone, and used, as a balance, to run the motor when not so chopped. This will keep the armature moving constantly. This method can be used with either a shunt or series motor, as the transformer current does not pass through the motor as is the previous case, but from main brush to auxiliary, being broken by

(Continued on page 27)

The Measurement of High Resistance

*By R. V. Achatz**

A well known radio amateur, in discussing with the writer some experimental work, said that he was having trouble in measuring the resistance of grid leak resistances which he was constructing. This suggested the fact that the writer had seen several articles describing the construction of high resistances but did not recall any description of methods of measuring their resistance after they were constructed. For this reason it was thought that a description of one method might be interesting.

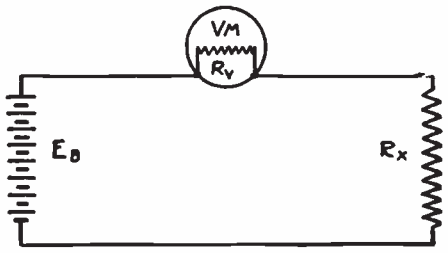


FIG. 1

An easy way of measuring the approximate resistance of any piece of apparatus is by means of a voltmeter of known resistance. The circuit is arranged as shown in Fig. 1, with the voltmeter in series with the resistance to be measured. The readings of the voltmeter, both in series with the unknown resistance and directly across the battery, are taken. The unknown resistance is then calculated from the formula

$$R_x = R_v \frac{E_b}{E_v} - 1 \qquad (1)$$

where R_x is the unknown resistance, R_v the voltmeter resistance, E_b the battery voltage and E_v the reading when the voltmeter is in series with the resistance.

This method depends upon the fact that the voltmeter reads the resistance drop of voltage between the terminals of the instrument and the battery voltage is then equal to the sum of the voltmeter reading and the resistance drop in voltage across the unknown resistance, or

$$E_b = E_v + iR_x \qquad (2)$$

The current i is equal to the battery voltage divided by the total resistance of the circuit, or

$$i = \frac{E_b}{R_v + R_x} \qquad (3)$$

By substituting this value of i in (2) and performing some simple algebraic transformations the expression in the form (1) is secured. The writer does not attempt to remember this expression but works it out whenever it is necessary to use this test. If the resistance of the voltmeter is not known it may be determined by placing the instrument in series with a known resistance and taking the same readings. In this case R_x is known and R_v is unknown.

The most satisfactory instrument for this test is one having a high resistance and many radio amateurs can secure access to such an instrument by cultivating the acquaintance of the Wire Chief at the nearest telephone exchange. A testing voltmeter forms part of the equipment of the trouble testing desk and is arranged with switching keys to make the various connections. One standard type of testing voltmeter has a double scale with a range of four volts and forty volts. The four volt scale has a resistance of 10,000 ohms and the forty volt scale has a resistance of 100,000 ohms. In many cases charts or curves have been worked out which will give the resistance directly from the voltmeter reading with a given voltage of the testing battery. With care in taking the readings, the accuracy of the measurement with this type of voltmeter should be within about five per-cent, which is usually sufficient for the purpose.

*Asst. Professor in Telephone Engineering, Purdue University, Lafayette, Ind.

FLICKER BALANCES

(Continued from page 26)

the mica segments. In Fig. 2, the idea is to open-circuit the field coils of the motor by the use of a double break key, and pass the current through the primary of the coil or transformer instead, and a series motor must be used for this work, the commutator and armature remaining in circuit.

By the addition of external resistances as wide a range of power can be had as may be desired, and by changing motor speeds a corresponding change in spark note can be had to suit almost anyone. The note will be clear and musical, but it will in most cases be found necessary to use a very short spark gap; but this is what is expected in quench gap work anyway.

Other forms of balance will occur to the radio experimenter. Such devices as cooling fans for gaps, etc. can be used. It

(Concluded on page 47)

More on Wave Meters

By Nine Zee Vee

THIRTY amateurs at a radio club were asked to state the fundamental wave length of their antennae. Not one could answer. Nor could any of them give the inductance or the capacity of their antennae, and only a few knew the wave length of their transmitters, and that because it had been measured for them at a distant receiving station. It seems that most amateurs adopt the hit-or-miss plan of making their aerials, transmitting condensers, and transmitting inductances of a certain size "because some other amateur used that size". Ask the average amateur the capacity of his transmitting condenser. Nine out of ten don't know. As for decrement—they have a hazy idea of what it means but that's all.

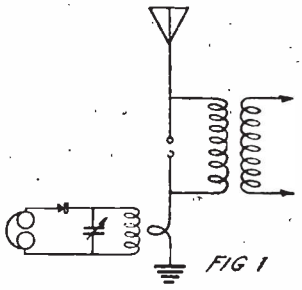


FIG 1

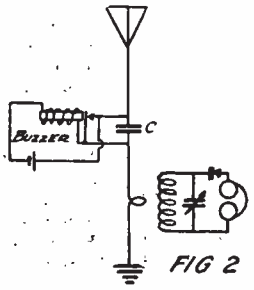


FIG 2

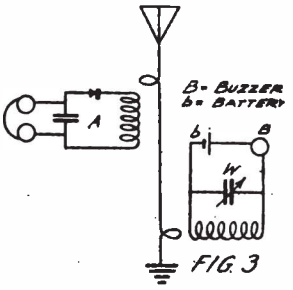


FIG 3

No wonder they named us amateurs.

By the simple and judicious use of a wave meter all of the above values can easily be obtained. A wave meter is just as necessary to the modern amateur set as a V.T. It seems, however, to be regarded by the general radioist as a luxury. The methods of using a wave meter as well as directions for constructing one have been very timely covered by Mr. Pacent in recent QST's; therefore there is no excuse for not having one.

Measurement of the natural wave of an antenna is probably well known to the up to date amateur. However, three methods of exciting the aerial are given in Figs. 1, 2, and 3. A small induction coil is shunted across a gap in the antenna-ground circuit in Fig. 1, while in Fig. 2 a condenser of 1 mfd. capacity replaces the gap and a buzzer replaces the induction coil. The 1 mfd. condenser here used has a large enough capacity with respect to the antenna capacity not to affect the wave length. The wave meter is placed near a loop in the ground, and the reading taken in the usual way. In Fig. 3 the antenna is excited by the wave meter W, A being the detecting circuit.

For the determination of the capacity of an antenna it is necessary to have at hand a variable condenser with either a direct reading capacity scale or provided with a degree-capacity curve. With the circuits arranged as per Fig. 4, vary the wave meter until it is in resonance with circuit A. Now disconnect the aerial and ground leads and connect in their place the variable condenser of known capacity. Leaving the W.M. unchanged, vary C until resonance is obtained. The capacity of C is then the capacity of the antenna. The inductance L must be at least five times the antenna inductance for accurate results. Another method of determining antenna capacity is to first measure the wave length of the aerial alone and then with a condenser of known capacity in series with it. If the two wave lengths do not vary by more than about 20% the aerial capacity can be calculated from the formula

$$C=\frac{C_1(\lambda^2-\lambda_1^2)}{\lambda^2}$$

where C=effective capacity of the antenna, C_1=capacity of the series condenser, λ=wave length of the antenna, and λ_1=its wave length with C_1 in series.

Antenna inductance is measured in a similar manner. The wave of the antenna is first measured alone and then with a known inductance in series with it. The formula then becomes

$$L=L_1\frac{\lambda^2}{\lambda^2-\lambda^2}$$

where L=inductance of antenna, L_1=known inductance, λ=wave length of the antenna alone, and λ_1=its wave with L_1= in series. From the fundamental formula for the natural period of a circuit containing inductance and capacity, (L=

microheneries, C=microfarads), it is obvious that if the wave length and capacity of an antenna are known the inductance can be determined. Or if the wave length and inductance are known the capacity can be figured. It is a good plan to measure both the inductance and the capacity and then check each by substitution in the formula.

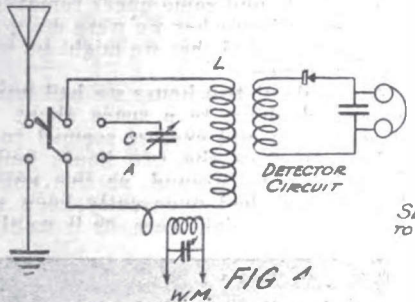


FIG 4

Measurement of the capacity of an unknown condenser also requires, besides the wave meter a variable condenser of known capacity. The circuits may be arranged as in Fig 5. With the D P.D.T. switch thrown so as to include C_x, the unknown capacity, in circuit, vary the inductance L until resonance is obtained. Now throw the DPDT switch over to C, and leaving L unchanged vary C until the circuits are in resonance. The $C_x = C$. This method is known as the substitution method. If the condenser of the wave meter has a capacity scale, a simpler method can be employed, as follows: With the inductance coil of the wave meter placed near some exciting circuit, the wave meter and that circuit are tuned to resonance. After the capacity of the wave meter condenser has been noted, the unknown condenser is connected in parallel with it, and the circuits tuned to resonance again. The capacity of the unknown condenser is then the difference between the first and last readings of the wave meter condenser.

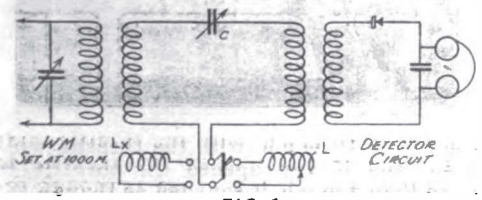


FIG. 6

The method for the determination of the value of an unknown inductance is similar to that employed for the unknown capacity. However, a variable inductance of known values is necessary. It is simpler when measuring inductances to place the unknown inductance in circuit with a known capacity, determine the natural period of the circuit and then by use of the wave length formula calculate the value of the inductance. Fig. 6, however, shows the circuits for the measurement of inductance. With the D.P.D.T. switch thrown so as to include L_x, the unknown inductance, in the circuit, the condenser C is varied until resonance is obtained. L is now thrown into circuit and varied until the resonance point is reached,

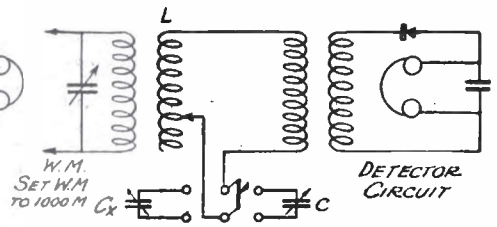


FIG. 5

C of course being left unchanged. The value of L_x is then equal to the value of L.

The tuning of a radio transmitting set to a definite wave has been gone over so many times that it will not be repeated here. The wave of incoming signals at a receiving station may be measured in two ways. If the signals are strong enough the inductance coil of the wave meter may be placed near the primary of the receiving transformer and the wave meter condenser varied until the loudest signals are obtained. A phone and detector are of course used in the wave meter circuit. Weaker signals which cannot be heard with this method may be brought to an exact tune on the receiving transformer, and the wave meter with a buzzer used to excite the former.

The foregoing measurements can be more simply and accurately made by using the oscillating V.T. method shown by Mr. Rawson in the August, 1919, QST. However, few amateurs possess the necessary milliammeter, so the above methods are in more common use. The known condenser required in some of the measurements can very well be the Murdock 43-plate type and the capacity curve shown by Mr. Pacent in the January QST made use of. After the condenser capacity is known it may be included with an inductance in a wave meter circuit and this circuit tuned to a certain wave. By substituting in the formula the known value of λ and that of C, the value of L can be calculated. We then have a known value of inductance by comparison with which further measurements may be made.

Induction Shooting

*By K. E. Hassel**

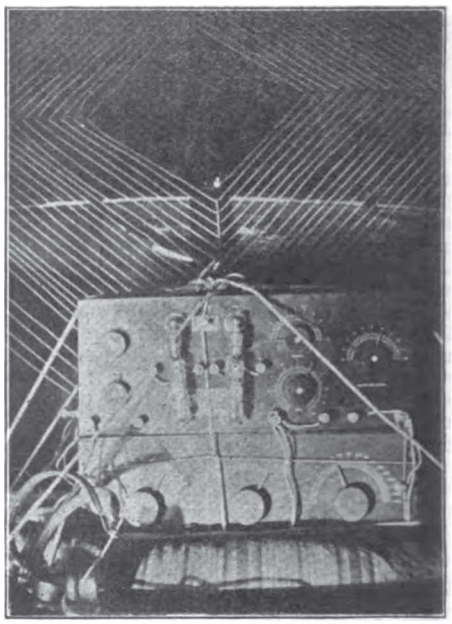
EVER lite up the old pipe, carefully adjust the fones, then flip on the bulb expecting to hear 8ER and be greeted by a roar that would drown out anything less than a 1-KW five miles away? Well, such was the misfortune of more than one station on the north side of Chicago. To spit on the cat wouldn't ease your feelings a bit and I doubt if throwing the cat in the lake would have helped much. Many a nite I reached for the Colt .45 and looked around for something to take it out on. To help matters 9AU would say "DX QSA hr tonite induction nil". Wouldn't that drive a man to Root Beer?

The above will explain why your log shows slight activity on the part of 9ZN for about two weeks, early last spring, before the QRN started up. Honest, OM, we could have rectified that induction and charged our battery with it. There were just three ways of stopping it. First, to ground the antenna; second, to turn out the bulb; and third, to go out and locate the source and apply the Wouff Hong. We used the first two methods for about two weeks; then we got mad and decided to try the third method.

When you start out to locate the source of induction in a city the size of Chicago you feel as if you were going out to find where the QRN comes from. The preparations were as follows: a flivver truck was furnished by Mr. Boettcher of 9KN, and equipped with his receiving set consisting of a C.R.L. Regenerative Receiver, a one-step Amplifigon, and the necessary tubes, batteries, fones, etc. A small loop was made up and connected to the antenna and ground posts of the receiver. The first nite that we got all ready to do or die, the induction never came on; however, the next nite it was as strong as ever and we started out accompanied by Mr. Marco of 9CD.

Just where to begin was a question, but inasmuch as CD seemed to hear it the loudest we began by taking our first reading in front of his house. To our great delight we heard the induction quite distinctly and best of all we obtained a definite direction which happened to be parallel with the street. We then went four blocks west and two blocks south and took another reading. The direction was determined and plotted out on our map. We then circled around, taking readings and plotting the directions on our map, until we had several lines which crossed in an approximate point which happened to be in a fairly live business district. By this time we had attracted the attention of many people and some queer remarks were heard as to just what we were doing. One woman suggested that we might be hunting a lost message.

After about two hours we had narrowed the search down to a space about half a block square and success seemed to be in sight. Most of the two hours had been spent in riding around, as this particular flivver truck had apparently been remodeled to haul freight cars, as it would only



run about 10 m.p.h. with the throttle wide open, and if you opened the throttle to more than 4 m.p.h. it sounded as though the engine was coming out from under the hood. However, even in a flivver you eventually get there and in another half hour we had discovered that a single street lamp had been causing more QRM than 29 boys with spark coils all calling CQ at once.

Now that we had located the culprit the next question was how to apply the Wouff Hong. Several nice bricks were in sight, but so was a cop, so that method had to be abandoned for the time at least. Right then I would have given a good VT for the use of a .22 rifle equipped with one of Mr.

(Concluded on page 47)

* Sales Manager, Chicago Radio Laboratory, and Operator "SF" at 9ZN.

CU in St. Louis

WELL, O.M., we're all set for that A.R.R.L. Midwest Convention in St. Louis, December 28th, 29th, and 30th. At the rate the Arrangements Committee has been receiving reservations, there will be SOME crowd there, and everything has been lined up to make it a convention that will outclass the Chicago meeting—which means that it will have to come off in great style.

Our President, our Traffic Manager and our Secretary-Editor of course will be there, glad to make the personal acquaintance of you fellows—you didn't think we'd miss being there, did you? It will certainly be great to meet face to face the men we hear in the air and read about. We will all get together and talk over our relay problems, the progress of our organization, how to improve our stations, and we will have lots of fun too, for the Committee has tipped us off to a few of the surprises that are in store for the gang, and we wouldn't miss 'em for a new condenser.

But you'll have to attend the meeting to get the benefit of these things. Every amateur who can possibly get there should feel it a duty and a privilege to be present, and he will leave the meeting a wiser and a happier man. Tell the Arrangements Committee, at 1300 Olive St., St. Louis, that you're coming, and start saving up your shekels. We'll see you there, OM.

The New Call Book

WITH unmitigated joy we greet the appearance of the Department of Commerce's list of radio stations. It surely does seem good to get hold of them again—to know that all one has to do to learn some chap's QRA is to look him up, and not be wondering for months who that particular DX station is.

The list is in the usual form of this publication except that this year it is in two sections, one listing commercial, government, and special amateur stations, and the other the general amateurs. Both lists are necessary to keep in touch with things on the air, and both should be in every amateur's station. Their price is but fifteen cents each. Altho published for the Department of Commerce, the Department does not make the distribution, and orders should be mailed to the Superintendent of Documents, Government Printing Office, Washington, D. C. It should be particularly noted that stamps are not acceptable as a remittance—it should be money order or personal check.

QST adopts the new lists as its standard and will resume the publication of calls commencing where they stop, in each district. If your call does not appear in the book, report it to us and we will publish it.

Take Care!

PROBABLY QST readers noted in the November issue the report of the signals of 7HH in 1HAA's list of "Calls Heard". At 12:15 a.m. on Sept. 24th a station signing this call was distinctly and without a question of doubt heard both by 1HAA and by several amateurs at Station 2VA, Hoboken, N. J. As the signals were none too loud, and swinging with every evidence of it being a distant station, 2VA and 1HAA thought they had hung up some pretty good receiving, and we went after a description of 7HH for publication in QST. We wrote to 7HH and learn that his maximum range was 25 miles, that his station has been dismantled since June, and that it is impossible that it was he whose signals were heard. The call has not be reassigned.

Now who was it? Could it have been an unintentional slip on the part of some other station? 8HH shows a clean slate, none of their operators being in the punk class and their station having confined its activities to experimental phone work during that period. We are therefore regretfully forced to the conclusion that some misguided amateur was maliciously signing false call letters for the express purpose of deluding other amateurs. Perhaps he was close by, and giving some nice

artificial fading by swinging his oscillation transformer open and shut.

We would like to meet this fellow. Such practices must be stopped at once and for all time. If these lines meet the eyes of the would-be "7HH" let him take them as a warning—that if we can find out who he is we will drive him so far out of Amateur Radio that his call letters will be SOL. Fellows, absolutely this sort of thing can not be permitted in our midst. The A.R.R.L. will not tolerate it an instant and will immediately take steps to bar any amateur guilty of such action from enjoying the privileges which belong to the rest of us as law-abiding citizens. A.R.R.L. Headquarters requests reports of any such instances that come to the notice of its members, and particularly wants to know the QRA of "7HH". Who knows?

QST the World Over

THE other day we received here at Headquarters a subscription to QST and membership in the A.R.R.L. from Prof. Bacon, head of the Physics Department of the American University at Beirut, Syria. Never heard of the place, did you? Well, to tell the truth, neither had we. We know now, however, that it is an American University of over 1,000 students located more than 7,000 miles from the QST Factory, over in what used to be Asiatic Turkey in the bad old days befo' de Wah. They have a radio set in connection with the Physics Department, and find that they need QST to keep abreast of the times! We'll admit it rather took our breath away. Then we started looking up our foreign subscribers, just to satisfy our curiosity as to just what places QST goes to besides the good old U.S.A. Here are a few of them. England and Mexico tie for highest in number of subscribers. Little Honolulu runs a close second, and third comes, who would ever think it, the Flowery Kingdom! Yes, we think that the newspaper dope we read about the awakening of China must have some grains of truth in it, for they are subscribing to QST over there, which you will agree, is a sure sign of scientific progress.

Central and South America, as might be expected, come in for a good share, for we mail copies each month to Argentina, Chile, Costa Rica, Nicaragua, as well as to the British West Indies.

Japan is on our mailing list as well, but we must say that so far China has her beaten in number of subscribers. Probably the Japs, as is their habit, saw a copy of QST and then started out to try and make a Jap imitation to take its place. We'll say it can't be done, fellows. Do you agree with us?

Nor must we forget Mr. Arnar, whose picture you saw in November QST. He holds the frontier line 'way up in Iceland. Says the only thing to keep him warm on a real cold night, about ninety below, is to read an Old Man story. T.O.M.'s language would keep anyone warm!

Isn't there something for us to think about in this? QST is the official organ of a body of amateurs actively working so far only in the United States and Canada. But our fame has spread to the ends of the earth, and we have brothers in radio all over the seven seas. Has not a germ been planted which may in time grow up and bear fruit in a great international organization of amateurs, who will be QSO each other not only "from the rocky coasts of Maine to the sunny slopes of California" but "from Greenland's icy mountains to India's coral strand", as we used to sing in Sunday School. Elsewhere in this issue we publish a letter received by Hugh Robinson, 2QR, Keyport, N. J., from Scotland, telling of the reception of his speech and the enjoyment of his radiophone concert! Who will say that the day is not nearer at hand than many of us think?

QST Ship Operators

IN the November issue of QST we published an interesting letter from the operator of KOSM reporting amateur signals up to 1300 miles off the Atlantic Coast. And we will not soon forget the splendid letter of Operator Roebuck a few months ago reporting signals that will probably long stand as records for some of our stations.

Can't we have more of this? All of us are interested in knowing how far we are reaching out, and the possibilities of some of us being heard in the China Sea or the Bay of Biscay are not nearly as remote as they used to be. The audibility and the fading at various distances will be interesting, too. Commercial operators who can spare the time to rig up some equipment to get down on short waves and report our signals to QST will do us a great favor, and will themselves find it most interesting to keep tab on the doings in the amateur world back home. And if anyone is particularly ambitious, perhaps we can arrange a schedule for certain of our good stations and get data on swinging and audibility every night until no signals are heard—and so hang up a few new records for miles-per-watt. Will you help us, you commercial ops?

THE OPERATING DEPARTMENT

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

WELL, we have paved the way for another rotten Old Man story, as the result of our reception in Hartford of the election returns. Only two stations were readable at times. They were 8ZW and 9ZJ. However, from them we were able to get information that was in the hands of the newspapers in some cases more than two hours ahead of the land wires. That is one thing to be thankful for and another is that we will get many laughs from the O.M. story if he finds this out. What success the other sections had remains to be seen but reports will be had in the January division reports. Rain and induction were the two big issues here in the way of prevention.

