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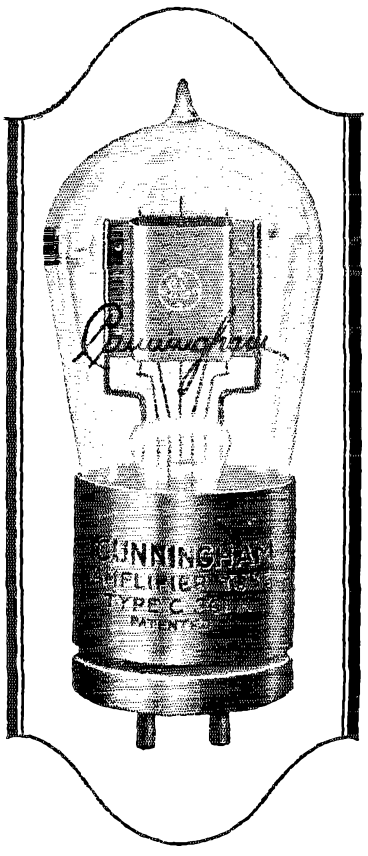

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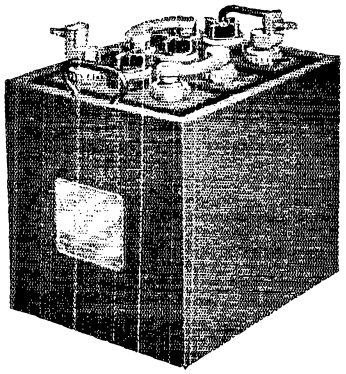

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QST

A Magazine Devoted Exclusively to the Radio Amateur