Several changes have taken place in the personnel of the Operating Department. Mr. J. C. Cooper, of the East Gulf Division, resigned because of pressure in his business. In his place we have Mr. E. H. Merritt, 192 W. North Ave., Atlanta, Ga. As yet Mr. Merritt is having difficulty in getting good material for relay work, as a careful survey of his report will show. Let's give him a lift, fellows, and report to him any station in that division doing good DX work.

Mr. C. A. Service, Jr., has resigned as he will be out of the Atlantic Division after this month. We have not learned of his destination, but hope he will be available in some other division. Mr. C. H. Stewart, 3ZS, has taken over the duties of the Atlantic Division Manager. Mr. Stewart is located in St. David's, Pa. His report shows that good relay material is needed and as Mr. Stewart is our representative on legislation, it is requested that all amateurs help as much as possible in keeping this division in order, as a legislative representative is a very busy man, indeed.

Fellows, in the Dakota Division we are going to lose Mr. R. H. Pray. On account of ill health he is going to locate in California. If he is able to be of assistance to the west we know that they will benefit greatly, as Mr. Pray has been most successful in his organization work, and to him is due the credit for awakening the amateurs in his part of the country. Mr. Boyd Phelps, 3344 First Avenue South, Minneapolis, Minn. has been appointed Division Manager of the Dakota Division. Mr. Phelps has done much to organize the Twin Cities, and undoubtedly will be a big factor in carrying out the work Mr. Pray has started.

The new appointment certificates of the Operating Department have been mailed to all amateurs holding office in the divisions. If your certificate has not been received, it is your duty to write your Division Manager and see that he has sent your name in. He has been requested to send a list of his personnel. If you are not a member of the A.R.R.L., you need not look for a certificate. Better check yourself up and send your application blank in.

Again—DIVISION REPORTS MUST BE IN THIS OFFICE NOT LATER THAN THE FIRST OF EACH MONTH.

This month's reports follow:

ATLANTIC DIVISION
Chas. H. Stewart, Mgr.

The relay work in this Division, while of considerable volume in the aggregate, is far from satisfactory, and it is fully realized that there is much room for improvement. Considerable perfection of the organized is still necessary if the best results are to be achieved. We are, however, working with this before us, and as soon as we can get the work properly divided and find some more reliable traffic assistants to take some of the burden off the District Superintendents, and as soon as an adequate organization within the Districts can be built up, we are confident that much better results will follow.

So far as Trunk Lines are concerned, they are still unorganized in spite of the best efforts. That is to say, so far it has been apparently impossible to build up a reliable chain of stations with such distances intervening as to insure a workable relay system under average conditions. It has been necessary to rely upon long jumps in many cases, and in this way a considerable number of messages have passed along through the Division.

District Superintendent for Western Pennsylvania, Mr. R. C. Devinney, reports that upwards of 300 messages were handled during the month, mostly by 8ZD, 8DV

and 8RQ. On Branch Line No. 2 he reports the loss of two stations, 8ADF at New Castle, Pa. and 8UG at Erie, but states that the Erie station will probably be replaced shortly. A station has been located at Vandergrift. The Traffic Assistant (8EN) has received a special station license, and is now using the call letters 8ZD, and has been heard recently quite well in the station of the Division Manager.

Mr. H. M. Walleze, Supt. Central Pennsylvania, reports that he is doing his utmost to get his own station 8BQ re-established. He states that he is not satisfied with the progress so far made in his District, but he is doing his best to find some way of improving the condition. It is a fact that available stations in his territory are few and far between, and it is a considerable handicap. He has appointed Mr. W. A. Cawley, of Milton, Pa. as his Traffic Assistant.

The Supt. for Eastern Pennsylvania, Mr. S. W. Place, of Norristown, Pa. reports that he is in touch with new stations at Pottstown and Reading, and hopes to get them interested in relay work shortly, and that if the former Pottsville station will only come to life soon, work on Trunk Line B could be carried on in a reliable manner through his District. He also advises that McVicar (3CE) of Norwood expects to return home within a month, and will be of assistance on Trunk Line D to the South of Philadelphia. In this connection it will be noted that 3HJ has been able to work 3HG at Baltimore on several occasions, and as the latter station has been heard quite often recently at my own station, it would seem that the old difficulty of working between the Philadelphia District and Baltimore is on the way towards a solution, although the ideal condition would be to have the gaps shorter for more reliable work. Mr. Roy C. Ehrhardt, old 8CE and now 8ZQ at Dunmore, Pa., has been appointed Traffic Assistant in charge of the northern counties of the Eastern Pennsylvania District.

Mr. R. B. Duvall advises that he is busy working up local matters in Baltimore, and that 3HG is doing excellent work nightly, and that 3IY has started into the game with renewed interest. Both stations have been heard by the Division Manager, which bears out Mr. Duvall's statement. It is certainly very gratifying to see that conditions are improving in this section.

Mr. Francis Baer (3XF) 1744 Corcoran St., Washington, D. C., has been appointed District Superintendent for the District of Columbia, and we can expect a comprehensive report from him by next month of the conditions in that section. All stations in that vicinity should make themselves known to him.

In the absence of a report from the Assistant Division Manager of the Northern Section of the Atlantic Division, I am not in a position to report on conditions in New York and New Jersey.

ROANOKE DIVISION
W. T. Gravely, Mgr.

We are off—the 1920-21 Season is on in full blast, and with it some new records are being made. The air is alive with amateur signals—the deep bassos may be heard booming, (and they are broad, too, usually), the fine rich, resonant tones of those a little higher may be heard pounding in, and on up the scale, until we reach the spark which comes good on the start, and which fades, fades, fades, away as the motor gathers speed (a condition due to the lack of balance between transformer, condenser and gap), and then the CW's, that so called "last word" in radio communication. If one can drop in on a good night and hear all that is going on, and fail to feel as elated as a youngster we will call him an "Oldster".

Reports from 3EN and 3FG, in the Norfolk District, are not very encouraging. They are complaining terribly of the QRM from NAM on 200 meters, which they say, is due to re-radiation. The Division Manager 200 miles away experiences lots of QRM also on 200 from this same source. These stations say they are unable to handle traffic with any consistency until the trouble at NAM is remedied. Let's hope it will be soon.

3HO, C. D. Blair of Richmond, reports progress. His station is on the air now and will soon be in good shape.

Mr. Wohlford, 3CA, Roanoke, reports slow progress in his District, but we hope they will be heard from ere the season has progressed very far.

Mr. Heck, (8EF) Mannington, failed to make any report this month, so we are without information concerning the W. Va. field.

However, 8ZW of Wheeling is being heard far and wide, so we know there is action in the State.

3AEV of Danville will soon be in the air with a 1 K.W. outfit, and will assist the Manager in relay operations at this point. He will conduct tests with the stations in the Division, with the view of mapping out effective lines. Those who are interested will please get in touch with Mr. A. S. Clarke, care Clarke Electric Co., Danville, Va., and arrange for test schedules.

Definite lines will not be created until these have been carried out, because a dead line is worse than no line at all—it demonstrates lack of efficiency, lack of grit and determination.

Word has come from the Radio Club of the University of Virginia, through Mr.

Sanders its Secretary, to the effect that their station will be in operation at an early date, certainly by the last of November. This station should fit in well on the main Southern route.

Very few new stations are being reported, so there is very little to build on. Therefore, it becomes necessary to perfect those we now have to a higher degree and handle traffic in longer jumps.

The Manager made the acquaintance of Traffic Manager Schnell a few nights ago through the ether with 1AW and 3BZ making the introduction. Communication as clear and as fine as could be desired. It was a genuine hand-clasp, friend Schnell—the Roanoke Division greets you —it is yours to command—we promise you our hearty co-operation.

EAST GULF DIVISION
E. H. Merritt, Mgr.

We are still unable to handle messages in this division due mostly to a lack of stations. Quite a few stations have written in that they are working on their sets and hope soon to have them ready, but even with these the number of stations available for relay work is very small, in fact, too small. I am sure though that if we all keep trying, we can get a route worked up soon. Let every one do his best to help out.

The route within the last few days has been open as far as Savannah but I have not yet had a report of any work being handled that far. We have heard 4YB reaching out, and while he fades badly here, he has been heard working over some remarkable distances. 5XA, Auburn, Ala., can also be heard quite often now but the Atlanta stations have been unable to work him yet. 5XA seems to go nearly every other direction, though 4XC and 4AG are both working and have handled several messages during the month.

The Division Manager has at last located a station in South Carolina, 4EG, Mr. W. C. Etheredge, Woodruff, S. C. 4EG is a new-comer and so far, his spark is unknown over here in Georgia. We will welcome 4EG heartily.

The Asst. Manager reports that he is also unable to locate stations in Alabama.

Mr. O. A. Gulledge of Fort Pierce, Fla., (4AT), has been appointed District Superintendent of Florida. It has been impossible for 4AT to work with stations south of him but they are trying everything possible to put it across to the fellows in Miami. They are trying directional aerials now and are tuning the sets to the highest possible efficiency and expect to make connection soon. 4AT will be able to work north.

The Division Manager again requests that all men in this Division that have not yet written in please get in touch with him at once. Several vacant places in the Division personnel will be filled as soon as men are found to take the jobs. The places we need to fill most are in the Districts of Alabama and South Carolina.

WEST GULF DIVISION
Frank M. Corlett, Mgr.

With more favorable atmospheric conditions prevailing in this section relay work is beginning to assume more business-like regularity. With the actual handling of daily test messages over the Trunk Lines and the heavy message traffic following directly behind these tests will come the information or data on which the Division Manager and his assistants will select the Trunk Line Relay Stations. Trunk Line Relay Stations will be the most efficient set of amateur stations in the Division and station owners should be proud of the distinction of having a Trunk Line Station Appointment in their station.

It is already apparent that a number of changes in the personnel of this Division's Traffic organization will be necessary for the best interests of the League.

District Superintendents and others having correspondence with Division headquarters have no doubt noticed the delay in answering their correspondence. The D. M. has realized for some time that the work of this Division justified the appointment of an assistant. Mr. Raymond L. White, having been transfered from Ennis to Dallas by his firm has been relieved of his duties as District Superintendent of Northern Texas and "promoted" to Assistant Division Manager, with headquarters in Dallas, temporary address General Delivery. Mr. White, besides having charge of the division's correspondence, will "sit in" at 5ZC until his station, 5AP, is again in operation. District Superintendents will report direct to Mr. White. I am sure that correspondence will receive the more prompt attention that it deserves under this new arrangement. Succeeding Mr. White as District Superintendent of Northern Texas District, Mr. H. P. Haeifer 5AJ, has been promoted from City Manager of Dallas to District Superintendent. All Assistant District Superintendents of Northern Texas District will report direct to Mr. Haeifer. A City Manager for Dallas will be announced later.

In the Oklahoma District three appointments of Asst. Dist. Supts., and their Territory assignments have been made. These are; Mr. C. M. Selby, 5BM, 1163 Locust St., Muskogee, Okla., Asst. Dist. Supt., Oklahoma District and assigned the Northeastern Territory comprising the Counties of Washington, Nowata, Craig, Ottawa, Rogers, Mayer, Delaware, Creek,

Tulsa, Wagner, Cherokee, Adair, Okmulgee, Muskogee, Okfuskee, McIntosch and Sequoyah: Mr. Emanuel Schonwald, 5ZZ, Blackwell, Okla., Asst. Dist. Supt., Oklahoma District and assigned the Northwestern Territory comprising the counties of Osage, Pawnee, Payne, Lincoln, Oklahoma, Logan, Noble, Kay, Grant, Garfield, Kingfisher, Canadian, Blaine, Major, Alfalfa, Woods, Woodward, Dewey, Custer, RogerMills, Ellis, Harper, Beaver, Texas and Cimarron: Mr. M. C. Poor, 5EF, 437 West Grand Ave., McAlester, Okla., Asst. Dist. Supt., Oklahoma District and assigned the Southeastern Territory comprising the counties of Seminole, Hughes, Pittsburgh, Haskell, Latimer, LeFlore, Pontotoc, Coal, Johnson, Atoka, Pushmahata, Marshall, Bryan, Choctaw and McCurtain. All amateur station owners in these respective territories should furnish their respective Asst. Dist. Supt. their name, call letters, and a description of their stations. It is hoped that a District Superintendent for Oklahoma District can be announced in the near future. In the mean time Asst. Dist. Supts. will report direct to the Asst. Div. Mgr. 5ZZ at Blackwell, Okla., will act as Division Terminal Station on Trunk Line Tests, starting a "FOX SOUTH" at 9 o'clock each night and forwarding to the Div. Mgr. all "FOX NORTH" tests received from the South.

Louis Falconi, Dist. Supt. of New Mexico District, announces the appointment of Mr. A. B. Livingood, care Mountain State Tel. & Tel. Co., East Las Vegas, N. M., as Asst. Dist. Supt., New Mexico District, and he has been assigned the East Las Vegas Territory comprising the Counties of Torrence, Guadalupe, Quay, San Miguel, Santa Fe, Taos, Colfax, Mora and Union. Mr. Livingood wants to hear from all amateur stations in his Territory giving names, call letters and descriptions of their stations. 5ZA reports the Southern Transcontinental Relay Route, TRUNK LINE C, open for traffic to the Pacific Coast. Up to October 14th **ten messages have gone thru to the coast either direct or Via 6GE at Douglas Ariz.** Another good station in Doublas which is going to prove helpful in the work to the coast is 6IG operated by H. L. Gooding. Have not heard from our old friend Bob Trump at Phoenix yet. To sum up the Trunk Line situation, New Mexico District will be able to take care of traffic from district boundary to district boundary with ease. Stations in El Paso, East Las Vegas, Clovis and Albuquerque seem slow in getting started but will be with us soon. This "season" is starting in with a bang. At 5ZA a dozen or more Pacific Coast stations are heard nightly. Until a reliable station West of Roswell can be located 5ZA will act as Division Terminal station on tests and will start a "CAST EAST" at 9 o'clock each night, and forward to Div. headquarters all "CAST WEST" tests received from the East.

The situation in the Southern Texas District apparently is unchanged. At Austin, Texas, 5ZU and 5BO are on most every night, QRN or not, until it is seen that QRN is too heavy for relay work. 5EJ at Austin has moved out of the city 5 miles to get away from the dilapidated street car system QRM. College Station now has a 150 watt aeroplane transmitter, 500 cycle set, which is far easier to copy than the 2 K.W. 60 cycle which they also have. 5ZN, Ed Nettleton, Eagle Pass. Texas, is heard breaking thru every once in a while. Austin and Houston stations have the greatest difficulty working each other lately, while either can work Kansas and Missouri stations with apparent ease. Mr. Wall is erecting a station in San Antonio, regenerative receiver, ½ K.W. Quenched Gap transmitter. This should be able to work around WUJ, the Army station, without interference. At last a San Antonio station! With E. A. Sahm and Harry Hans in New Braunfelds with a good station we should be able to work thru to San Antonio most any time. Mr. Daniels, 5AO, Asst. Dist. Supt. in charge of Houston Territory, reports Houston started off with a bang the first good night with 5DH, 5ZV, 5AO, 5CA, 5HE, 5AE, 5YI, 5XD, 5ZAC, 5ZT, 5JO, 5JK, 5JM in commission and other licenses on the way. The Southern end of Line F and the Eastern end on Line C will be well taken care of in Houston. Each station should be assigned some definite work to do and then do that one thing well. There is room for all good stations and still be plenty of work for ea h to do. The more stations the more there will be to do. Houston stations report that 5ZC, the division headquarters station, "fades" very bad. Signals between Houston and Dallas have always faded more or less and practical relay work, direct, between these points has never been done with any degree of satisfaction.

At one of the largest meetings of the Houston Radio Club, all officers of the last term were re-elected to succeed themselves. Lectures on radio theory will be resumed with the next meeting and will be given every two weeks through the season, the speaker to be chosen by the directors.

Some very good records have been made on transmission by 5AO, his signals having been reported QSA with very little QSS from New York 1435 miles, Philadelphia 1350 miles, while time signals have been reported by Elgin, Ill.; Clinton, Iowa; Hammond, Ind.; and Louisville, Ky. A 1 K.W. Thordarson and home-made semi-quenched gap are used.

Mr. H. P. Haeifer, 5AJ, newly appointed Dist. Supt. for Northern Texas District, reports radio activities becoming more promising daily. Asst. Dist. Supts., Pierce of Corsicana and Clyde Mosteller of Pilot Point reports have not been received. Assistants' reports should reach me promptly and regularly. In the Greenville Territory there are at least four dependable relay stations, 5IS, Frank Cain; 5DW, Dave Oblewitch; and Zeke Butcher, 5AL, of Greenville; 5HV, Arthur West of Commerce. 5CL, James F. Burnes of Marshall, has just been heard in the air. Amarillo Territory is progressing nicely under Asst. Dist. Supt. Martin, in the way of numerical strength. Henry M. Harris of the Waco Territory reports the Waco Hertzian Society is bending every effort to get their station at Hill's Business College going. We need this station or some station in Waco very badly on Line "F". 5GG, Fay Welden of McGregor is heard quite frequently. Harris says A. & M. College, Rice Institute, and Texas University are being heard in Waco. One of the operators at Texas U is Mr. Gordon White, formerly of Waco.

Come on, fellows lets get Ft. Worth on the radio map; get together and organize a Radio Club. It can be done with a very little effort. 5CG, Marion Apple, McKinney, Texas is doing good work and will no doubt land an appointment on a Trunk Line soon.

October 8th was an unusually good night in this section and it was possible to run tests on Trunk Line "F" both ways to and from Valley City, N. D. to Dallas, Texas. The Line South from Dallas was also in good working order that night so really Line "F" was complete terminal to terminal. Several days previous to this a test message was started north from Dallas and on this night the test was returned Via 9ZX, 9PI, 9LR, 5ZC. The test north was the same except that 5ZC gave it to 5CD and 5CD to 9LR. After 9LR gave 5ZC the south-bound test he remarked that he had worked 9ZX direct that night so congratulations were exchanged between 9ZX and 5ZC via 9LR. Later with the help of 9LR. 9ZX and 5ZC worked direct for a few minutes.

MIDWEST DIVISION

L. A. Benson, Mgr.

Announcement! The Division Manager invites the Radio World to the first Midwest A.R.R.L. Convention to be held in St. Louis, Mo. Dec. 28th, 29th and 30th, three big days.

This invitation is extended to all brother radio men in this and all the other Divisions for the sole purpose of being favored by your presence at this, the most important undertaking in our entire radio history.

The main purpose of this convention is to bring together the radio men from every Division if possible, to discuss radio in general and to shake hands with the many men with whom you have worked by radio but have never seen.

Speakers of prominence will address the visitors, and many vital factors will be discussed. Plans for the betterment of amateur radio will be formulated. It is proposed to make the convention an annual affair. We have many surprises in store for you and it is to your own advantage that you favor us with your presence. If you are a real radio man, if you have radio at heart, if you want to know how good the radio game really is—then by all means come to this Convention.

The Committee on arrangements will provide hotel accomodations—the radio men in St. Louis can accomodate several hundred at their homes. A banquet, "the kind that's different", a radio ball, contests for which elaborate radio apparatus will be awarded as prizes, and many other social features will be a part of the affair. You miss the biggest event in the history of your radio career if you miss this convention. For the good of the game and as a member of the A.R.R.L. give this the widest publicity possible, tell every one of your radio friends about it. Announce it "via radio" from your station.

9JA reports a personal letter addressed to each operator of a licensed radio station thruout the state brought forth very gratifying results and we have discovered many stations which will be of use this winter. Accordingly the stations who are out of commission have been taken off the routes and these new stations substituted. 9ZQ has worked 9ZJ at Indianapolis several times.

In the west a number of good stations have been located and 9AEQ is coming right to the front. 9ZU and 9FZ show promise in the northwest and 9MS seems to be the standby for the Davenport section. At Des Moines there are several good stations. The Burlington Club has promised to take care of the southeast and with 9CS, 9DT, and 9ZQ in the northeast we feel that we can get traffic thru at any time and to any part of the state.

The central portion is well covered with a number of good stations whose calls it is not necessary to mention here.

9HT reports "DX" has started and stations are pounding in. Considerable fading has been noticed during the past two weeks.

All stations in this district are showing extreme interest in traffic handling and many new stations are in operation.

9XT, Mr. H. H. Smith of Lincoln, now has his station in operation, and with 9UQ is successfully handling all traffic in that direction.

A station is badly needed in the northern section of this district.

It may be of interest to report that all fading recorded here is from stations north or south.

9KO reports a daylight route to Kansas City, Mo., has been perfected. 9ABI of Columbia, Mo., has proven a valuable station along this route. The route is as follows: 9KO to 9AJN to 9ABI to 9AOJ to 9DU to 9RP. These are all short jumps and communication is almost certain thru any QRN or QRM.

9DU is back in the game again but is having the usual trouble with the power company. He reports conditions in his territory the best ever and many new routes are now under construction.

DAKOTA DIVISION
R. H. Pray, Mgr.

Radio has been increasing in this division and relay work has been going on consistently. The trunk lines A and G are both handling traffic, A going via 9AJI, 9PN and 9OE in Duluth and Superior, to 9ZC or 9ZX (alternate 9WU) to 7IM at Billings, Montana. Traffic also has gone via 9ZT and 9HM in Minneapolis and St. Paul so that route is assured as far as 7IM, 7IM working west to 7CC and 7CU. Trunk line G has handled a message from Valley City, 9ZX, to Dallas, 5ZC, and an answer back to Valley City in half an hour.

Mr. Boyd Phelps, 9ZT, Superintendent of Southern Minnesota, has been giving talks to the various radio clubs in Minneapolis and St. Paul and reports great interest in the A.R.R.L. has been awakened. The amateurs of the Twin Cities evidently knew nothing about the principles of the A.R.R.L. and when they found that the A.R.R.L. is THE AMATEUR, the clamor for application blanks was so great that a supply had to be rushed from Hartford. Two of the clubs have been approved by the traffic officials of the Division and their applications for affiliation are now pending with the Board of Direction. It seems that that Twin Cities are in a fair way to take a place with the other cities of the middle west such as Chicago and St. Louis. The amateur radio activities of combined Minneapolis and St. Paul are under the control of the Twin Cities Executive Radio Council, which is much the same as the Chicago Plan. Consequently there is very little local QRM. Mr. H. R. Hall, 23 Merriam Place, St. Paul, has been appointed City Manager of St. Paul.

In the Southern Minnesota section outside of St. Paul and Minneapolis, stations are beginning to appear.

In the District of Northern Minnesota Mr. Gjelhaug, 9ZC, Superintendent, reports most of the news is from the Twin Ports, where Mr. Bridges, Assistant District Supt., and Mr. Wagner, 9EA, City Manager of Duluth, are working hard at organization. In Duluth there are now 9EA and 9AJI handling traffic, and in Superior are 9EO, 9MX and 9PN all working DX.

All in all, A.R.R.L. work of all kinds is shaping up much better this season than last and with co-operation from all members in the Division the Dakota Division should be one of the best for traffic handling. But there must be co-operation, which means that every one with any kind of station should get in touch with their District Superintendent. A list of officers will be found in the October QST.

ROCKY MOUNTAIN DIVISION
M. S. Andelin, Mgr.

Radio activities are commencing with renewed vigor. All old operators are back on the job with improved sets and ideas. Mr. I. J. Kaar, Assistant Division Manager, has returned from the coast and reports as follows:

"Things look good up this way in the line of radio. I am putting up a 70 foot mast so that I will be able to work with greater efficiency on 300 meters. 6OT, Mr. Berry, can work the coast and will stand by for traffic. Mr. Seely, 540 So. 9th East, Salt Lake City, is installing a continuous wave set for relay work.

"I intend to have the Colorado Wireless Association station at Denver act as relay station on trunk line "B" which runs as follows: 9JE Colorado Springs, or CWA Denver; 6ZA Salt Lake City, or 6ZH and 6JT Richfield, and link up with Central and Pacific Divisions on either side. Also a branch line will run from New Mexico up into Wyoming.

"Mr. W. C. Thompson of Richfield, 6ZH, has installed a 1 K.W. transmitter and is working on 300 meters.

"I wish to locate some good stations in Wyoming. Any one there desiring to get in the relay game please write or wireless me at Richfield, Utah."

NORTHWESTERN DIVISION
John D. Hertz, Mgr.

Now that we are entering the active winter season, we believe it well that all in the Division should know "who's who". Accordingly we present a revised list of Division officers. Several additions and a change or two will be noted.

D. M., John D. Hertz, 7ZB, Portland, Oregon. (Mail address, Box 873, Vancouver, Wash.)

Asst. D. M., Earl Dawes, 7ZD, Box 336, Bozeman, Montana.

Asst. D. M., Royal Mumford, 7ZJ, Vancouver, Wash.

D. S., Wilfred Slauson, 7ZG, Bear Creek, Montana.
D. S., L. L. Stanley, 7DJ, 320 State St., Helena, Montana.
D. S., F. F. Grey, 7FL, c/o Grey Machine Shops, Butte, Montana.
D. S., Jack Woodworth, 7CC, 170 Almon St., Moscow, Idaho.
D. S., Currie N. Teed, 7FT, Kuna, Idaho.
D. S., Howard F. Mason, 7BK, 3335 33rd Ave. S., Seattle, Wash.
D. S., Miss Winifred E. Dow, 7CB, 2329 South K. St., Tacoma, Wash.
D. S., Olfan DeGuire, 7CW, Silverton, Oregon.
D. S., P. W. Dann, 7JP, Box 974, Astoria, Oregon.

We take pleasure in announcing the appointment of Miss Dow as District superintendent at Tacoma. Miss Dow is a prewar amateur, and needs no introduction on this coast. She is an enthusiastic DX operator, and is credited with having constructed a great deal of her apparatus.

New territory has been opened in this Division at the mouth of the Columbia. Mr. P. W. Dann is the first there to establish communication with "the outside world". He has been appointed District Superintendent at Astoria. Communications to him should be addressed Box 974, Astoria, Oregon.

With the change in weather we notice another curious freak, it becoming more and more apparent as the weather gets "better". It seems that during the summer months the stations in Seattle and Portland have comparatively little trouble working each other, but with the coming of fall, communication between these points falls off almost entirely, while stations in both of these districts carry on satisfactory communication with sixth district stations. It has reached the point where the Portland boys are complaining that the Seattle stations are never on the job, yet we get letters from Seattle inquiring why no one in Portland is ever on.

The trans-continental route "A" has been open only irregularly. The boys on this side of the mountains say this is due to the fact that 7IM is on only occasionally.

We are greatly interested in the fact that communication is now open from Seattle to Everett, Wash. This is another step towards the Canadian border.

A Columbia River Route is being developed. At present this lines up as follows: Astoria, 7JP; Kelso, 7BV; Portland, 7BP, 7DA, 7DS; Vancouver, Wash., 7FH; Pullman, 7BQ; Moscow, 7CC; Spokane, ??. This is practically a daylight route from Astoria to Portland. This will probably go via any Portland or Vancouver station to 7BV, to some station in Chehalis or Centralia, to 7YS, to 7CE, 7CB, or 7BC, to 7AD, 7BK or 7AN. Every attempt will be made to locate the missing link between 7BV and 7YS. Salem and Silverton are also among the workable places from Portland during daylight.

The early part of the month was marked by the erection and maintenance of station "SF" at the Oregon State Fair, Salem, by the Northwestern Radio Association of Portland. Apparatus for this station was loaned by members of the Association, and included material for the erection of a 1 K.W. non-synchronous rotary spark set, used in conjunction with a short wave regenerative receiver and two stage amplifier. A transmitting wave of 260 meters was used by special authorization from our friend, Radio Inspector Redfern. The station complete was installed during three days prior to opening by the club engineers. Stations in all parts of the sixth and seventh districts were worked, and among others, 9WT was heard. Conversation on the Los Angeles-Avalon radio-phone circuit was heard regularly. The whole undertaking was pronounced a great success, and this success is attributed chiefly to the backing of the Northwestern Radio Association. It takes a radio club to put real things over the top, boys.

Mason, reporting from Seattle says: "Portland stations are heard here but seldom now. Even 7CW has faded out and is only heard occasionally. 7AD says he has not heard 7CU for three weeks. Sixth district stations are coming in better now than they did a month ago, 6BN, 6BJ, 6QR, 6EJ, 6FE, and 6AK being among the steadiest. Mr. Brott, 7AD, recently worked 6BJ direct, which is good work indeed.

"There is an increasing amount of small town stuff going on in Seattle. It looks as if two or three good stations will develop before long. 7IY on Vashon Island, about ten miles southwest of Seattle is heard here very strong, and he has worked 7FO of Everett, Wash., who does not seem to hear Seattle stations very well."

Miss Dow reports for Tacoma and vicinity: "Northwestern Washington claims a new record. On September twenty-second 7YS was copied by 9OE of Wichita, Kansas, a distance of approximately 1500 miles.

"We are rejoicing over the return of ex-7LV, Al Stenso, who was in the Navy during the war. Al has always been an ardent relayer, and this winter we'll hear some mighty fine work from him."

We heard our first Canadian station here a short time ago.

In Portland the following stations have been working. 7DA, 7BP, 7DS, 7DP,

7ZI. 7ZI boasts of working 6JD, (885 miles), from two A.M. till five A.M. one morning. Traffic from Portland goes south without trouble, occasionally east, but northward it is forced to go via USM, at present.

The D.M.'s station, 7ZB, is scheduled to be back on the job by the first of November. A fan antenna is going up, and a counterpoise is under construction. Working waves 375, and possibly 275, will be used, with a calling wave of 200 meters. For local work CW will be used on 150, 175 and 200 meters.

ONTARIO DIVISION
A. H. K. Russell

October has witnessed the revival of life in the Ontario Division, and progress has been most satisfactory.

In the early part of the past month, the Manager made a visit to a newly erected station in Niagara Falls, N. Y., and from there held a very satisfactory conversation both by I.C.W. and radiophone with station 3BP, that of Mr. E. Rogers in Toronto, the Niagara Falls part of the talk being supplied with a half kilowatt transmitter, spark type. As Mr. Rogers' signals have already been copied QSA in Buffalo and Brantford, he appears to furnish a reliable outlet for south and west bound traffic.

The station of the Manager has had some remarkable C.W. results considering that the radiation was approximately one-tenth of an ampere with a high voltage battery of flashlight cells giving about 250 volts. Signals from the radiophone in this station have been copied in Guelph and Kitchener, 40 and 60 miles from Toronto respectively. There are now over half a dozen C.W. stations of low power in Toronto. It is hoped that 3AB will have a medium powered CW and phone set working by some time before the New Year, with a range of a couple of hundred miles.

The District Superintendent of the Brantford district reports that things look extremely well in his territory, and he hopes shortly to be able to report communication established with both Toronto and Windsor, thus furnishing the connecting link for west bound traffic. Lack of a powerful transmitting set has so far kept Brantford off the DX map. In any case traffic to and from Toronto may now be relayed through by way of Niagara Falls or Buffalo.

Mr. Carter, the Windsor Superintendent, advises that relay work is going on well in his district, and his own station 3DH has a range of at least 250 miles, and quite recently his signals have been copied on a single bulb in Toronto.

East of Toronto, and to the North, there seems to be little hope that through communication will be established for some time, particularly in the latter direction. Mr. Lloyd at Sault Ste. Marie advise that several power stations have been erected but at present their traffic outlet appears to be down through Northern Michigan, particularly through KUXM or 8AID in Cheboygan.

Some promising receiving results are reported from Belleville, but nothing is known of the transmitting stations between here and Montreal, as the amateurs in this region seem to be shrinking violets, and refuse to let the Division Manager hear anything about them.

DELTA DIVISION
J. M. Clayton, Mgr.

After practically five months of closed season in the South it is gratifying to hear 'em roll in.

Mr. Paul E. Greenlaw has resigned as Assistant Division Manager of the Division and has been appointed Traffic Manager.

Mr. Hubert E. deBen, 5ZP of New Orleans, has been appointed Assistant Division Manager of the Division. Mr. deBen reports that Louisiana is sorely in need of DX stations.

Mr. Barrow, 5EA has been appointed District Superintendent of the state of Louisiana.

W. E. Anthony, 5ZS, of Shreveport has been appointed City Manager of Shreveport. Anthony is one of the old timers at the relaying game, having run 5ZS before the war.

New Orleans is overflowing with enthusiasm and interest, in fact so much so that some young hopefuls sit at their "wave-minus" sets and practice the code until late hours.

At present 5ZP is handling all traffic for the state of Louisiana. So far this month 56 messages have been handled by Mr. deBen.

Mr. Hutcheson, 5DA, Superintendent of the State of Tennessee, has been going quite a bit of DX work since October.

5YH fulfills what his "summer spark" predicted—a long-reaching whizz-bang of a noise. He has been kept busy clearing the old hook only to have 'em pile up on him again. This month he has handled (QSRed) 88 messages. 5YH has worked with 2RK, 3BZ, 9XM, 4XC and the rest of the DX fellows who pound in this way.

The Division Manager has at last succeeded in hashing together another station.

During the month of October 5ZL has relayed 148 messages.

Traffic going south is being cleared thru 5ZP mostly; however, quite a few have been handled thru 5DW and an occasional one to 5ZC.

Northbound traffic has no trouble in

getting away. It can go thru 9KV, 9LC, 9ABI, 9ZN, 8DI, or any of the midwest stations.

Westbound traffic is being cleared thru 5ZA as usual. 5ZA pounds in like a ton of brick all over the division and seems able to work just anyone he wants to.

Mid-West traffic has been handled thru 9LR and 9ABI but these seem to be a dearth of stations west of 9LR. Where is Kansas City this season?

The Delta Division A.R.R.L. QSS Tests start on November the 4th and will last all November. Tests will be sent every Tuesday and Thursday night by the following:

5ZL, 5ZP, 5YM, 5ZC and 5YE. While 5ZC is not in the Delta Division he has kindly consented to take the place of 5DA who will be unable to take part in the tests..

Twenty-five recorders have been selected in an approximate "double circle" around the transmitters. These recorders have been supplied with QSS forms. Each form bears the call of the recording station, the call of the transmitter and the date. They are arranged consecutively as to dates and order of transmission for each test night. The recorder merely notes the QSS and signs his name to each sheet.

It is hoped that the southern stations can show up infinitely better in these tests that they did in the summer series. In this connection I would like to point out that no better luck will be had this time unless we have far far better co-operation from one or two "roof raisers" down south than we did in the Bureau of Standards-A.R.R.L. tests just over. We hope some of these fellows will realize that by one thoughtless call during a test they can undo a mighty lot of work that some of the rest of us have put forth.

ST. LAWRENCE DIVISION
A. J. Lorimer, Mgr.

The past few months have been without any marked activity in this division.

The closing of navigation is not far off and we are looking forward to the return to transmission on 200 meters.

We are a little doubtful regarding our northern route to Quebec, having heard little or nothing from our northern stations since last season. 2BJ at Three Rivers used to work Montreal stations quite regularly but has not been heard from all summer.

2CI (3Z) at Farnham has been working every Saturday night for the past month and succeeded in getting some traffic thru to 1HAA and QSRed some to 2AK at Montreal.

Stations 2AK, 2CK, 2CL, 2AW are making good headway and may be handling traffic from Montreal to 8BB at Plattsburgh, N. Y. 8BB is the nearest U. S. station and seems to carry well to the south. When this station sets an operating schedule we will arrange a similar schedule here and route our traffic thru Plattsburgh.

1RAY, Burlington, Vermont, is being heard here but is QRZ most of the time.

NEW ENGLAND DIVISION
Guy R. Entwistle, Mgr.

The recent convention at Worcester brought out the following points:

1. New England has the stations.
2. These stations are successful in relaying.
3. The greatest difficulty experienced is to get the stations on at the proper time.

Thus far, only occasional messages filter thru. The writer has received several messages from New York indicating that a relay must exist, but the time taken for these messages in transit is altogether too long.

Mr. Fred A. Blethen has been appointed Traffic Assistant and has assisted the D .M. in formulating three main routes thru New England for both east and west bound traffic from New York, Boston, Portland, Montreal and the interior. These will be published at a later date, although copies may be obtained by writing the D. M. of the New England Division.

Certain evenings of the week are assigned to each man; also, definite hours of these evenings, thus limiting the time necessary to devote to actual relay work. In this way we feel that more amateurs will be willing to co-operate with us in the relaying of citizen's radio messages.

The Executive Committee of Greater Boston was called together shortly after the Worcester Convention, and the following regulations are to be upheld in this district:

Time divisions—6 A.M. to 6 P.M. free air, permitting opportunity for testing, tuning, code practice, chewing the rag, etc. 6 P.M. to 7 P.M., collecting of local relay traffic and short distance relays. This will give an opportunity to those not yet included in the main line routes to break in to the relay game and also get a line on their transmitting distances. 7 P.M. to 10 P.M., general work, working with one another, no relaying, no tuning and no testing. 10 P.M., all local work stops, long distance relay men check up their clocks by Arlington and start off and begin their regular schedules as indicated on the schedule sheets mailed to the various stations included in the relay. It is important that we all have the same time, as in many cases a station is limited to only fifteen minutes per evening. From 10 P.M. on will be devoted entirely to

main line relays and long distance relays.

By this time division everybody has an equal chance to do his own particular kind of work, and by a gentlemen's agreement results will be accomplished which cannot be brought about in any other way.

A Vigilance Committee has been selected to report local offenders, both as to willful QRM, failure to respect time schedules, and those with too great a wave length, spark coil transmitters using plain aerial, and the like. The D. M. has been promised the co-operation of local Radio Inspector Charles Kolster, in closing down offending stations.

Mr. P. J. Furlong, 6 Glenside Avenue, Jamaica Plain, Mass., has been appointed City Manager.

1DY has replaced 1BH as D. S. of Northern Massachusetts. Mr. J. C. Randall, 1NAQ, has been appointed D. S. of the Hartford, Connecticut, section. A. D. Ms. are re-appointed for another year.

Amateurs wishing to be included on trunk line relays should send the following information to the D. M.

1. Evenings and time of evening after 10 P.M. you are on.
2. First district stations you hear.
3. First district station you WORK.

With this information the Traffic Assistant can determine the possibility of additional men being placed in the relay chain.

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

During the month of October the winter relay season has fallen into its regular stride and greater quantities of traffic are being handled than even during last winter's long distance season. In order to facilitate both traffic and organization work, several changes have been made in the Division, the most important of these being the division of the state of Ohio into three Districts, to be known as the Miami Valley District, Toledo District and Eastern Ohio District. The boundaries of these districts are as follows: Toledo District—Enclosed by the outer boundaries of and including the counties of Van Wert, Allen, Hardin, Marion, Delaware, Licking, Knox, Ashland and Lorain. Miami Valley District to be enclosed by the outer boundaries of and including the counties of Mercier, Auglaize, Logan, Huron, Franklin, Pickaway, Ross, Pike and Sciota. District of Eastern Ohio to be bounded by the outer boundaries of and including the counties of Cuyahoga, Medina, Wayne, Holmes, Coshocton, Muskingum, Perry, Fairfield, Hocking, Benton, Jackson and Lawrence. The District Superintendents of these new Districts are as follows: Toledo District, Mr. K. A. Duerk, 8ZY, 600 Wilhelm St., Defiance, Ohio; Miami Valley District, Mr. and Mrs. Chas. Candler, 8ZL, 105 S. Ash St., St. Marys, Ohio; District of Eastern Ohio, Mr. A. J. Manning, 8ZG, 252 McKinley Ave., Salem, Ohio. Mr. Robert Higgy of 8IK, Columbus, Ohio, formerly assistant to Mr. Duerk, has been appointed Assistant District Superintendent of the Miami Valley District under 8ZL, because of the fact that Columbus, Ohio, is now included in that District. Note: 8ER has been changed to 8ZL. Mr. Henry Klaus of 9AK has been appointed District Supt. of Illinois, with Mr. E. G. Cunningham, 9AP, Champaign, Illinois and Mr. Ivan Frane, 9AQW, Eureka, Illinois, as assistants. Mr. Klaus is taking up the organization of his District where Mr. Taylor stopped, and expects to run a test over the new Chicago-St. Louis short distance route very soon.

The regular Sunday schedule of the Lake Shore Route, under Mr. Burhop, has been resumed with gratifying success. This route is a sure outlet from Chicago to Wisconsin and Minnesota towns, as well as to Canada and to the Northwest coast. In addition to his organization work, Mr. Burhop has been very active of late in increasing the A.R.R.L. membership. Mr. Melvin Herman, 9FN, 1419 S. 9th St., Sheboygan, Wisc., has been appointed Assistant District Superintendent for Wisconsin under Mr. Burhop and is undertaking, as his first assignment, the operation of the Madison branch of the Lake Shore route.

Although the District of Michigan was not very active during the summer months, it has returned to its normal condition and traffic is being handled as during the last season. Mr. C. E. Darr, the District Superintendent, has secured as Assistant District Superintendent Mr. Norman Schlaak, 405 Knox St., Birmingham, Michigan, who is assisting in the formation of routes and organization of club work.

Mr. Holst of 9BG, Chicago City Manager, is proving himself worthy of his position. Meetings of the Chicago Executive Council have been held at intervals of two weeks, and because of the absence of the Radio Inspector at Chicago, due to the transfer of Mr. Kolster, the Executive Council has had the job of regulating interference and in general enforcing the regulations. Its success along these lines has been very gratifying, which is due primarily to the co-operation of the various club members.

Traffic through Chicago is being handled in even better shape that ever before because of the number of long distance stations now able to handle traffic in this city. Among these we wish to express our appreciation especially to 9AU, whose operators Mr. Zeller and Mr. Sholtes have

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L. A. BENSON

This will serve to introduce the operator of 9KV, better known as "Benny".

Benson was born in 1898 in St. Louis, where he has always lived. The well-known radio bug got in its work on him at the age of 14, and of course it never heals. He has operated several amateur sets, his pre-war amateur station being prominent in amateur affairs in the middle west before the war. He has also taken his crack at commercial operating, serving with the Marconi Co. on several lake boats in 1917, and during the war was a radio instructor at Camp Pike, Ark. He is now Manager of the Midwest Division of our A.R.R.L., which he says is the best job of all, and his present station, 9KV, is doing record work.

"Benny" is holding a sheet in his hand but we don't dare show it. Is

(Concluded on page 47)

LOUIS FALCONI

Mr. Falconi, 5ZA, Roswell, New Mexico, is the man who put thru our coast-to-coast traffic last year. His well-known spark is a vital link in our chain, and we are glad to know him better thru the pages of QST.

He was born in Italy, March 25, 1895. Hearing of the wonders of America, the family moved to the United States and located at Portsmouth, Va., where LF lived until seventeen years old. He became interested in radio in 1911 upon reading in "Electrician and Mechanic" directions on "How to Make a Detector", and "the bug" did its work well, for he has been a firm radio bug ever since. In 1912 he installed a ½ K.W. set with the call 3HU and tried in vain to cover the seven miles to Norfolk. In the latter part of 1913, while about to graduate from high school, the position of

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WITH THE AFFILIATED CLUBS

"Live Wire" Radio Club
AFFILIATED WITH THE A·R·R·L·

NOTICE

It has been brought to our attention that several clubs either contemplating affiliation or perhaps having actually adopted a resolution making application for the same, are using stationery bearing the statement "Affiliated with the A.R.R.L." This can not be permitted. Affiliation means the establishment of a bond of brotherliness, and this cannot be completed until the League acts on the applications. Formal ratification by our Board of Direction is necessary, and generally about two months are required to accomplish an affiliation. Clubs should refrain from announcing their affiliation until they are advised that formal action has been taken and that their charter is being prepared, and A.R.R.L. members are urged to use their influence to prevent such misconstructions of the nature of affiliation in clubs to which they belong.

The Secretary will gladly communicate with clubs interested in becoming affiliated with the League.

New England Conference at Worcester, Oct. 31.

New England Conference

The annual conference of the A.R.R.L. New England Division relay officials was held at the Hotel Warren, Worcester, Mass., Sunday afternoon, Oct. 31st, with Mr. G. R. Entwistle, Division Manager, presiding, and about seventy relay men in attendance.

After a Dutch-treat dinner at 1 p.m., short business talks were made by President H. P. Maxim, Secretary K. B. Warner, Asst. Division Manager H. Castner. Traffic Manager F. H. Schnell, and District Superintendent Lee A. Bates were the principal speakers. The purpose of the meeting was the improvement of relay work along the line from New York to Portland, Me. There are several gaps in the line, general conditions requiring stations at close distances for reliable work, and the meeting was largely devoted to clearing these up. The meeting was thrown open to general discussion of the problems, everyone was asked whom he could work, reports were had on new stations in missing towns, and the data pieced together. Amateurs were present from Bridgeport to Portland and from Fall River to Vermont, and thru this get-together meeting a vast improvement in relay operation is expected. Daylight tests along a route from Bridgeport to Portland thru stations represented at the meeting, were arranged.

This business meeting is an annual affair, and Springfield, Mass. was chosen as the place for next year's conference.

Representatives were present from M.I.T.,

Harvard, Dartmouth, Tufts, Brown, Essex County, Cumberland County, Lowell, and Brookline radio associations, who, speaking for their entire memberships, added much to the value of the meeting.

The success of this year's meeting was largely made possible by the hard work of District Supt. Lee A. Bates, 1GY, of Worcester. We thank you, 1GY.

Chicago Executive Council

QST has mentioned "Grid Leak", the monthly organ of the Chicago Executive Council. It is growing, and is a fine, interesting little paper. In its general composition and printing it offers valuable suggestions to other clubs contemplating the publication of a paper, and we urge that they get a copy, which may be done by addressing the editor, Mr. N. E. Wunderlich, 4533 No. Sawyer Ave., Chicago.

Of particular interest to us is a warning to violators of the Chicago traffic regulations, with their call letters and offenses published in full. F.B.! It is not pleasant to see one's name held up to six hundred of one's fellow amateurs as a law-breaker, and this publicity will probably result in so reducing the violations as to make this space in Grid Leak available for more pleasant topics.

The October issue also contained 1 genuine T.O.M. story, short tho it was.

Baltimore Club Paper

A good radio club in Baltimore, Md., (affiliated with the A.R.R.L.) has hit upon a very good idea for increasing its membership and furthering the interest in radio matters by publishing a club paper, which we learn is called "The Radio Condenser".

The first issue was distributed Nov. 1st and contained some very interesting local news, besides a few articles on radio by some members. The paper has a wide scope, covering personal news items, technical dope, a Traffic Department, and other subjects interesting to amateurs in Baltimore and vicinity.

St. Louis Radio Assn.

The St. Louis Radio Assn., with fifty members, was recently reorganized and affiliated with the A.R.R.L., and now holds meetings every Friday evening from 8 to 10:30, to which anyone interested in radio is welcome. The present quarters are in the Y.M.C.A., but the club expects soon to have quarters of its own. This association is fortunate in having among its members a number of the older heads in the game, who give instructive and interesting talks at the meetings. Code practice is also a regular feature.

The Secretary, Mr. J. A. Fritz, is very desirous of hearing from other clubs.

South Side Radio Assn.

The South Side Radio Association, of Chicago, Ill., now has a wave meter of standard calibration and direct reading galvanometer type for use of its membership.

Meetings are held at 3400 South Michigan Ave. every Thursday evening at 8 p.m.

All amateurs residing on the South Side of the city of Chicago and who are not now members are requested to get in touch with us.

B. W. Stolte, 9NJ, Asst. Sec'y.,
3554 So. Halstead Ave.

South Jersey Radio Association

The South Jersey Radio Association is at last on its pre-war footing.

At our last meeting on October 14th, we had fifty enthusiasts out. Great spirit was shown. We had a fine talk by Mr. Wexlin, 3GW, on a simple wireless telephone that really works and does not cost much to construct.

The Association, in order to advertise itself more, furnished Collingswood, N. J., with the election returns.

We have at the head of the technical committee Mr. Haig, manager of the Independent Wireless Company. You can rest assured the staff is a good one.

Collingswood, N. J., is our headquarters. Men from all parts of south Jersey flock there on the third Thursdays of the month. Why don't you join the happy throng? We will make it worth your while.

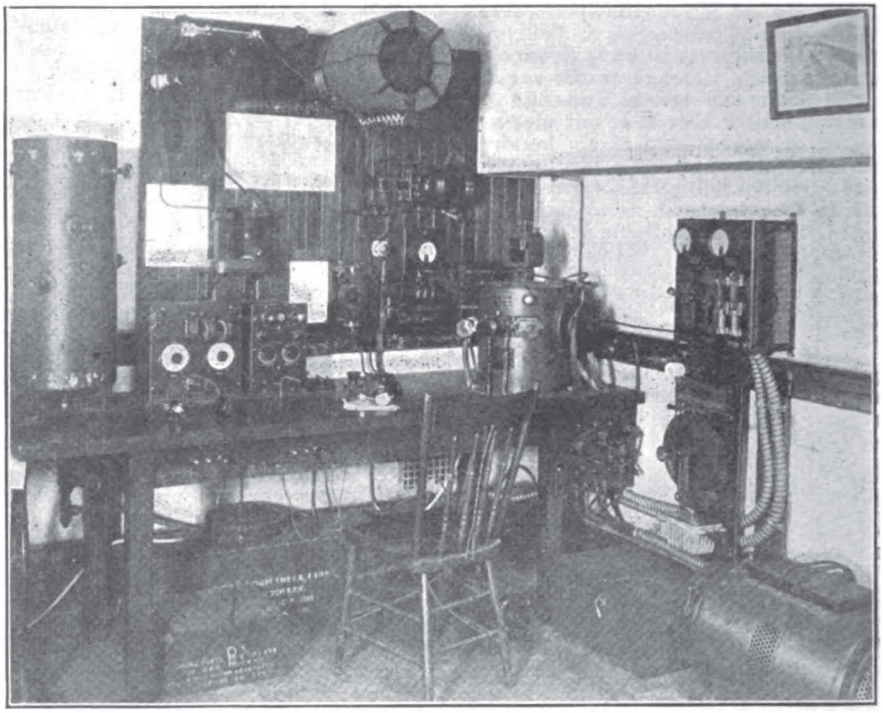
Radio Club of Tacoma

The Radio Club of Tacoma, which has recently become affiliated with the A.R.R.L. started up in November, 1919, but it was in existence several years before the war. Meetings are held every Tuesday at 8 p.m. in the Club's room in the St. Luke's Parish House. The officers are Leslie Lunan, acting President, H. J. Holt, Secretary, K. W. Weingarten, Treasurer, and Harold Manning, Asst. Secretary and Press Agent. There is a Wavelength Committee to tune all stations, an Interference Committee, and a Meetings and Papers Committee to arrange for talks at each meeting.

The Club has a nine o'clock curfew for local work so as to give the long distance men a chance. One thing about Tacoma that few cities of its size can say is that the operators here have had very little trouble or QRM from the "Great American Noise-Maker," the Spark Coil.

The secretary would be glad to hear from other clubs on any matters of interest. Address communications to Herbert J. Holt, 806 South Sheridan Avenue, Tacoma, Wash.

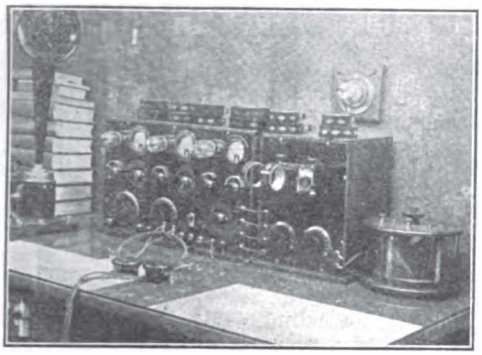
3YG, PHILADELPHIA



Probably many amateurs have heard 3YG and wondered who it was and what kind of a set was used. It is the station of the Philadelphia School of Wireless Telegraphy, which boasts of being the first school in this country to teach wireless exclusively, and the first on this coast to have an arc set in actual operation. Our photograph shows their arc set, which is a 2 k.w. Federal Poulsen, model Q, with a transmitting range of 2000 miles. This is not amateur equipment, of course, but there are features in this station that will interest QST readers, as most of us haven't much idea what an arc set looks like. A motor-driven chopper, which may be seen on the wall below the tuning inductances, is used for ICW on waves below 700 meters, while the straight arc is used for longer distances on the higher wave lengths, which are generally 2000 and 2700 meters. This station expects to conduct tests with similar stations located at the radio schools in Boston, New York, and Baltimore, as soon as all of them are in working order.

A NEAT RECEIVING SET

This set was built by Mr. Roy Haynes, of 6939 S. May St., Chicago, and consists of honeycomb mounting and variables in the circuit described by Mr. Groves in QST for last March, used with a detector and two-step, equipped with ammeter for



each bulb. Mr. Haynes states that he gets wonderful results with this set on both spark and undamped, and the Magnavox provides radiophone music loud enough to dance to.

QST

Did we hear you say you would like to see more photographs of stations? Well, so would we, but this month we had no more interesting ones that would reproduce. You can help by sending in photos and description of YOUR station. Photos should be clear in detail, on glossy paper, and preferably flashlites 4" x 5" or larger.

L. A. BENSON

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it a QST or something else good in the radio line? No, gentle reader, it isn't. The original photograph in our office quite clearly shows that it's a fashion plate from a woman's magazine! But, then, wasn't he all dressed up when he had his picture grabbed?

LOUIS FALCONI

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radio operator on the Coast Survey U.S.S. "Bach", NLK, was offered him, and the desire to travel and operate a sure-enough station was so strong that the job was accepted. After six months of pea-soup, salt horse, and Scandinavian Turkey, the Doc decided that a trip west, for better or for worse, was needed. Thereupon arrangements were made for a trip to the land of "Injuns and wild men". The trip ended at Fort Stanton, N. M., and the stay lasted three years, during which time a home-made receiver was the only available radio apparatus, there being no A.C. During the war he moved to Roswell, and after the war a station was installed, and so 5ZA came into being. Present occupation, peddling and repairing "Exide" batteries and perfecting 5ZA at odd times.

OPERATING DEPARTMENT

(Concluded from page 42)

been standing alternate watches, thus keeping the station open practically every night. In this way, alternating with 9ZN, 9AU has handled successfully a great amount of relay traffic which has assisted in relieving the congestion at 9ZN.

FLICKER BALANCES

(Concluded from page 27)

might even be possible to use special vibrating interrupters in place of the motor type as a balance in case no motor is available.

Why not follow out some of the ideas presented above, and not only prevent the lights from blinking when the transmitter works, but get a five hundred cycle note, a few batteries charged, or a little cool air for your overheated instruments into the bargain?

*Author "Radio Buyer's and Builder's Handbook."

INDUCTION SHOOTING

(Concluded from page 30)

Maxim's silencers. There was a small door in the pole which covered the lowering mechanism, but after trying all the skeleton keys we had, then a hammer and a chisel, we had to abandon the idea of first aid. After about fifteen minutes debating, mostly spent in cussing at the lamp, we decided to go home, determined that if the power company didn't fix the trouble we would, and not according to any underwriters' rules either.

The next morning I got in touch with one of the power company officials who was also a radio man and he saw to it that the trouble was investigated and corrected. The trouble seemed to be an arc in the lamp base. The lamp was of the incandescent type connected in series on a 2200 volt over-head line. The offending lamp was located about one mile from 9ZN and less than one block from 9CD. Although the induction from this lamp was terrific within a radius of a little over one mile, it seemed to die out quite rapidly thereafter, as stations located about three miles away were unable to hear a sound from it.

The line apparently acted as an antenna and it couldn't have done the job better if it had been designed for the purpose. I was unable to be present when the repairs were being made and therefore cannot say positively what the trouble was, but I do know that it caused our power bill to take a drop.

2BAD: Say, OM, what is a damped oscillation?

4NIT: I'm not sure, but I think it is somebody shimmying in the rain!

Ex-1IAA sends us an idea for mounting a tubular audion in the standard base of a burnt-out VT. Most of the latter have prongs consisting of very small pipe, into which the lead wires are soldered. They may be removed, the leads from the tubular audion inserted in their stead, the audion shoved down into the base as far as possible, sealing wax run in to hold it, and the new leads soldered in.

The Westinghouse Electric & Mfg. Co. announce their entry into the commercial wireless field. During the war this company carried on valuable research work in radio and so is equipped to assist in the advancement of the art. They have acquired control of the International Radio Telegraph Co., of New York, including its stations WCG, WCY, WSC, WLC, and WCI. They will be interested also in the manufacturing branch of the business, their great munitions factory near Springfield, Mass., having been equipped for the manufacture of all kinds of radio apparatus. Things of interest to the amateur are expected. It will be remembered that 8XK, the station of Mr. Frank Conrad at Pittsburgh, is licensed in the Westinghouse name, Mr. Conrad being a well-known Westinghouse engineer.

Regarding the recently-announced GE-WE patent merger, it is announced that the A.T.&T. has "bought into" the Radio Corpn. of America, and that an exchange of licenses has been agreed upon. This should entirely clear the vacuum tube situation, and it is also rumored that it presages the inauguration of ship-to-shore radiophone in connection with the Bell land lines, to which end the Western Electric experiments of the past year have no doubt been conducted.

Dear Eddie:

Who is 1BVD? I got him all summer, but not any more. I guess he's off for the winter, eh? He used to be in the air all over the country every Monday morning.

The Old Dog.

Operators from 9ZN covered the recent Moran-Leonard fight at East Chicago, 20 miles from Chicago, for the Chicago "Herald Examiner", with a DeForest radiophone and a portable ¼ k.w. transmitter, the arena being so situated that no telegraph or telephone wires were available. Mr. Hall, one of the sporting editors of the paper, dictated his report of the fight over the radiophone, the spark being used for calling. Mr. Hassel worked 9ZN and had a reporter at his end to take down the stuff, with phone connection to the Herald Examiner office.

The call letters of the new Lafayette station at Bordeaux are LAF, and the wave length is 23410 meters.

Kruse says 8XK's typewriter has a cold—and wouldn't it be wonderful it sometime in a fading report it would write "8ER" instead of "ADR"?

9LR is doing phenomenal work. 6EN, Los Angeles, reports him in the phones for a half hour on two recent nights, and as QSA as San Francisco when in on a swing.

The question of licensing amateurs in New Zealand is now before the House of Representatives and it seems almost certain that the necessary legislation will be passed. It looks practically as certain, however, that the new laws will give the New Zealand amateurs but very little more privileges than are "enjoyed" now by amateurs in England. It is that much, anyway. Anticipating licenses in the near future, amateur clubs are being formed in numerous N. Z. towns.

The gold cat-whisker is hereby awarded the amateur who was recently discovered with a big knob fastened to the vibrator screw on his spark coil. When he started to send he would have the vibrator unscrewed, and as he sent he tightened it up by the big knob, and vice versa as he got thru, giving a very creditable imitation of a rotary. What will they try next!

Pending the appearance of the government call book, the Managers of the Northwestern and Central Divisions mimeographed lists of call letters in their territories and distributed them for the use of

relay stations. This was a great help and was much appreciated.

There's a "blacklist" hanging up in 1HAA's shack. The way to get listed on it is to transmit during the A.R.R.L.-BS fading tests.

When you write "that man with the big husky spark", bear in mind that you are one of a hundred doing the same thing—enclose a stamp. One hundred two's pay for a year's subscription to QST.

A soak on his ivory top-mast for the guy who hollers "QRM" when he means "QRS".

Will 2TF tell us how he makes his rotary jump ahead when he presses his key each time? It lends individuality.

Isn't it about time Runyon came back in the game?

Has any United States amateur succeeded in getting any Ediswan tubes shipped into this country? We understand the English firm is afraid of patent litigation here and will not make shipments to the States. The customers duty, by the way, it about 60%.

A new idea for rectifiers for CW has presented itself. We learn of several amateurs who are experimenting with electrolytic rectifiers. A number in series are necessary for each side of the circuit, as there is a critical voltage beyond which they cease to rectify. The current being small the jars may be small, one experimenter we know using test tubes, with elements of aluminum antenna wire and lead fuse wire, in a saturated solution of ordinary borax. If any of you will report your results in this line, the Editor will be glad to present them in QST for the benefit of the fraternity.

WOULDN'T IT BE WONDERFUL—

If 9ZJ's second operator would sign off with "ARK" instead of using "SK" every time?

If 1NAP would stay awake long enough to work 1AW and so prove that 1AW's 5 amps can cover seven miles? Final Authority please note.

If 9LR had a copy of the QR and QS abbreviations before him all the time and could send 30 a minute?

If 6ER wouldn't sit on his key at about .6 o'clock every evening?

If 1DY would send with the other foot once in a while?

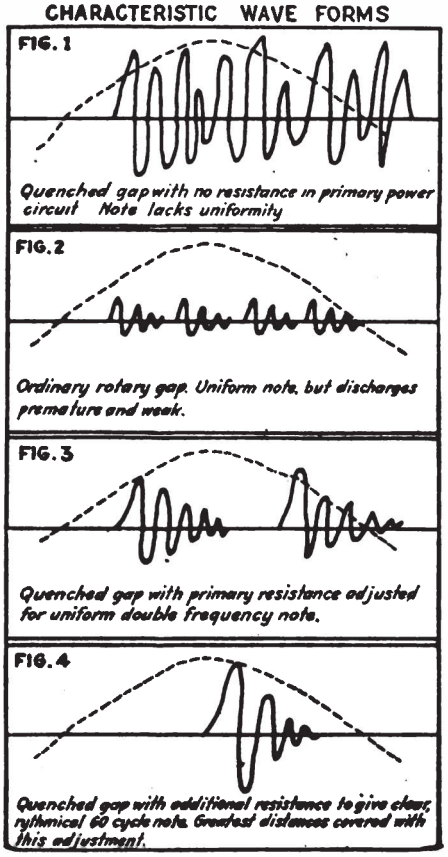
If Portland, Maine, had a live amateur in it who could be heard regularly on the job?

If 6ADU could work 7CU? And if 6KA wouldn't change his tone every day and ask everybody "QSB? QSA?"?

If we could regularly have those wonderful quiet spells that are common during the QSS tests?

Re Quenched Gaps

MUCH has been said pro and con on the subject of rotary and quenched gaps. Both gaps have been found to be good but the quenched gap has certain inherent advantages about which there seems to be considerable lack of knowledge. Briefly, the quenched gap causes the transmitter to radiate



maximum energy on a single wave length, reducing interference and increasing range, and is practically silent in operation even when operating at full power.

More in detail, a rapid quenching action quickly stops discharge of the transmitting condenser after the first and most powerful oscillations have passed. Thus, the induced energy is concentrated entirely on the antenna allowing it to radiate on a single sharp wave length and preventing a wasteful re-transfer of energy back into

(Concluded on page 66)

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.

8UD, CATTARAUGUS, N. Y. to Sept. 1
8EV, 2JU, 2XB, 2XJ, 2XX, 8CK, 8DA, 8DI, 8DV, 8ER, 8FM, 8GB, 8GW, 8HA, 8HB, 8KZ, 8IK, 8IL, 8LD, 8LW, 8LX, 8UI, 8UO, 8WY, 8XK, 8XU, 9AJ, 9CA, 9HR, 9CP, 9ZN, 9ZS.

2KV, BRONXVILLE, N. Y., July 1 to Sept. 20.
1AW, 1BM, 1BBZ, 1CBJ, 1CD, 1CE, 1CK, 1DL, 1DQ, 1FAQ, 1FV, 1FW, 1GY, 1HAA, 1JAP, 1NAQ, 1OAL, 1PG, 1RZ, 1SZ, 1TS, 1XE, 2BM, 2TF, 3BA, 3BC, 3BE, 3BG, 3BZ, 3CV, 3CW, 3DR, 3DS, 3EN, 3ES, 3EX, 3FG, 3FN, 3FR, 3FW, 3GH, 3GU, 3GX, 3HG, 3HJ, 3HO, 3JK, 3KM, 3LA, 3LP, 3LS, 3LY, 3MU, 3NB, 3OB, 3PE, 3PS, 3PU, 3RK, 3RW, 3SX, 3UA, 3UU, 3UC, 3VV, 3ZA, NSF, 5DA, 8ACF, 8AFA, 8BP, 8BV, 8CB, 8DA, 8DI, 8DV, 8DY, 8EN, 8ER, 8FG, 8HH, 8HP, 8IC, 8IK, 8JS, 8LA, 8LX, 8MB, 8MI, 8MT, 8NI, 8QM, 8RQ, 8RS, 8WY, 8XK, 8ZS, 8ZW, 9BS, 9EQ, 9IA, 9IO, 9IT, 9ZL, 9ZN.

2TF, SCHENECTADY, N. Y., July 20 to Sept. 5
(1AW), (1A[illegible], 1AR, (1AS), 1AG, (1BBL), 1BM, (1BL), 1CK, (1CE), (1DQ), (1DR), 1ES, 1EK, 1EAR, (1FB), (1FV), 1FW, 1GY, 1GAO, (1HAA), 1HO, 1NAQ, 1NAX, (1QP) C.W., 1RZ, 1SZ, (1UN), (1XE), (1XB) phone, (2AJW), (2BM), (2BK), 2BG, 2CT, 2DN, 2EL, (2HI) C.W., 2HN, (2JU), (2MK), (2NF), (2OA), (2PL), 2QR, (2RK), 2SH, 2UC, 2WB, 3BG, 3DS, 3EH, 3EN, 3FB, (3NJ), 3IJ, 3JK, 3KM, (3NB), 3NO, (3OB), 3VV, 3XI, (3ZA), 8AD, 8BP, (8BV, 8CB, 8CH, (8DV), 8DA, 8DI, (8EN), 8EL, 8FO, 8GB, (8GY), 8IK, 8JU, (8JS), 8LK, 8LF, 8MT, 8ML, 8NI, (8QM), 8RW, 8SH, 8UO, 8XK, 8ZY, 9ZN, 9ZT.

3CS, TRENTON, N. J., July and August
1AW, 1CB, 1CE, 1CK, 1HAA, 1NAQ, 1XD phone, 2CX, 2EL, 2JU, 2NF, 2ME, 2QR phone, 2RC, 2RK, 2UE, (2VA), (2JZ), (2WB), 2YM, 2ZM C.W. and phone, 2ZV C.W., 2XX Mod. C.W. and phone, 2XF phone, 2XJ phone, 3BG, 3BZ, 3CM, 3EN, 3FB, 3FG, 3FL, 3FR, 3GR, 3GX, 3GV, 3HJ, 3HX, 3JM, 3KM, 3PW, 3MU, 3ARY, NSF, 3XH, 3ZA, 8LW phone, 8BP, 8DV, 8MT, 8WY, 8XK, 8ZW.

2AOS, MONTCLAIR, N. J., July 26 to Sept. 10.
1AW, 1EPE, 1JA, 1AS, 1HAA, 1PS, 1OAL, 1JH, 2XJ (phone), 2XC (phone), 2ARD (phone), 2WI (phone and C.W.) 2ZM (phone and spark), 2MT (C.W.), 2JP (C.W.) 3KM, 3BV, 3FG, 3CV, 3WN, 3HJ, 3AV, 3BG, 3LY, 3GB, 3GV, 3ZA, 3NB, NSF, 8DI, 8OV, 8XK, 8GY, 8MT. Two's too numerous.

3KD, PHILADELPHIA, July and August
1AW, 1AR, 1HAA, 1NAQ, 1XG (fone), 2BK, 2NF, 2JU, 2UE, 2XJ, 3NB, 3BH, 3KM, 3EH, 3RW, 8DA, 8DI, 8DY, 8ER, 8NI, 8SH, 8XK, 9HR, 9ZN,

2TT, NEW YORK, July 1 to Sept. 30.
1AK, 1AW, 1BL, 1DQ, 1FW (daylite), 1HAA (daylite), 1JAP, 1NAQ, 1RZ, 1XE, 2TF, 2BM, 3AAE, 3BG, 3BZ, 3CS, 3CV, 3EH, 3EN, 3EV, 3FB, 3FG, 3GX, 3HG, 3HX, 3HJ, 3KM, 3NB, 3ND, 3OU, 3RW, 3UC, 3VV, 3ZA, 3ZW, 4AE, 8ACF, 8BP, 8CB, 8DA, 8DR, 8EN, 8ER, 8FT, 8HH, 8IK, 8JS, 8LF, 8WY, 8XK, 8ZW, 9LC, 9ZJ, 9ZN, NSF, 2CM (Canadian).

6OC, SAN FRANCISCO.
6AK, 6AV, 6BQ, 6CT, 6CV, 6EA, 6EB, 6EJ, 6ER, 6FE, 6FH, 6FS, 6GE, 6IF, 6IH, 6II, 6IT, 6JD, 6JI, 6JM, 6JQ, 6KP, 6OH, 6PQ, 6QM, 6QR, 6SK, 6TC, 6UM, 6AAK, 6AAT, 7BJ, 7CF, 7CU, 7CW, 7ZI.

8ACF, WASHINGTON, PA., during Sept.
1AK, (1AW), 1CM, 1NA, 1RZ, 1SA, 1BBL, 1HAA, (2BK), 2BM, 2CM, 2DA, 2DJ, 2EF, (2EL), (2GR), 2HG, 2HT, 2JU, (2JZ), 2KM, 2NF, 2RK, 2WB, 2TF, (2ZL), 2AIF, 3BZ, 3CT, (3DH), 3HJ, 3KM, 3ZW, 4CC, 4CP, 4BQ, 4DL, (5DA), 5HA, (8AM), 8FI, 8FT, (8GW), (8JS), (8AAW), (8AJT), (9AU), 9AP, 9DV, 9EQ, 9EE, 9KV, 9GK, (9GX), 9HR, 9IF, (9HM), 9LR, 9NQ, (9VS), 9ZJ, (9ZL), 9ZN, 9ZQ, 9AAP, 9AAX.

4BZ, ATLANTA, GA., April 22 to May 30
1AW, 1EP, 1ZG, 2BM, 2FG, 2ZM, 2XJ (fone), 2ZS, 3FG, 3GO, 3NC, (3XA), 3XF, (NSF), (4AE), 4BB, 4BK, 4BQ, 4CC, (4YB), 5AP, (5BT), (5BZ), (5DA), 5EA, (5YE, 5ZP, (5ZX), 5ZY, 8DA, 8DC, (8ER), (8JQ), (8LA), 8LR, (8NZ), 8PJ, 8WY, (8XA), 8XP, 9AK, (9CA), 9CE, (9GO), 9GX, (9HN), 9IJ, (9KV), (9LC), 9NK, 9OV, 9PS, (9PV), 9QJ, (9RP), 9UG, 9YA, 9YB, (9ZL), 9ZT.

2HN, LONG ISLAND CITY, Aug. 15 to Sept. 20.
1AW, (1BM), (1BBL), (1CK), 1DQ, 1FAG, 1GY, (1GAX), (1HAA), 1HAX, (1NAQ), (1PY), 1QR C.W., 1RZ, (1SZ), 1TL, 1VB, 1VG, (2BK), 2BM, 2CT, 2DN, 2EL, (2GR), (2HJ), 2JN, 2JZ, (2JU), 2MC, 2OA, 2PT, 2RK, 2WI, (2YM), 2ZL C.W., 2ZM, 3BG, (3BZ), 3EH, 3EN, 3DC, 3GX, 3HG, 3HJ, (3KM), 3OB, 3VV, 3ZB, (3ZE), 4CC, 4CP, 8BP, 8BV, (8DR), 8DJ, 8DZ, 8EN, 8GS, 8HH, 8HM, 8JS, 8JJ, 8LL, 8PQ, 8ST, 8XK C.W., 8IW, NSF fone, (8ZD), 9AP, 9EQ, 9HR, 9VS.

9AP, CHAMPAIGN, ILL., September.
1AK, 1AW, 2JZ, 2RK, 3ND, 3BZ, 3ZW, 4AE, (4BQ), (4YA), 5YH, 5CD, 8DR, 8ZD, (8HH), 8CI, 8FT, 8CB, (8HG), (8DZ), 8OI, 8GE, (8LA), 8AM, (8LF), 8OZ, (8XK), (8GB), 8NG, (8ZY), (8EN), 8UO, (8DI), 8DF C.W., (8GY), 8IN, (8DV), (8IK), 8ML, 8FI, 8CF, 8LW, 8WY, 8JJ, 8NI, 9AX, 9AV, 9AA, (9AEG), (9AIG), 9AFB, 9ACY, 9ABL, (9AT), 9AMK, 9ABJ, 9AUF, 9IO, 9FS, (9HM), (9ZL), (9ZC), (9EE), 9HD, 9EL, 9LR, 9ZQ, 9FL, 9AEQ, 9GN, (9LC), 9KV, (9CS), (9HR), 9GC, 9OE, 9FN, 9GP, (9PN), 9UU, 9SN, 9US, 9WZ, 9KO, 9NJ, [illegible]EC, 9AGN, 9BW, (9CP), 9UV, 9ZT, 9ZY, 9QM, [illegible]BO, 9OR, 9ZW, 9NJ.

1AW, HARTFORD, CONN., Oct. 12 to Nov. 2.
(1AK), (1AZ), (1BM), (1CK), 1FQ, 1JQ, (1OE), (1QN), 1WP, (1WR), (1XT), 1XK, 1XZ, (1XV), (1YB), (1BBH), (1BBL), 1CBQ, (1EAS), (1HAA), (1NAQ), 1TAZ, 1UAW, 1VAD, 2BK, Canadian 2CI, (2DN), 2JZ, 2JJ, 2OM, 2RB, (2RK), 2TF, (2WB), (2ZL), 2ZM, 2ACM, Canadian 3Z, (3BZ), 3FN, 3GO, 3HJ, (3DH), (3EV), (3KM), 3XF, (3ZA), (3ACM), (NSF), (WWV), (4YB), 8AY, 8BU, (8CB), 8CH, 8DG, 8DP, 8DV, (8ER), 8FC, 8FJ, 8FD, 8GU, 8GW, 8HA, 8HF, (8HH), 8IK, 8JJ, 8JQ, 8JS, 8KE, 8MT, 8MQ, 8NI, 8OJ, 8PC, 8QM, 8QA, 8RW, 8SP, 8SH, (8XU), (8XK), 8ZJ, (8ZW), 8ZG, 8ZS, 8ZP, 8ZY, 8AAN, (8ACF),

8AMB, 9AL, 9AU, 9JN, 9LQ, 9ZJ, (9ZL), (9ZN), 9AAV.

8AN, DETROIT, MICH., October.
NSF, 1AW, 1HAA, 1IW, 2RK, 3BZ, 3DH, 3HJ, 3NB, 5FV, 8AP, 8BG, 8BP, 8CF, 8DG, 8DI, 8EN, 8ER, 8FD, 8FI, 8FT, 8HH, 8JT, 8NI, 8WY, 8OJ, 8QJ, 8RN, 8XA, 8XI, 8XK, 8YV, 8ZA, 8ZB, 8ZC, 8ZW, 8ZY, 9AC, 9AP, 9AU, 9AJY, 9HM, 9HR, 9LQ, 9ZJ, 9ZL, 9ZN.

1AK, FALL RIVER, MASS., Oct. 11 to 28.
(NSF), (1AW), (1CK), (1DY), (1FBF), (1HAA), (1IAW), 1IS, (1KAQ), (1PAW), 1PY, 1XD, 1XX, 1YB, (2BM), 2CE, 2CT, (2DA), 2DN, (2JZ), (2OA), (2RK), (2RM), 2WB, 2ZL, 3BZ, (3DH), 3HJ, (3KM), (3PU), 3SW, (8ACF), 8CB, (8DR), 8ER, (8HH), (8DI), 8FT, 8GW, 8IK, (8JU), (8KE), (8LA), 8MZ, 8NI, 8NZ, (8RQ), 8SP, 8WY, 8XK, 8XU, 8ZA, (8ZD), 8ZW, 9HR, 9IR, 9LQ, 9ZJ, 9ZN.

9ZN, CHICAGO, ILL., From Sept. 9th to Oct. 15th.
1AW, 2GR, 2JZ, (2RK), 3JK, (3BZ), (3DH), (5ZL), 5XH, 5CG, (5YH), 5XA, 5ZC, 5YM, (8JJ), 8ZV, (8XC), 8FN, (8FT), (8CB), 8AM, 8ACF, 8LA, 8OI, (8ER), (8DI), 8ML, (8ZW), (8HH), (8DV), (8HG), 8GB, 8RQ, 8MZ, 8AW, 8XK, 8TT, (8ZG), 8ZD, (8RO), 8ZC, (9GP), 9NQ, 9HM, 9AAF, 9LC, 9EE, 9CP, (9ZL), 9AP, 9AEQ, 9EQ, 9ZQ, (9ZV), (9LR), (9ZX), (9HR), 9ZC, (9KV), 9CS, 9JT, 9KO, 9LQ, 9AOJ, 9CA, 9CV, 9GN, 9RV, 9AON, (9AOJ), (9AEQ) 9FU, 9CO, 9OF, 9AMQ, 9AAP, 9PI, 9NP, 9QJ, 9FR, 9HY, (NSF).

CANADIAN 3GS, September, (Bridgeburg, Canada: near NNZ.)
1AW, 1HAA, 1FB, 1QI, 1TS, 1VD, 1XD, 2CT, 2BF, 2EE, 2DH, 2JU, 2OZ (?), 2XH, 2ZL, 3BG, 3BZ, 3CO (Can.), 3DS, 3DV, 3GO, 3GE (Can.), 3GX, 3HE, 3KK, 3KM, 3AK, 3BV, 3BM, 3CB, 3DA, 3DR, 3EN, 3NI, 3PF, 3QM, 3SI, 8ACF, 9HM, 9ZL, 9ZN, NSF.

9CS, CLINTON, IOWA, Sept. 25 to Oct. 7.
3KM, 5CD, 5CF, 5CG, 5ER, 5IS, 5XC, (5YH), 5ZC. 5ZL, 5ZP, 8CB, (8DI), 8ER, (8FT), 8HG, 8HR, 8NI, 8XK, 8ZW, 8ACF, 9AJ, (9AP), 9CA, 9DC, 9DT, 9EE, 9EK, 9EL, 9EQ, 9ER, 9EZ, 9FR, 9FU, (9GC), 9GN, 9GQ, 9HM, (9IX), 9JL, 9JT, 9KO, (9KV), (9LC), 9LM, 9LR, (9LU), (9MS), (9NQ), 9OE, 9OR, 9QM, 9QY, 9RG, 9RY, 9VS, 9WG, 9WT, 9ZC, 9ZJ, 9ZN, (9ZV), 9AAF, 9ABI, 9AEG, 9AEQ, 9AEP, 9AJI, 9AOJ, 9ANV, 9AOC, NSF.

8AEQ, COLUMBUS, OHIO, June 1st to Aug. 1st.
8CC, 8CI, 8DA, 8DV, 8DJ, 8DR, 8DW, 8EN, 8ER, 8FF, 8FI, 8GB, 8GQ, 8HH, 8IK, 8MT, 8WY, 8XK, 8ZR, 8ZW, 8ZY, 9ZN.

3VV, NORFOLK, VA., Sept. 10th to Oct. 10th.
1AW, 1HAA, 1RZ, (2BQ), (2BK), (2CT), (2DN), 2EH, (2EL), 2HN, 2HR, (2JZ), (2NB), 2QL C.W., (2RK), (2ZL), (2ARD C.W.), (3BZ), 3BS, (3DH), 3DK, (3EH), (3GB), 3GR, (3HG), (3HJ), (3IW using ¼ inch spk. coil), (3JK), (3LS), 3LZ, (3RW), 3XF, 4AA, 4AG, 4AL, 4CC, 4CK, 4DM, (4XA), (4XC), 4XQ, 4ZN, 5ER, 5GH, 5HG, (5HY), 5NK, 5XA, 5ZL, 5ZR, 5ZZ, 8AI, 8CB, 8CI, 8DG, (8DI), 8DR, 8DZ, 8EN, (8ER), (8FM), (8FT), 8HH, (8IK), 8JT, (8KE), 8KI, 8KV, (8LF), 8LR, 8OZ, 8PF, 8RC, 8RG, 8RW, 8RY, 8TT, 8VP, 8WT, 8XI, (8XK C.W.), 8ZA, (8ZD), 8ZE, (8ZG), 8ZN, (8ZW), 9CA, 9CM, 9CV, 9GN, 9KV, 9LM, 9LR, 9OX, 9ZN, 9ZR, 9AAF, NSF.

8ZD, PITTSBURGH, (ex-8EN), from Aug. 5th to Oct. 10th.
1AE, 1AK, (1AW), 1FB, 1FM, (1HAA), 1RZ, 1XD (phone and C.W.), 1ZA, (2AER), (2BK), (2BM), (2BG), (2CS), (2CT), 2DA, (2EL), (2GR), (2HN), (2JU), (2JZ), 2ME, (2NF), 2NM, 2QR. 2RB, 2RK, (2TF), (2UC), 2UE, 2VA, 2XJ (phone and C.W.), (3BZ), 3CH, 3DH, (3EN), (3FG), (3HJ), (3KM), (3VV), 3WS, (3XF), (3UC), (3NV), 3ZW, 4AG, 4BL, 4BQ, 4CC, 4XC, 4YA, (5DA), 5ER, 5KT, 5XA, (5ZL, 5ZP, NSF, KQO, XF-1 (C.W.), 8AHA, (8BV), 8BO, (8CB), (8CF), 8DA, (8DI), (8EJ), 8ER, (8FI), (8FO), (8FT), (8GB), (8GI), (8HH), 8IK, 8IL, 8ID, 8JJ, (8JS), (8KE), 8LA, (8MT), 8ML, (8NI), (8OJ), 8PQ, (8RW), 8SP, 8TT, (8OI), (8WY), (8XA), (8YV), (8ZA), (8ZG), 8ZQ, (8ZW) (phone), 9AK, 9AP, (9AU), 9AFA, 9AFR, 9CA, 9CP, 9DU, (9FN), 9FU, 9GN, 9HM, 9HR, 9KO, (9KV), 9ZJ, (9ZL), 9ZN, 9ZQ.

3EH, COLLINGSWOOD, N. J.
(1BL), (1HAA), 1GM, 1QR, (1RZ), 2EL, 2ER, 2FH, 2NF, 2RK, 2WM, 3EK, 8BV, 8DI, 8EF, 8EN, 8MI, 8NO, 8SH, 1AA, (1AW), 1DY, 2BB, 2BM, 2CT, 2FG, 2JG, 2TF, 2WB, 2ZL, (3BE), (3BH), (3BZ), 3FG, 3KM, (3VV), 3VW, 3ZW, 8BF, 8CB, 8DV, (8ER), 8HH, 8FO, 8JJ, 8LF, 8MT, 8PU, 8XK, 8ZA, 8ZG, 8ZW, 9ZN, 9ZL.

4BE, WILMINGTON, N. C., Oct. 15th to Sept. 15th.
1AW, 1XF, 1XD, 2NF, 2ZL, 2RK, 2ZM, 3KM, 3BZ, 3FG, 3PK, 4AE, 4AG, 4AT, 4BL, 4BQ, 4CP, 4YA, 5DA, 5ER, 5ZC, 5XA, 8BP, 8CB, 8DJ, 8EN, 8ER, 8ID, 8NI, 8RO, 8RQ, 8RW, 8XK, 8YV, 8ZW, 8ACF, 9AE, 9AP, 9EQ, 9ZJ, 9ZN, 9ZV, NSF.

8AJK, BUCYRUS, OHIO
8AFB, 8AF, 8AJ, 8DI, 8DR, 8ER, 8FI, 8FT, (8GB), 8GN, (8HH), 8HG, 8IK, 8IZ, 8JF, 8JJ, 8LE, 8MA, 8OI, 8QJ, (8QP), 8QU, 8SH, 8UO, (8VJ), (8WZ), 8XA, 8XK, 8YV, 8ZY, 8ZW, 8ZG, 9AAF, 9AA, 9AKH, 9AU, 9AJI, 9FS, 9GB, 9GN, 9DZ, 9HR, 9LR, 9FN, 9KO, 9MR, 9OI, 9ZJ, 9ZL, 9ZN, 5DA, 5ZL, 3KM, 3DH, 3VV, 5TW, (8ALM), 8DM, 8OJ, 9AF.

Calls heard on S.S. LAKE FANDANGO off PROVIDENCE, R. I., one to two A.M., Oct. 1?.
2WZ, 2ZJ, 8AEM, 3DH, 8JZ, 8KH, 8ZV, 8AH, 8CB, 8DR, 8GP, 8FW, 8NB, 8NI 8SH, 8XK, 8ZG, 8ZW, 9ZN.

3UQ, YARDLEY, PA., Sept. 5 to Oct. 1.
1AW, 1BL, 1CK, 1DY, 1FA, 1SQ, 1XD and 1XJ (phone), 2BM, 2BL (phone), 2CT, 2DF, 2EL, 2GP 2GN, 2JU, 2JZ, 2ME, 2NF, 2RK, 2UB, 2UE, 2U 2VA, 2XX, 2ZL, 3BE, 3BM, 3BZ, 3CV, 3DF, 3E 3FG, 3FJ, 3GH, 3GX, 3HG, 3IB, 3KM, 3QH, 3R 3RW, 3TX, 3VW, 3VV, 3AAE, 3ABV, 5DA, 8A 8CB, 8DF, 8DI, 8DV, 8DJ, 8EN, 8EV, 8EX, 8F 8HI, 8IF, 8JS, 8JV, 8LO, 8MT, 8ML, 8NI, 8C 8RQ, 8RZ, 8SP, 8XK, 8YV, 9ZL, NSF.

8WE, ELMIRA, N. Y., Sept. 19-30.
1BL, 1HAA, 1JA, 1XD, 2XJ, 3BD, 3BG, 3BQ, 3KM, 3ZS, 8BV, 8ER, 8HA, 8HR, 8QW, 8RA, 8WY, 8ZW.

Received at 1MB, LYNN, MASS., Jan. to Oct. 8.
1AW, 1BM, 1EK, 1FB, 1FR, 1FV, 1II, 1IW, 1JP (daytime), 1PM, 1PY, 1RL, 1TS, 1XF, 1ZA, 1ZC, 1AAU, 1EAV, 1HAA, 1HAL, 1DBU, 2BG, 2BK, 2BM, 2BR, 2CB, 2CL, 2CS, 2DN, 2EL, 2ER, 2FG, 2GR, 2HN, 2JE, 2JU, 2JZ, 2LO, 2NC, 2NF, 2OA, 2PL, 2QR, 2RB, 2RK, 2SH, 2TF, 2VA, 2WB, 2XJ, 2XH, 2ZL, 2ZC, 2ZM, 2ZS, 2AVF, 2AJW, 3AA, 3BH, 3BZ, 3CU, 3DH, 3EN, 3EV, 3FG, 3GO, 3GV, 3HJ, 3HX, 3KM, 3NB, 3NC, 3NV, 3VV, 3ZA, 3ZC. 3ZW, 8AMO, 8BB, 8BV, 8CV, 8DA, 8EN, 8E 8HG, 8JQ, 8LF, 8WY, 8XU, 8XK, 9ZN, NSF.

9AIF, SIOUX FALLS, S. D., September.
5AO, 5CD, 5CG, 5DA, 5IS, 5ZA, 5ZC, 5ZL, 7I 8ZA. 9AEG, 9AEQ, 9ACV, 9AMB, 9AON, 9AP 9AEU, 9AJN, 9AE, 9AP, 9BA, 9CA, 9EE, 9E 9EW, 9EL, 9FL, 9FZ, 9FP, 9FR, 9GN, 9GC, 9HM, 9HT, 9HR, 9IF, 9JN, 9JT, 9JB, 9KV, 9LC, 9LR, 9OE, 9PI, 9PN, 9PS, 9RY, 9ZQ, 9ZC, 9ZT, 9ZL, 9ZU, 9ZN, 9ZV, 9ZX.

1TS, BRISTOL, CONN., Sept. 1 to Nov. 1.
(1AAT C.W.), 1AAU C.W., 1AK, 1AN, 1AS, (1AW), 1AZ, 1BB, (1BBL), 1BL, 1BM, 1CM, 1CK, 1DJ, 1DQ, 1DR, 1DY, 1EAS, 1EAT, 1EAV, 1EBN, 1EP, 1FAQ, (1FBK) spk., C.W. and fone, 1FQ spk., C.W. and fone, 1GAW, 1GY, 1HAA, 1IAO, 1IAX, 1IS, 1AP, 1JD, 1JQ, 1KAQ, (1KAZ) spk., C.W. and fone. (1NAQ), (1NAT), 1NO C.W. and fone, 1OE, 1PY, 1QAV, 1QN, 1RU C.W., 1RZ. 1SZ. 1VAA, 1XD fone, 1XT spk. and C.W., 1XV

C.W. and fone, 1XX C.W., 1XB, 2ACM, 2ADD spk. C.W. and fone, 2ADM, 2AER, 2AJW, 2AM, 2ARA, 2AOS, 2BB, 2BG, 2BK, 2CI, 2CT, 2DA, 2DI, 2DN, 2DR, 2EH, 2EL, 2GR spk., C.W. and fone, 2HN, 2JJ, 2JO, 2JU, 2JZ, 2KN, 2MP, 2NB, 2NF, 2OA, 2OE, 2OM, 2RK, 2RM, 2RR, 2SH, 2TF, 2TR, 2UE, 2UK, 2WB, 2WD C.W. and fone, 2WG, 2XF fone, 2XH, 2XJ fone, 2XX C.W., 2ZC, 2ZL C.W., 2ZM, 3AAP, 3ABD, 3ACI, 3ACM, 3BC, 3BG, 3BH, 3BZ, 3DC, 3DH, 3DL, 3DR, 3DS, 3EH, 3EN, 3EV, 3FB, 3FG, 3FL, 3FR, 3GO, 3GV, 3GX, 3HG, 3HJ, 3IY, 3JK, 3KM, 3NB, 3ND C.W., 3OU, 3PU, 3QW, 3RW, 3VV, 3ZA, 3ZE, 3ZS, 3ZW, 4XB C.W., 8ABG, 8ACF, 8AFM, 8AGZ C.W., 8AIO, 8AY, 8BO, 8BV, 8CB, 8DI, 8DR, 8DP, 8BP, 8DV, 8EN, 8ER, 8FC, 8FD, 8FK, 8FO, 8FT, 8FW, 8GI, 8GS, 8GW, 8ID, 8IN, 8HA, 8HF, 8HG, 8HH, 8HP, 8IK, 8JJ, 8JS, 8KE, 8LA, 8LF, 8LG, 8LW, 8ML, 8MQ, 8MT, 8NI, 8NZ, 8OJ, 8OZ, 8PU, 8QM, 8RQ, 8RU, 8RW, 8SH, 8SJ, 8SP, 8UI, 8VX, 8WY, 8XC C.W., 8XK C.W. and fone, 8XP, 8XU, 8ZA, 8ZD, 8ZG spk. and C.W., 8ZQ, 8ZS, 8ZV spk. and C.W., 8ZW, 9AA, 9AD, 9JI, 9AP, 9CA, 9DV, 9GC, 9HR, 9KF, 9KM, 9LM, 9YA, 9YI, 9ZJ, 9ZL, 9ZN, 9ZQ, 9ZX, Canadian 3Z.

9LR, ANTHONY, KANSAS.

3RK, 3RW, 4XC, (5AI), (5AO), 5AY, (5BI), 5BO, (5CD), (5CG), (5DW), (5EF), 5FP, 5HA, 5LL, (5YH), (5ZA), (5ZC), 5ZN, 5ZP, 5ZS, (5ZT), (5ZU), (5ZV), (5ZW), 6EJ, 6JB, 6JD, 7CC, (7IM), 8CF, 8DA, (8DI), 8ER, (8HG), 8ID, 8JJ, 8LA, 8XD, (8ZY), 9AJ, (9AK), (9AN), 9AO, (9AP), 9AT, 9AU, (9AX), (9CA), (9CS), 9CV, 9EE, 9EI, (9EL), (9EQ), (9EZ), (9FB), (9FL), (9FN), (9FP), (9GC), (9GN), 9GQ 9HI, (9HM), 9HR, 9HS, (9IP), 9JT, 9KF, (9KO), (9KV), 9KX, (9LC), 9LF, 9LG, 9MC, (9NQ), (9PI), (9PN), (9QM), 9RM, (9RN), 9RQ, 9RY, 9VS, (9WI), 9YA, 9ZC, (9ZJ), (9ZN), 9ZQ, 9ZT, (9ZV), (9ZX), 9AAV, 9ABL, (9ACB), (9ACN), (9ACV), 9AEL, (9AEP), (9AEQ), (9AEU), (9AIG), (9AJI), 9AIF, (9AJN), 9AMB, 9ANG, (9AOJ), (9AON).

8DW, GREENVILLE, TEX., Sept. 18 to Oct. 12.

4AC, 4AE, 4BQ, 4XC, 4XQ, (5AI), (5AO) 5BC, 5BG, 5BI, 5BO, 5BQ, (5CD), (CG), 5CI, 5DI, (5ED), 5EF, 5EG, 5ER, 5FA, 5GU, 5HA, (5HV), 5IB, (5IE), 5UG, 5XA, 5XD, 5XG, 5XU, 5YE, 5YH, 5YS, (5ZA), (5ZC), 5ZH, (5ZL), 5ZN, 5ZP, 5ZR, 5ZT, (5ZU), 5ZV, 5ZW, (5ZZ), 8DI, 8DY, 8ER, (8FT), 8JJ, 8ML, 8XK, 8YW, 8ZG, 8ZW, 8ZY, 9ABF, 9ABI, 9ABU, 9AC, 9ACB, 9ACN, 9AE, (9AEG), 9AEK, 9AEP, (9AEQ), (9AEU), 9AEY, 9AFS, 9AHF, (9AIG), 9AJN, 9AK, 9AKB, 9AOC, 9AOE, 9AOJ, 9AON, 9AP, 9APC, 9APY, 9AU, 9BC, 9BEM, 9BQ, (9BW), 9BY, 9DT, 9DY, 9EL, 9EQ, 9ER, 9FC, (9FL), 9FP, 9FR, 9FT, 9GC, 9GN, 9GP, 9GU, 9GX, 9GY, 9HI, 9HM, 9HR, 9JN, 9KI, 9KO, 9KQ, (9KV), 9LG, (9LR), 9LM, 9LX, 9NQ, 9NX, 9OE, 9OR, 9PT, 9QG, 9QM, 9RW, 9TA, 9UU, 9VP, 9VS, 9WZ, 9XE, 9XG, 9XM, 9YG, 9YM, 9ZC, 9ZH, 9ZJ, 9ZL, 9ZN, 9ZX.

8RQ, SPRINGDALE, PA.

(1AW), 1AAP, 1BBL, 1CB, 1HAA, 1JU, 1RZ, 1TS, 2AD, 2BK, 2BM, 2CH, 2DA, (2DR), 2EL, 2GO, 2GR, 2JB, (2JE), 2JU, 2ME, 2NF, 2OA, 2QR, 2RK, 2RR, 2TF, (2WB), 2XJ, 2XX, (2ZL), 2ZR, 3AAP, 3ACS, 3AN, 3BE, 3BF, 3BG, 3BH, 3BI, (3BK), 3BZ, (3EN), 3EV, 3FG, 3GC, (3GO), 3GR, (3HG), (3HJ), (3KM), 3LG, (3NB), 3NC, 3NT, (3NV), 3OB, 3VJ, 3XF, 3XG, 3XN, 3ZM, 4CC, 4YN, 5BA, 5DA, 5YE, 5ZP, 8AA, 8BB, 8BP, (8BQ), 8BZ, 8CH, 8CF, (8DA), 8DI, 8DY, 8EJ, 8ER, (8FD), (8GB), 8GE, (8GI), 8GH, (8GK), (8GS), 8HG, 8HJ, 8IK, 8JJ, 8KG, (8LA), 8MA, 8ML, 8NI, 8OZ, 8PP, 8RB, 8RS, 8SH, 8TI, 8TN, 8TT, 8TY, 8UO, (8WY), 8XA, (8XU), 8XM, 8ZV, 8ZX, 8ZY, (9AK), 9AL, 9AT, 9CA, 9CB, 9CE, 9CK, 9HR, 9IS, 9LF, 9LQ, (9MH), 9OR, 9RY, 9ZJ, 9ZL, 9ZN.

2GK, SCHENECTADY, N. Y., July and August.

1AW, 1AE, 1AK, 1BM, 1CE, 1CK, 1ES, 1GM, 1HI, 1HAA, 1QV, 1RD, 1SE, 1TW, 1TS, 1YB, 1YN, 2ANN, 2DA, 2BM, 2ED, 2JE, 2JU, 2ME, 2LX, 2OM, 2OA, 2VA, 2ZM, 2ZL, 2XX, 2XG, 3DH, 3EN, 8BB, 8DA, 8ER, 8EN, 8XU, 8XK, 9ZJ, 9ZN, NSF.

9AEU, DAVID CITY, NEB., Aug. 20 to Oct. 7.

4XA, 4XC, (5AI), 5AL, 5AO, 5CD, 5CG, 5CW, (5DW), 5EF, 5FA, (5IS), 5IF, 5IE, 5XG, 5ZA, 5ZC, 5ZD, 5ZL, 5ZV, 8DZ, 8ER, 8FT, 8IK, 8OZ, 8ZY, 8ACB, 9AK, 9AU, 9AX, (9EW), 9FL, 9FP, 9GC, 9GN, 9HM, 9HS, 9IE, 9JS, (9KV), 9LC, (9LM), (9LR), (9NQ), 9NR, 9MS, 9OE, (9PN), 9RK, 9RR, 9RY, 9SC, (9UU), 9VE, 9VS, 9WI, 9YO, 9ADN, (9AEG), 9AEP, (9AEQ), (9AFX), (9AJN), 9ALB, (9ANQ), 9HOJ, (9APN).

3PB, PHILADELPHIA

1AK, 1AW, 1BL, 1DY, 1HAA, 1LL, 1XD, 1XE, 2HN, 3AL, 3BI, 3BZ, 3EN, 3GO, 3KM, 3RM, 3ZW, 4AI, 8GR, 8IK, 8LA, 8NI, 9ZN.

9AKG, CLEVELAND, Aug. 20 to Oct. 16.

1AC, 1AW, 2NF, 3BQ, 3VV, 5ZP (heard five mins. then faded), 8BO, 8BV, 8DG, 8DV, 8EN, 8ER, 8HE, 8IK, 8JJ very QSA, 8LS, 8MM, 8MT, (8OI), 8QJ, 8TT, 8XK, 8ZB, 9FB, 9FS, 9HR, 9LM, 9LR very QSA, 9MB, 9OR, 9ZN.

8HH, MANSFIELD, OHIO, Sept. 1st to Oct. 15th.

(NSF), 1AW, 1HA, (2BK), 2DH, 2EL, 2HN, 2JU, 2LQ, 2RK, 2TT, 2YH, 2ZC, 2ZL on C.W. 2ZM, 3AH, 3BG, 3BL, 3BZ, 3CW, 3DH, 3EN, 3GR, 3HG, 3HI, 3HJ, 3JZ, 3KM, 3NX, 3OG, (3VV), 4AE, 4AG, (4BQ), 4BZ, 4CC, 4YH, 5AO, 5BZ, 5CD, 5CQ, (5DA), 5ER, 5FV, 5XA, 5XC, 5XH, (5YH), 5ZC, 5ZL, 5ZP, 8AM, 8BN, 8BL, 8CA, 8CB, 8CD, (8CF), (8CF), (8DA), 8DG, 8DI, 8DR, 8DV, 8DX, 8EN, 8ER, 8FI, 8GB, 8GS, 8GW, 8GX, 8HE, 8HG, 8HR, 8HT, (8IB), (8ID), 8IN, (8IZ), (8JF), (8JJ), 8KF, 8LF, (8LS), (8ML), (8MM), 8MT, 8NQ, (8OI), (8QJ), 8QY, 8RA, 8RI, 8RQ, (8UO), 8VW, 8WY, (8WZ), 8XC, 8XD, (8XK), 8XL, 8ZA, 8ZB, 8ZD, (8ZG), 8ZW, 8ZX, 8ZY, 8ACF, 8AGX, (8AJK), (8ALM), 9AA, 9AW, 99K, 9AP, 9AV, 9AW, 9AX, 9BC, 9CA, 9CF, 9CH, 9CP, 9EE, 9EQ, 9EX, 9FP, 9FR, 9FD, (9GN), 9GX, (9HM), 9HO, (9HR), 9IP, 9KD, (9KV), 9LC, 9LR, 9OE, 9OR, 9QJ, 9SK, (9ZN), 9ZX, 9AAF, 9AJI, 9AUU, 9DAF, 9OAJ.

Heard by L. W. HATRY, 2048 8th St., PORT ARTHUR, TEXAS, Sept. 13 to Oct. 12 inclusive, on a 20 foot aerial in attic of two story house. 5AO, 5AS, 5BO, 5CD, 5CG, 5DW, 5EO, 5EF, 5YH, 5ZC, 5ZW, 5ZL, 5ZV, 8ER, 9AB, 9AEG, 9AQG, 9AP, 9AIG, 9FL, 9GC, 9LR, 9OE, 9KV, 9RY, 9SW, 9WU, 9ZC, 9ZV. Will answer any letter or card about the above list.

9EQ, ST. LOUIS, Sept. 13 to Oct. 13.

2BK, 2RK, 5AO, 5CD, 5DA, 5EF, 5ZC, 5ZP, 5ZZ, (5ZL), 8AT, 8ER, (8FT), 8XK, 8ZI, 8XA, 9AK, 9AL, (9AP), 9AV, (9AU), (9AX), (9AEG), (9AEQ), 9AE, (9EL), 9EE, 9EZ, 9ES, 9FM, (9FL), 9FV, 9GX, 9GC, (9HM), (9HR), 9IP, 9JE, (9LR), 9NQ, 9OE, 9QP, 9RG, (9TU), (9UU), 9VS, 9XM, 9ZN, 9ZL, (9ZC), 9ZH, (9ZJ), (9ZQ), 9ZP.

9ZL, MANITOWOC, WIS., Oct. 9-24th.

(1AW), 1BM, 1FM, 1HAA, (2BB), (2BM), 2DA, 2EL, 2EN, (2RK), 2RV, 2XX C.W. and fone, 2ZM, 3ABD, (3DH), 3EN, 3FG, 3HH, 4BQ, 4XC, 5BE, 5CG, 5DW, 5ZL, 5ZZ, 8AM, 8BP, 8CB, 8DG, 8DI, (8DV), 8EN, 8ER, 8FN, 8FT, 8HA, 8ID, (8IK), 8JJ, 8JU, 8KP, 8ML, 8MT, 8NI, 8OJ, 8PQ, 8SH, 8TT, 8WY, (8XK) mod. C.W. and fone, 8ZA 8ZE, 8ZD, 8ZG, (8ZW), 9AA, (9AAC), 9ABI, 9ABZ, 9AE, (9AD), 9AEG, 9AEQ, 9AEY, 9AHU, 9AHS, 9AIG, 9AIR, 9AIY, 9AJ, (9AJI), 9ANQ, (9AP), 9AT, 9AU, 9AW, 9AWR, 9CA, 9CS, 9CW, (9DF), 9ER, 9FF, 9FU, (9GC), 9GP, 9HM, 9HR, (9HT), 9HY, 9IH, (9JN), (9JT), 9KO, 9KP, 9KV, 9KW, 9LC, (9LM), 9LQ, 9MH, (9MO), 9NQ, 9OE, 9OR, 9PI, 9PN, (9WU), (9XM), (9ZC), (9ZN), 9ZQ, (9ZT), (9ZX), NSF, WWV.

(Concluded on page 54)

QST'S DIRECTORY OF CALLS

ADOPTING the Department of Commerce's list of amateur stations as its 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.

FIRST DISTRICT

Gilbert R. Osborne	71 Batavia St., Boston, Mass.	1DBJ
George F. Burton	15 Summer St., Roslindale, Mass.	1DBK
Chester M. Day	44 Bates Rd., Watertown, Mass.	1DBL
Ralph H. Hutchins	152 Spring St., Watertown, Mass.	1DBM
K. V. R. Lansingh	"The Firs", Sunset, Deer Isle, Me.	1DBN
James E. Glynn	965 Plymouth Ave., Fall River, Mass.	1DBO
Louis Greenblatt	9 Butron St., Waterbury, Conn.	1DBP
H. J. McClure	Crishaven, Me.	1DBQ
Sherman Shapiro	23 Elizabeth St., Waterbury, Conn.	1DBR
Paul S. Hill, Jr.	344 Main St., Saco, Me.	1DBS
Fisher Hills	84 High St., Saco, Maine	1DBT
Morton B. Williams	214 Huntington Ave., Boston, Mass.	1DBU
Emery A. Millette	29 May St., Spencer, Mass.	1DBV
Arthur R. Prouty	25 High St., Spencer, Mass.	1DBW
Wesley G. Skibsted	Mason St., Greenwich, Conn.	1DBX
Eugene E. Evans	Egdell St., Framingham, Mass.	1DBY
Tremaine Electric Company	City Hall Sq., Brockton, Mass.	1DBZ

SECOND DISTRICT

Geo. N. Garrison	East Orange, N. J.	2AWM

THIRD DISTRICT

Frank J. Homsher	North Glenside, Pa.	3AAR
Carlice P. Koon	1108 Washington St., Portsmouth, Va.	3ACB
O. A. Hutcheson	418 Glasgow St., Portsmouth, Va.	3ACK
H. B. Bennett	1619 Omobundro Ave., Norfolk, Va.	3ACT
L. A. Roane	511 South St., Portsmouth, Va.	3ACZ

SIXTH DISTRICT

F. Thompson	348 W. Milford St., Los Angeles, Cal.	6AAB
E. Hockenbeamer	721 Arlington Ave., Berkeley, Cal.	6AAC
H. J. Balden	Fillmore, Cal.	6AAD
L. T. Hall	691 Post St., San Francisco, Cal.	6AAE
L. B. Hinckley	Fillmore, Calif.	6AAF
C. A. Coffman	R.F.D. No. 4, Box 140, Anaheim, Cal.	6AAG
C. Baldwin & Max Gardner	R. No. 6 N. Center St., Phoenix, Arizona	6AAH
H. Ambler	1070 10th St., San Diego, Cal.	6AAI
N. C. DeWolfe	206 Ellsworth, San Mateo, Cal.	6AAJ
A. B. Lopez	720 Santa Barbara St., Santa Barbara, Cal.	6AAK
H. Fleur	1540 Palou Ave., San Francisco, Cal.	6AAL
C. H. Wiles	R.F.D. No. 1, Box 57A, Stockton, Cal.	6AAM
Jack Dent	3d & Elm Sts., San Diego, Cal.	6AAN
R. S. Hewitt	3039 Royal St., Los Angeles, Cal.	6AAO
C. E. Peterson	529 Santa Inez Drive, San Mateo, Cal.	6AAP
C. Bane	262 Castro St., San Francisco	6AAQ
C. Zeigler	6355 Dana St., Oakland, Cal.	6AAR
F. F. Moffett	843 Lake St., Reno, Nevada	6AAS
I. H. Brush	546 B St., Santa Rosa, Cal.	6AAT
J. Byrne	28 Union St., Santa Cruz, Cal.	6AAU
V. Elliott	840 Magnolia St., Pasadena, Cal.	6AAV
A. Woolf	1904 Shattuch Ave., Berkeley, Cal.	6AAW
K. Burzell	2705 Mobile Ave., Sawtelle, Cal.	6AAX
P. H. Gilbert	Big Creek, Cal.	6AAY
A. E. Banks	1648 Neal St., San Diego, Cal.	6ZB
W. C. Thompson	Richfield, Utah	6ZH
A. L. Munzig	1017 Tribune St., Redlands, Cal.	6ZJ
A. E. Bessey	Sunnyvale, Cal.	6ZK
A. N. Marquis	649 First Ave., Yuma, Ariz.	6ZL

SEVENTH DISTRICT

Benedict Barr	Mt. Angel, Benedict, Ore.	7ID
C. J. W. Tibbetts	1813 Broadway, Helena, Mont.	7IE
R. M. Dansfield	662 Charnelton Street, Eugene, Ore.	7IF
P. B. Jackson	434 Broadway, Seaside, Ore.	7IG
G. W. Selvidge	4321 Ninth Avenue, NE, Seattle	7IH
A. B. Rotering	Box 43, Glascow, Mont.	7IJ
Harry H. Olson	310 4th Avenue, Seaside, Ore.	7IK
T. C. Hall	1126 Taylor Street, Eugene, Ore.	7IL
L. J. Simms	311 North 27th Street, Billings, Mont.	7IM
A. L. Adams	321 West Main Street, Silverton, Ore.	7IN
H. E. Welch	Route S, Salem, Ore.	7IO
A. A. McCue	Kalwock, Tlaska	7IP
Donald C. Gannon	Central Avenue, Kent, Wash.	7IQ
J. R. Harris	Cohagen, Montana	7IR

F. W. Lawrence	406 South Crosby Street, Tacoma	7IS
Roy Anderson	Ketchikan, Alaska	7IT
George Mecham	7748 Wilson Avenue, Seattle	7IU
Arthur Fletcher	Woodbine Street, Boise, Idaho	7IV
P. R. Hoppe	633 Willamette Street, Eugene, Ore.	7IW
T. L. Estes	Snohomish, Wash.	7IX
Danzil Cuttler	Vashon, Wash.	7IY
Chas. Burson	1921 3rd Avenue, Seattle	7IZ
O. M. Heacock	Enterprise, Ore.	7ZH
E. R. Mumford	518 Beach St., Vancouver, Wash.	7ZJ

EIGHTH DISTRICT

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

Roy E. Chapin	358 Helen Ave., Detroit, Mich.	8BO
Chas. J. Dorazil	2304 Tampa Ave., Cleveland, Ohio	8CE
Ralph R. Kimes	3034 E. 79th St., Cleveland, Ohio	8CU
Herbert Reich	3000 Berkshire Rd., Cleveland Heights, Ohio	8DA
Stanley B. Gould	4182 Willys Parkway, Toledo, Ohio	8EN
Jas. Penberthy	486 Phila. West, Detroit, Mich.	8FE
John A. McCullough	13915 Potomac Ave., East Cleveland, Ohio	8FX
Carrolls Miller	Olivet, Mich.	8GS
J. Eddy Bromley	301 Baynes St., Buffalo, N. Y.	8LA
Jack Gafill	506 Southfield Ave., Birmingham, Mich.	8NG
Milton Fruehauf	17702 Detroit Ave., Lakewood, Ohio	8TZ
Thomas Quincey	452 Davison Ave. W., Detroit, Mich.	8UG
Howard Wilkinson	1446 Michigan Ave., Buffalo, N. Y.	8ACN
Myron H. Premus	53 McKinley Ave., Kenmore, N. Y.	8AHQ
James P. Turner	681 George St., Clyde, Ohio	8AKM

(Following are new calls.)

Frank Schiestel	49 Richter St., Detroit, Mich.	8AIA
Charles J. Fertick	62 Vincent St., Dayton, Ohio	8AIB
Reuben P. Deihl	Cresson, Pa.	8AIC
Paul Blake	634 Huron St., Cheboygan, Mich.	8AID
Lloyd E. Flagg	158 Anderson Place, Buffalo, N. Y.	8AIE
Robt. Wuerfel	R.F.D. No. 3 Miller Ave., Ann Arbor, Mich.	8AIF
Wm. C. Schmezer	75 Amada Ave., Mt. Oliver, Pittsburgh, Pa.	8AIG
Russel Norman	304 Sherman St., Clarksburg, W. V.	8AIH
Seneca M. Dotterer	134 Defiance St., Leipsic, Ohio	8AII
Hamlin R. Fordyce	218 West 12th St., Cincinnati, Ohio	8AIJ
Fred Pickel	164 Pingree Ave., Detroit, Mich.	8AIK
Stuart W. Seeley	Grand River Ave., East Lansing, Mich.	8AIL
Wm. J. Jones	2729 Perrysville Ave., Pittsburgh, Pa.	8AIM
Robt. J. Parker	164 Church St., Buffalo, N. Y.	8AIN
Clarence W. Dalzell	212 Spring Ave., East Pittsburgh, Pa.	8AIO
C. Bosworth Johnson	1526 Quarrier St., Charleston, W. V.	8AIP
Robert Slusher	612 W. Pearl St., Wapakoneta, Ohio	8AIQ
Earl Field	10305 Olivet Ave., Cleveland, Ohio	8AIR
Harry C. Baldwin	14 Odell St., Union City, Pa.	8AIS
Garnet S. Solomon	Main St., West Cairo, Ohio	8AIT
William B. Hanlon	5818 Rippey St., Pittsburgh, Pa.	8AIU
Bertel J. Nelson	408 Orwell Way, Pittsburgh, Pa.	8AIV
Stanley Stevens	416 Railroad St., Bloomsburg, Pa.	8AIW
Geo. D. Bauer	6 Wilmer St., Rochester, N. Y.	8AIX
Paul O. Simcox	705 Clark St., Cambridge, Ohio	8AIY
Hugh T. Smith	123 Springfield Pike, Wyoming, Ohio	8AIZ
Glenn L. Martin Co.	Cleveland, Ohio (Correction)	8XC
Camp Greenbrier	Alderson, W. Va.	8XF
R. C. Corderman	Carnegie Inst., Pittsburgh, Pa.	8XN
Pittsburgh Wireless Equip. Cp.	202 N. Broad St., Ridgway, Pa.	8XO
University of Pittsburgh	Pittsburgh, Pa.	8YI
C. J. Murray	718 West Fair St., New Philadelphia, Ohio	8ZA
E. S. Ensign & W. P. Van Behren	923 W. Bancroft St., Toledo, Ohio	8ZB
B. P. Williams	3220 Orleans St., Pittsburgh, Pa.	8ZD
Edw. Manley	506 7th St., Marietta, Ohio	8ZE
M. H. Pancost	818 Penn St., Lansing, Mich.	8ZF
C. M. Howe	Madison Rd. & Erie, Cincinnati, Ohio	8ZH
Edw. I. Deighan	5415 Hermann Ave., Cleveland, Ohio	8ZP
George M. Withington, Jr.	Marietta, Ohio	8ZT

NINTH DISTRICT

Donald L. Hathaway	1575 Pennsylvania St., Denver, Colo.	9AMB
Roy H. Collins	701 E. Miller St., Bloomington, Ill.	9ANX

MORE "CALLS HEARD"

Following calls heard at 1HAA, VERMILYA, MARION, MASS., October.

(1AK), (1AW), 1AS, (1AAU), (1BB), (BBL), (1CK), (1CM), (1CZ), (1CBP), (1DY), (1DQ), (1DR), (1EAV), (1EP), (1FBF), (1FR), (1FBV), 1FS, 1GBY, 1GY, (1GZ), 1HF, 1IA, (1IS), 1KAQ, 1KAZ, (1KAY), (1NAQ), (1OAD), (1OE), 1OJ, 1PAW, (1QAV), (1RV), (1RZ), (1SN), (1SAS), T1S, 1UAP, (1UAG), 1VB, (1XX), (1XD), 1YB, (2ADD), (2ARY), 2AIM, 2ARS, 2ARY, (2ADM), 2AM, (2BK), (2BM), (2BG), (2BB), (2DA), (2DI), 2DS, (2GR), (2HN), (2JZ), (2JJ), 2KX, 2KN, (2OA), 2OM, (2RK), 2RM, (2TZ), 2UE, 2WG, (2WB), 2XJ, 2ZM, (2ZL), 3AB, 3ACS, 3ABD, 3BZ, 3BH, 3DH, 3DR, 3EH, 3FB, 3FR, (3HJ), 3KM, 3VV, (3ZA), 4CK, 5ZC, 8ACF, 8ABG, 8CB, 8DI, 8ER, 8FO, 8HH, 8HP, 8HA, 8ID, (8JS), 8LF, 8MT, 8MB, 8NN, 8OJ, 8PQ, 8SH, 8VY, (8NG), (8XU), 8XK, 8ZC, (8ZD), 8ZG, 8ZW, 8ZX, 9AEG, 9CP, 9LC, 9UU, 9ZJ, 9ZN. Canadian (3Z) or (2CI new call), (NSF), WWV.

Radio Communications by the Amateurs

THE PUBLISHERS OF QST ASSUME NO RESPONSIBILITY FOR THE STATEMENTS MADE HEREIN BY CORRESPONDENTS

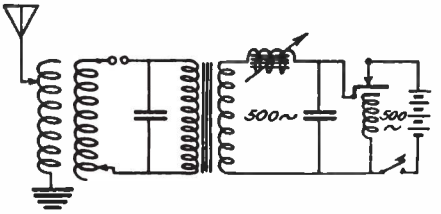
DATA ON SPARK COIL SETS

207 North 11th Street,
Newark, N. J.

Editor, QST:

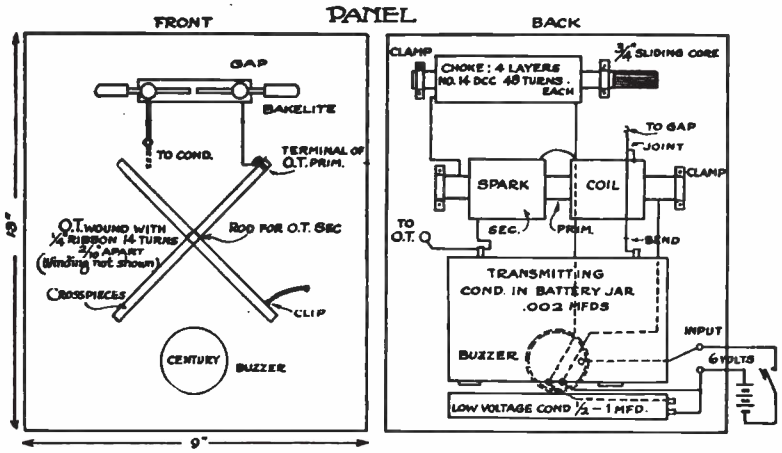
Just a few words about Ye Ancient Squeak-Box and of the work done with them by members of the Essex Radio Club.

With a tuned set, using a Century buzzer as an independent interrupter, and obtaining a 500 cycle note, distances from 10-20 miles were covered with an input of 8 to 10 watts. Better radiation has been obtained in later tests using the buzzer in the "resonance converter" method shown in the accompanying diagram and sketches. The idea is to obtain resonance between the low potential circuit and the buzzer frequency. This is done by varying the impedance of the choke coil until minimum



sparking at the buzzer contacts, and maximum output, are obtained.

Again, with a low frequency tuned squeak-box, 8-10 miles was covered with about 6 watts input. In this set special care was taken to obtain short leads in the OT primary circuit. All leads, including the primary and secondary circuits of the OT up to the aerial switch, were of ¼" brass ribbon. The condenser leads were about 1" long and the other lead from the gap to OT not over 4". This was possible because of the compactness of the condenser used, which was made up of a few plates of a Dubilier Protective Device, Type CD-694. This made a very small condenser suitable for the ¼" coil it was used with. The OT was designed with particular care, a novel feature being the use of two secondaries separated about 1" but mechanically and electrically joined. Both were in inductive relation to the primary, and in this manner a greater number of lines of force were cut by the secondaries. Because of the shape of the magnetic field, the secondary nearer the primary was larger in diameter. (Why not a secondary on each side of the primary, then?—Ed.). All the parts were arranged on a small panel. When working, 2" coupling was used at all times, and maximum true radiation obtained. Needless to say, the wave was sharp enough to make NAH and NSD blush for shame.



With the same set using a smaller condenser and a loading coil in the open circuit, signals have been transmitted about a mile on a portion of the lead-in 25 ft. long and 20 ft. high. The wave used was about 180 meters. Good radiation was

obtained but very few sets in the vicinity were able to get down to some of the low waves used.

Through these experiments I believe it is entirely possible for amateurs to have a small indoor aerial for work on waves as low as 100 meters and with which local communication could be carried on successfully, thus eliminating some of the QRM on 200.

Yours vs. QRM.,
W. F. Scott, 2PP.

RE THE O. W.'s.

9ZL, Manitowoc.

Dear Warner:—

You're right, Eddy, there are a lot of us hams giving our better halves the "bug". 9FN of Sheboygan, Wis., is starting early, however, and is pounding his intended's ears full of dots and dashes. The other day he asked her to hand him a dry cell from a shelf, and upon lifting it, she said, "Why Melvin, this battery must be real full yet, it's so heavy". Just give 'em time, eh Eddy?

9ZL.

COMING UP!

Chicago.

Dear Eddy:—

You fellows sure pack a wicked Wouff Hong, because I saw it at the Chicago convention—but listen, Eddy, they tell me it's for the squeak box boys. If that's right, I want to say that I think you ought to make another one about six feet long and double action, to be reserved for the 1 and 2KW hams who use full power to work a couple of miles. What spark coil could cause one-tenth the QRM of a 1KW station who slams on full power and then plays with his new Chink Key? 73 OM.

9QSX.

NEW KINDS OF QRM

Mansfield, Ohio
Oct. 25, 1920.

Editor, QST:

On a recent trip to Pittsburgh, Pa., Uniontown, Pa., Connellsville, Pa., and Wheeling, W. Va., in which places the writer visited 8XN, 8MT, 8AJP, 8WR and 8ZW, it was noted that at each station several different kinds of QRM, similar to that here at 8HH, obtained.

We had been taking it for granted, here in Mansfield, that this interference was something local, and never thought to mention the subject to other amateur stations. 8ZW was quite surprised to find that we had certain given kinds of interference here which were exactly like that which he had in Wheeling. Certain of these types of interference can be accounted for easily, while others are hard to locate. One type which I have just recently run down is that due to the operation of railroad signal devices at road crossings. These bells, when operating, give a "click, click" in the set which lasts for several minutes. Altho 8HH is probably a mile and a half from the nearest railroad crossing, this interference is received plain enough to be bothersome while copying distant stations.

There is another type of interference, however, which was heard at each of the stations referred to above. This type has a rolling, spitting, snapping and sizzling characteristic. It starts up out of a clear sky and has a duration of from thirty seconds to several minutes. This type of interference is received both summer and winter and seems to have no connection with static, as it was received at 8HH all thru the winter of 1919 and 1920 on cold, crisp nights when no static was present.

I might also mention that some of the Pennsylvania amateurs, with whom the writer talked, stated that some of their friends had tried to take the direction upon this type of interference, but had only met with failure. This conforms with the line of experiments carried on here, and would tend to indicate that it was not caused by power lines, etc. It is received just as well when all power lines within a radius of eleven miles are shut off, as when they are turned on.

This is certainly an interesting subject and if you will print a little article in QST about it, perhaps some of the fellows may be able to compare notes which may lead to the final solution of some of the QRM problems.

Very truly yours,
C. C. Endly.

(Editor's Note: The class of interference mentioned in Mr. Endly's third paragraph is familiar here in Hartford, but we have no suggestions as to its nature except that we believe it to be atmospheric and not artificial. It is not a nightly occurrence, but is often experienced several times in one night, and on nights otherwise without atmospheric disturbance. It gives one the idea that a heavily charged cloud is drifting thru the antenna, and discharging, starting gradually, reaching a steady intensity which lasts for ten to forty seconds, and tapering off to silence. The noise during the discharge is terrific. We have had it on beautiful starlit nights without a sign of a cloud; it is faster than the clicks of a snow-storm and not as fast as the discharge of a cloud of steam; and it is not our antenna series variable breaking down.

Let us see if we can't get at the nature of this thing thru our membership. Will anyone who has any data on the subject please communicate with the Editor?)

THE OHM-SAW, PLEASE!

6 Livingston Ave.,
Yonkers, N. Y.

Editor, QST:

Seems to me that something is flukey, since that September QST arrived. I'd like to ask a question—how do you get those five amps out into the ether, anyway? Gee, I hear about 5, 6, 7, often 8, even 9 amps being discussed as tho it was your fault if you couldn't do the same. Right, eh? Will somebody please explain? Here's why I'd like to get some dope.

I have a 1 K.W. Packard, .007 Dubilier, 120 cycle gap on a synchronous motor, usual O.T. The aerial is a 4 wire, 80 foot T, five feet between wires, approximately 55 feet high. The ground probably is like a tin can along side of 1AW and 1HAA, but it's not so bad. Now the sad part—that dawgone meter won't go beyond 2.8 amperes no matter what I do! With five inch coupling it drops to 2.6 amperes, and the decrement (obtained with a wavemeter-galvanometer combination) is .08. What's the answer?

The other day I got disgusted, and we started monkeying with radiation resistance—that is, "we" includes another in the same boat.

Well, we got something after a while. My output is about 70 watts, his is 135! Good—7% and 13.5% efficient. And we're just normal stations at that.

Maybe it's the receiving stations who are doing the good work, I don't know. Nevertheless, I'd like to shake hands with anybody who gets an efficiency of 20%! And say, if you happen to be the man, for heaven's sake give us a little dope on how it's done.

78—
Carl E. Trube, 2BK.

WHO IS HE?

Bridgeburg, Ont., Can.

Editor, QST:

In the interesting letter in QST of June 29th by our mutual brother Heydon, the latter, after straying far from the subject, landed rather heavily on my toes. I refer to his remarks regarding VAL. As I had the pleasure of assisting in the installation of the C.W. set there, I may rightly assume to know something about it. This station—or the C.W. apparatus in it—is loaned by the British Admiralty, and is operated under contract by the Canadian Government. (not Marconi Co.). This of course puts VAL under the British flag (even if its location in Nova Scotia did not effect that very desirable condition) and so I cannot see wherein consists the violation of the Convention rules—and by the bye: do certain American coast stations get this 800 m. and similar stuff, in the Convention rules? I have no recollection of such liberty being accorded in the Rule Book.

May I also record myself as in support of Mr. Heydon's defence of the great American Noise Maker. It's the man behind it, and not the gun itself that causes QRM. Half the QRM in my district is caused by "power" sets; and let us not forget that (tho' I am not one of them I speak on their behalf) many a good station can boast the use of a Ford coil or similar device in working DX (refer QST's Calls Heard). I almost nightly hear an amateur, presumably in Buffalo, whose station must be something like this: power at least 1 K.W.; cycles, 25 or less; condenser (owner's query: "Do they use condensers in sending sets?") nil; coupling inductances, (query: "W'ats them?") nil; spark gap, two 8d nails on a board; aerial, about 60' high and 160' long; receptor, maybe (I doubt it); operating speed, about 3 w.p.m. Operator haasn't learned to make dots yet....and then they wonder why Buffalo amateurs can't work Canadian 3AB! No spark coil on earth could liberate such aperiodic static as is let loose every few nights and for a couple of hours at a time, by the above mentioned Buffalo (?) "amateurs". I don't believe that amateur's identity is known, although three live amateurs with D-F loops would soon locate him. This QRM is the kind we all want stopped—and all know how to stop.

Why don't we do it? Are we afraid, or just lazy? Let's quit knocking the spark coil and get after the QRM. For spark coil and QRM are not the same thing at all. QRM is the radio-fan's international abreviation for "ignorant operator wkg.". Let's get rid of him.

Now Eddie, I too have strayed farther from the subject and will stop before I get lost. Hope I haven't taken up too much of your highly valued time O.M. So wishing continued success to QST

I remain
Sincerely,
Chas. A. Lowry.

(If this punk is in the United States, a can should be tied to him until he gets his set and his ability within the legal requirements. Get busy, Buffalo, and see if he can't be located and educated.—Ed.)

CONSIDERATION IN OPERATING

S.S. Coppename 10/3/20
At Sea.

Editor, QST:

Just finished clearing my hook to Swan Island and will now tell you all about my troubles.

This game is all OK but I want to say right now that the boys at home sure are lucky. You can 'holler' yer block off and when you try to get an OK for your nine

hours hard labor of pushing a thirteen pound key you will always find some bird testing.

I always went straight up in the air when I got busted up when trying to work some of the boys at home but believe me the QRM on 200 meters can't hold a candle to the 'junk' that is continually floating around on 600 meters. Of all the places in the world the Gulf is the place where some of our most beloved operators take advantage of the missing Radio Inspector and proceed to test out Mr. West's theory of the brushing antenna. Just a few minutes ago one of the Shipping Board Ops tried the experiment by laying a book on his key and proceeding (I guess) to stroll out on the deck to see if he was getting a brush off his antenna.

Of all the rotten dope this is the limit. It is a blessing that the Old Man doesn't have to sit out here with his hook bulging like a poisoned pup and listen to some of this dope going thru the air. I have grave fears that his pet pussy would never survive the initial night..

There is still one thorn in my side that I'll have to get cleared and then will let you rest in peace. That is about the question of the proper kind of MSGS that the A.R.R.L. wants to have going thru the air. One of the rules says no more "Greetings via Radio". That's me all over. The com ops have trouble getting their msgs. thru on practically the same reason; that some darn crank wants everybody to know that he is out at sea or don't know what to do to pass the time away so helps the opr on his ship keep things stirred up. You boys up there at Hartford can't please every one and inasmuch as the rule now stands let's don't back down. As far as Mr. Williams' letter goes, I appreciate his point but don't believe that he has the proper conception of what the word commercializing means. That is a big word and means a lot. If more of the big radio companies could boast of a real commercial system then there would be a pointer for the A.R.R.L., BUT as far as commercializing, the A.R.R.L. should have law and order and give these other people an example. We have set a good example in lots of cases so let's keep up the good work. Another thing, Mr. Williams states that his messages were not delivered. He should not blame the rules of the A.R.R.L. for that but rather the inefficiency of the operators on his relay route. Again I say that the rule is **good** and should be enforced to the limit.

As far as the life in the Merchant Marine is concerned it is monotonous true enough **but why** make the life of Amateurs like it by filling the air full of bunk??????

I fully expect to return to the amateur game next winter and I certainly will be disappointed if I hear the QRM on 200 that I am hearing out here on 600. 90% of the QRM is caused by unnecessary conversation and I am a firm believer that the operator that listens in more than he transmits will get a whole lot further and help others out at the same time by keeping QRM at a minimum.

Last trip this ship was in a hurricane and I want to say right now that all the QRM from ships did interfere with the copying of storm warnings etc.; but I got all of the weather by laying low and waiting, while other ships called and raised hob to get a report on the weather. I feel positive that if the boys at home would follow this rule they would find no trouble in working over greater distance than they had ever expected. The old saying "It is more blessed to give than to receive" DOES NOT APPLY IN RADIO, SO WHY TRY IT?

One thing more; if you call a station and say QRU and he answers you "nil", why litter up the air with useless gabble such as "how is my tone", etc.? Nine times out of ten the other fellow will tell you first "QSA" and if there was anything wrong he would tell you. At the same time while you are squawking about tone some other fellow is trying to be a REAL RELAY STATION and trying to clear his traffic so WHY continue to block his efforts and give a bad eye to the A.R.R.L.?

Let's all be a little more considerate of the other fellow. Radio is not a plaything, neither is it any longer a pastime. It is serious biz and let's treat it as such.

Hoping to be with you in the air soon, I send 73's to all.

M. B. Lowe.
(9LP—KDF).

MORE ABOUT XAJ

5XA, Auburn, Ala.

Editor, QST:

In reading over Mr. Walleze's article in the August QST about "XAJ", it strikes me that he exaggerates considerably and I'd like to give the readers of QST a little more correct impression of this station. To do so, I am enclosing two pictures of the old XAJ. The first is of the old cathedral, between the towers of which the "T" type is stretched. The other picture is of the station proper, which I was able to obtain by the use of a little diplomacy!!!

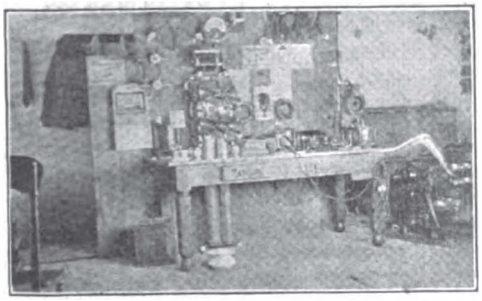
I can not refute the statement concerning the rating of the transformer, but the generator was rated at 3 K.W. (By the way, after transmission, this generator was stopped by an attendant bearing against the shaft of the m.g. set with a beam of wood used as a brake.)

As can be noticed in the picture, the condenser (Leyden jars) run thru the table down to the floor, but the quenched

gap is mounted directly above the condenser and the O.T. directly in front with

the primary nearest the gap. It seems to me that this makes for quite short leads in the closed circuit (which as everyone knows, is the circuit in which short leads count for most). Perhaps the connecting leads are not as large in proportion as those of our first-class amateur stations, but who has seen a commercial station (especially one built ten or fifteen years ago) whose leads are as large?

It may be that the room had just been cleaned up before I entered it, but at any rate, at no time did I ever see all of the



leads scattered over the walls, floor and ceiling as Mr. Walleze so graphically describes it (and it may be said here that during the year 1917-18, I was running into Tampico—on KRG & KGS—and I visited this station not less that twice a month).

In closing it might be said that this station is now 'no more', it having given place to a newer more modern station—which does **not** do as good work as the old one did!

Sincerely,
V. C. McIlvaine.

CONCERNING CAGES

Fall River, Mass.,
QST, Oct. 28, 1920.

Gentlemen:

I wish to comment on cage antennae as published in QST, October, 1920.

I have used a 4 wire cage since the war and find a few flaws in the article as published. In the first place, all wires being equal in length, the cage will roll and twist—but if the two or more upper ones are somewhat shorter it will maintain its shape when sagging in the middle as all aerials are bound to do. I use wooden hoops with cross wires like a wire wheel and circumference wires, all soldered together. If instead of the cumbersome insulators at the end, all antennae wires are carried to a common center at at the lead in end and one or more good insulators installed, much less strain is imposed on the whole construction.

Hoping the above comments are of some value, I remain

Yours truly,
Wm. H. Buffinton, 1GZ.

REPRODUCING BALL LIGHTNING

424 Hamilton Natl. Bank Bldg.,
Chattanooga, Tenn, Oct. 12, 1920.

Editor, QST:

My brother and I have been interested in building and operating some large Oudin and Tesla coils, more for the spectacular effect than anything else. While tuning up one large Oudin coil (stands about 4 feet) we had it grounded to the steam heating pipes of the building which passed directly behind the coil. The power was operated by our radio key, in fact the radio transmitting set was used. My young brother was standing with his right hand on the key and with his left, fingers up, palm extended, towards the large copper ball on top of the coil. Before he had moved his hand close enough to receive the discharge from the ball a "spark" or "fireball" broke from the STEAM PIPES, passed within about 12" of the copper ball and struck the boy on the palm. He received quite a jolt from this but nothing serious. Later he lost the skin from the palm of his hand. I could not get a good look at the "fireball" from where I was standing. We thought the matter was more of a joke than anything else and paid no attention to what really had happened.

(Continued on page 64)

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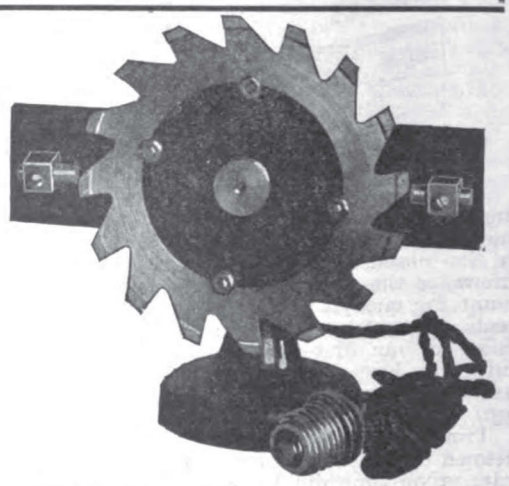

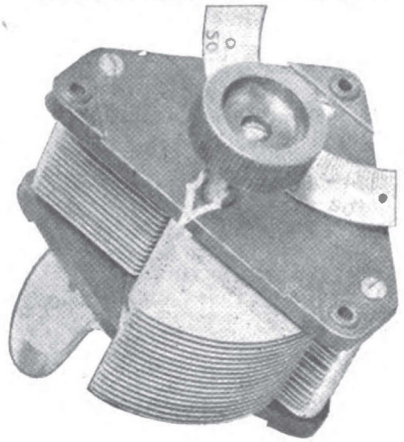

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CAT. NO. YM-10

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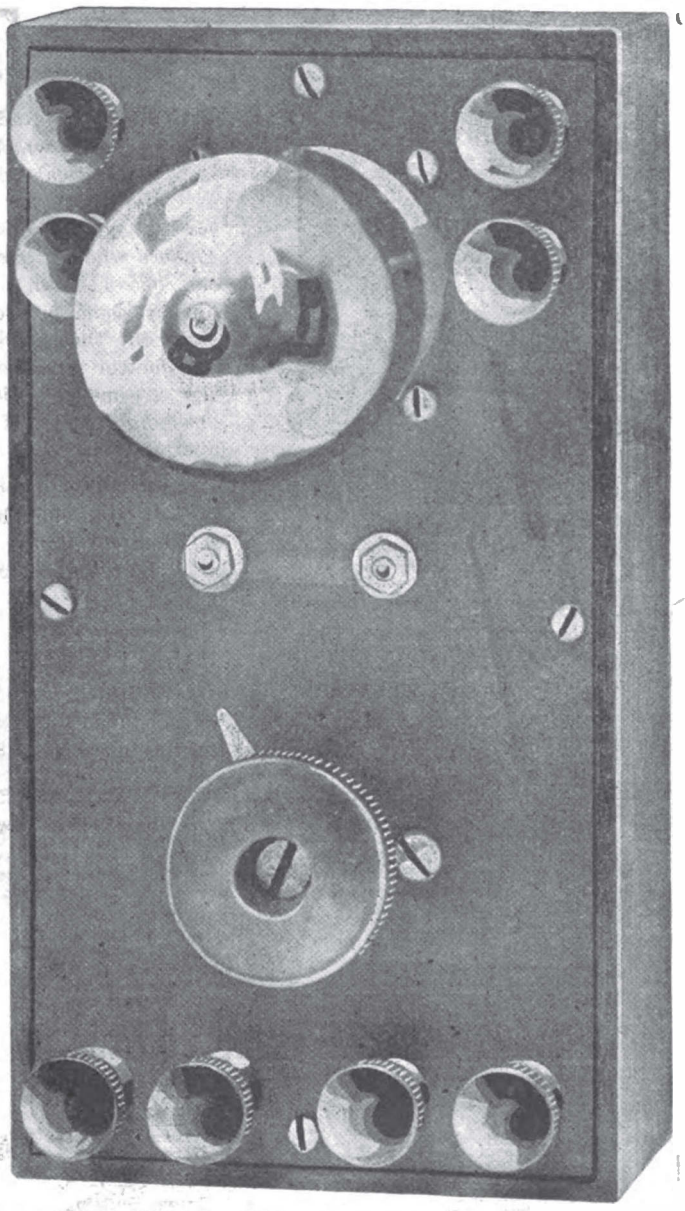

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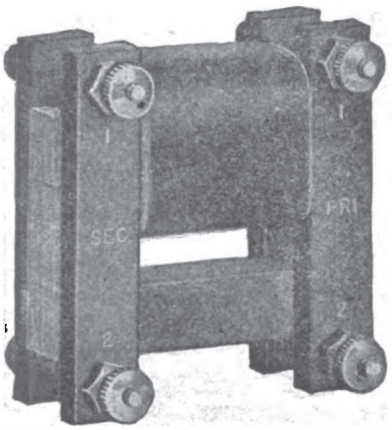

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RADISCO COILS

dio man knows that the service derived from wound coils has been proven to be far and more efficient than bank-wound or pan-uctances, and as a performer in long wave , they rank highest.

) COILS combine correct design and material, ppearance and reasonable strength, with e performance and prices that are not ex- Made in seventeen sizes, tapped and plain, gth range from 200 to 20,000 meters.

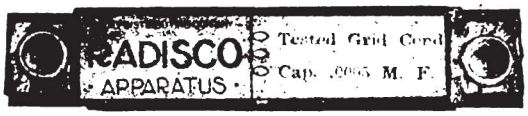
ns	Apx. Inductance in Milli-henries	Wave Length Range with .001 M.F. Variable Cond.		Price Wound with No. 26 SCC	20/38 Litz
40	.092	225	575	$0.70	
00	.61	460	1480	.95	
75	1.6	750	2400	1.15	
25	5.6	1375	4505	1.40	$2.00
50	16.0	2250	7700	1.65	2.60
50	35.0	3000	11200	2.00	3.10
00	114.0	6000	20000	2.65	4.25

tion is invited to the fact that all Litz Coils ind with 20/38 Litz.

O COILS MAY BE OBTAINED WITH TAPS ICH ALLOWS THEM TO BE USED FOR A LARER WAVE LENGTH RANGE

Vo. rns	Taps Taken Off At	Price Wound with No. 26 SCC	20/38 Litz
25-3	40-100-175 Turns	$1.70	$2.50
50-3	175-325-550 Turns	2.30	3.70
00-3	325-550-750 Turns	2.90	4.85

to any of our agents or direct to us for our ete catalog. Send 10 cents for mailing.



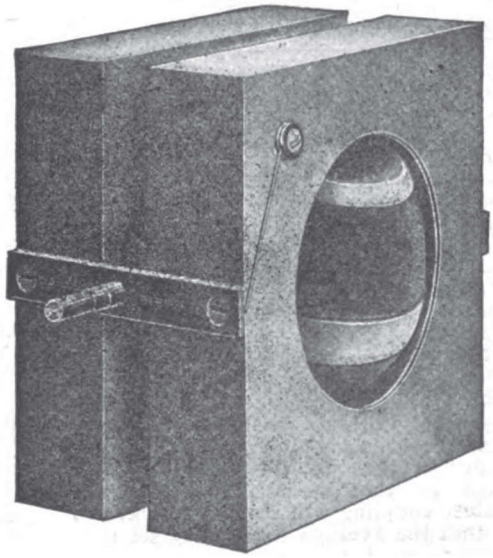
RADISCO GRID CONDENSER

Tested Capacity .0005 mf.

Another Radisco product, tho small in size, very large, indeed, in service. Of simple and effective design and construction; takes a minimum of space in audion control work. Its special construction permits the sale of a really efficient instrument at a very low price.

No. 1G Condenser, capacity .0005 mf., 35c

Include five cents for postage to all parts of U. S. and Canada.



RADISCO VARIOMETER

The latest addition to our Radio family. Like all other Radisco products it has been produced to anticipate and supply the demand for a good short wave instrument, qualified to withstand the acid tests of radio work.

For the radio man who desires an instrument of this character, our variometer makes a distinct appeal. Made in one size 4¾" high, 3" wide, 5" deep and the shaft is of ¼" brass, just the right size to fit the number 69 dial; forms are turned from thoroughly seasoned wood and substantial brass bearings provided.

No. 1 Variometer.....$7.00

No. 1D Variometer with dial..... 8.50

Shipping weight 3 pounds.

onsible Dealers: We offer you an opportunity to carry Radisco apparatus in stock. Write for interesting sales proposition.

Sometime later we had moved the coil several feet from the pipes and were again operating it. This time I was operating the key with the boy looking on. Another spark of "fireball" came, this time from the copper ball on top of the coil, and passed directly towards the boy, striking him in the forehead. He received nothing worse than a bad headache from this one. I was standing so that I had a clear view of the entire action. The ball appeared to be about ⅛ inches in diameter, very white, and was sparkling. It traveled fairly slowly, that is, so we could see it plainly, but a little too fast for the boy to dodge well. Now I would like to know what these things were—has anyone else seen anything like them? I cannot understand why they should ignore closer objects and people and pick on that brother of mine. Maybe they do not like him.

Any assistance you can give me will be very much appreciated.

Yours very truly,
Benj. F. Painter.

NAVY QRM

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

Editor, QST:

I wish to support heartily your statement on page 46 of October QST that Mr. "D. B." is mistaken in saying that a quencht gap station cannot emit a broad wave. Not only can it emit a broad wave but the most notorious offenders in that line today are quencht gap stations. This is logical when the design of the apparatus is considered.

When a quencht gap is functioning properly, very close coupling can be used; consequently the sets are so designed as to permit that close coupling. If then thru ignorance of the operator the set is maladjusted so that quenching ceases, the same close coupling will result in a wave so broad that the average rotary gap set cannot hope to rival it.

The most usual mis-adjustments are: wrong generator voltage, wrong generator frequency, wrong number of gap sections, and wrong coupling. The coupling especially is critical and as the editor has pointed out, wave changers do not always provide adjustment for this.

In general a bad note goes with defective quenching and the station with the broad wave also has a "mushy" quality.

Should Mr. "D. B." desire examples they can be had at New York. Tune in first the rotary gap of WCY at Cape May. The wave is sharp and while the maximum intensity is tremendous the station can be tuned out. This is a rotary gap.

Take next NAH-1, the Brooklyn Navy Yard, next after NAM the most notorious QRM maker on this coast. The tone is not clear and the wave is vastly broader than that of WCY. Here at Washington NAH-1 is about half as loud as WCY yet it cannot be tuned out with anything like the same ease. This is a quencht gap set —evidently badly adjusted, about as badly as possible.

That a quencht gap set can produce far different results is shown by WCG, the Bush terminal in Brooklyn. The beautiful clear whistle of this station is very considerably louder than NAH-1 yet its tuning is so sharp that even at waves very near its sending wave there is no interference (at Washington) from WCG.

I should like to have decremeter measurements on the antenna currents of the stations named.

The trouble is not at our tuners, it is at the coastal stations, especially at those star offenders NAM and NAH-1.

Sincerely,
S. Kruse.

RADIOPHONE CONCERTS

Union College Radio Club,
Schenectady, N. Y.,
22 October 1920.

Mr. Kenneth B. Warner,
Hartford, Conn.

Dear Sir:

The Radio Club at Union College, Schenectady, N. Y., is transmitting a radio concert every Thursday evening from 8:00 to 8:30 and from 9:00 to 9:30 Eastern Standard Time, on 350 meters, signing 2ADD.

We radiate over 3 amperes with five General Electric "V" Tubes. The Club would be greatly obliged if you could print this notice among the "QST" pages in an early issue.

Respectfully yours,
Jetson O. Bentley,
Secretary.

Address mail:
Jetson O. Bentley
Lambda Chi Alpha House,
22 Gillespie St.,
Schenectady, N. Y.

'TWAS EVER THUS!

KOSR, At Sea.

Editor, QST:

Did you ever stop to think what a vast amount of information you give, free of all charges and encumbrances, when you whisper your worries and discoveries to the man behind the counter of the "Home Paradise" or whatever its name may be—your favorite wireless store? Or what wonderful startling things the files of a mail order house would disclose? If you can't work in such a place then just try lingering near the counter an hour or two

some Saturday in the busy season and keep your ears open; it is far better than any vaudeville ever seen. Unfortunately it isn't all fun for the man who has to keep a straight face and show the budding wireless wizard the error of his ways. For instance think of the pathos that must be registered when Marconi Junior discovers that the man at the store was right after all and that a tuner wound on mother's best rolling pin **really won't** bring in signals without the aid of a detector or some other mysterious device! This is the bugaboo of both retail and mail order departments: explaining to an ever-changing group of hopefuls what a set won't work without and answering the next question that invariably follows—"why not".

Then there is the goof who wants some "110 volt fuse wire". He always wants it for general use around the attic, to protect all kinds of instruments known (and others which are in process of construction) but has no idea how much current he wants to use. He usually admits he doesn't understand about the amperes and such, and reverts to his request for fuse wire that will carry 110 volts safely.

Next, in a great hurry to be waited on, is a gentleman who was commissioned by his son to buy "an interrupter for a vibrator". Oh, yes; perhaps it **was** a vibrator for an interrupter but it must be one of the two. "What, you haven't any? Why he told me you were the best place in the city and that you would be sure to have it. Yes that is what he wants, you can't shove anything else off on me. Well, I guess I'll have to send him down for it himself. Good day."

This man was easy but wait till mother comes in with a list of what her darling son wants. Of course he took the prices from last years' catalog because they are so much more reasonable than the new ones, and woe unto the salesman who asks more than Willie had written on the slip as the correct price, for he then becomes guilty of trying to take advantage of a lady who doesn't understand wireless goods. We get along as well as possible, thinking longingly of the good old wouff-hong in the back room—but no, it is impossible. This is a lady we are dealing with, but oh boy, if Willie would only come in himself. So we finally arrive at the fourth item, which (after deciphering) turns out to be nothing more imposing than a Geissler tube to operate on 110 volts A.C. Then the conversation takes a turn like this: "Then you haven't any? Where **can** I find them? What! aren't made! Oh they must be; you are just telling me that because you are out of them." Then comes the clinching argument: "Of course there must be, or else why would he be wanting one?" Did you ever try to convince, or even intimate to a fond mother that there was something about wireless that sonny, who has a **government license** (this always heavily emphasized), doesn't know? Just try it some time! It's high treason, an insult to his as well as the mother's intelligence and poor business in general.

The young man with the glasses, knowing we cheerfully furnish information, wants to know what capacity to use in the tuned plate circuit to make his V.T. oscillate well on 25,000 meters; he also wants hook-up for radio frequency amplifier using common A and B batteries. After taking his address and his thumbprints and making all kinds of dire threats we loan him a French booklet with the desired diagrams,—which scrap of paper was jealously guarded and so escaped some eleven or nine "final" inspections and two or three cootie mills.

Here comes a youngster with a woebegone look; he must have been hooked up on the wrong side of the meter when it happened. But no, his trouble is still graver. He just received his new P—— transformer and it doesn't work. He has carefully connected the city juice line through the key **to the big porcelain insulators** on top of the thing, where the safety gap is, but when the key is pressed there is no result beyond a funny little humming noise. True, he didn't know quite where to look for the spark but then there should have been a spark somewhere shouldn't there?

We consider our time valuable so we pass this fellow over to Bill to enlighten and go over to take care of the heavy set man who looks as if he knows exactly what he wants. He does. First he asks us in a scientific way whether a bell can be rung by wireless. Of course it can. Visions of going out to set up a demonstration set at some school. Hope it's a co-ed school; here's where I slip one over before Bill comes to see what's up. I wonder if this guy is a professor or a newspaper man, if the latter I must duck for I am so bashful and hate publicity. OH YES! Then the man unfolds his scheme. He merely wants us to install an outfit to ring a bell by wireless (we just said it could be done) in his home. It is his clever idea, he is going to thus do away with the annoyance and expense of renewing his DOORBELL batteries by ringing it by wireless. This is too much! We barely recovered in time to sell him a bell transformer before he escaped, then with a strange buzzing noise in our ears we went to the office looking for action. First we handed in our resignation from the firm, expressing a hope that business would remain as good as was possible with the star salesman gone; then we dictated a letter to the district radio inspector asking when we could be examined for commercial license.

So we are now sailing the briny deep, going to sea at irregular intervals when the longshore strikes are at a minimum in the various ports we visit. Some day, when V.T's. are a dollar a dozen and we all have money to burn and nobody kicks about the price you ask them for goods we are coming back ashore. We will bring along what souvenirs we can collect from various radio stations, and what we do not use on 8—will be offered for sale at the old stand. Drop in and tell us how you eliminated static and fading, and if we know any bigger ones we will tell them to you—whenever the boss is out.

R. O.

RE QUENCHED GAPS

(Concluded from page 49)

the primary oscillating circuit, a condition almost inevitable wherever straight or ill-designed rotary gaps are used.

A properly designed quenched gap therefore allows closer coupling. This insures a greater percentage of available energy actually put into the antenna and a substantial increase in transmitting range, the emitted wave conforming to Federal regulations respecting decrement.

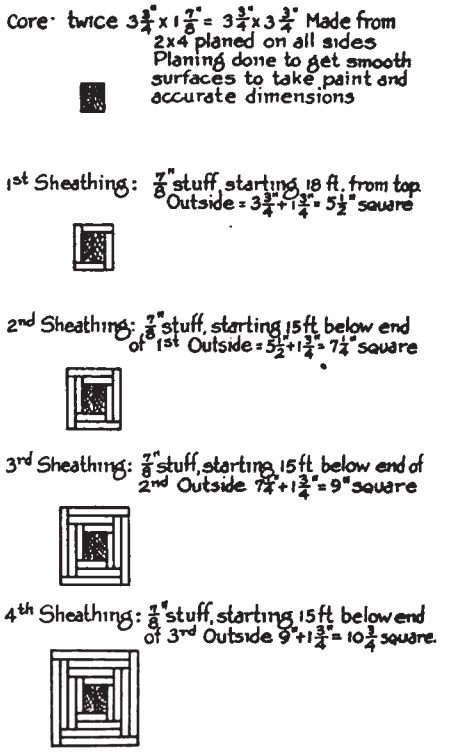
It has been said that a quenched gap operates best with 500 cycle current. This is not in accordance with the facts. Frequency does not affect the efficiency of the gap itself. In the case of 200 meter operation 60 cycle current is much more desirable since the slower period permits a complete charge of the condenser before each train of oscillations takes place. The question has been asked whether it is possible to obtain a good spark note with 60 cycle current. The answer is "yes." A clear, rhythmical note of either 60 cycles or 120 cycles frequency may be obtained by adjusting the number of gaps in circuit and the value of resistance in series with the a.c. transformer primary.

Some quenched gap sets produce a "mushy" note because the operator fails to use sufficient resistance in the primary power circuit. This causes the spark to "arc" in the gap, producing the "mushy" note. The importance of using sufficient resistance in the primary power circuit does not seem to be fully appreciated by a few operators. Figs. 1, 3 and 4 emphasize this point. Fig. 2 shows the characteristic wave form of the ordinary rotary gap.

No special knowledge is required for the operation of a quenched gap. Explicit instructions are included with most of the better types on the market and the operator simply needs follow these. As regards upkeep, the quenched gap has a long life for everyday use—not abuse. It is neither liable to wear out or break provided the ordinary operating instructions are followed.

The Masts at 1AW

SINCE the description of 1AW in the July issue Mr. Maxim has received a number of requests for a description of the masts, which were shown in our cover illustration for that month. The following illustration will explain the construction. The figures are approximate, as the stock varied a little. It was all given a coat of good lead paint before



assembling. All of the assembling was done with the use of 4" galvanized iron spikes, and the completed mast was given two coats of paints. It was then bound around with iron packing-case binding every three feet from top to bottom. The lumber is best quality spruce and the material was sawn exactly to width before assembling. All joints were carefully staggered.

The masts are 80 ft. high and are set on concrete footings flush with the ground. Each mast has three sets of three guys, of No. 6 iron wire, with turnbuckles. All fittings were wrapped around or tied to the masts—no holes were bored thru them anywhere.

Thru artist's error our drawing shows the various cross-sections as slightly rectangular. They should be square.

—FOR YOUR CONVENIENCE—

QST'S INDEX OF ADVERTISERS

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ALWAYS MENTION QST WHEN WRITING TO ADVERTISERS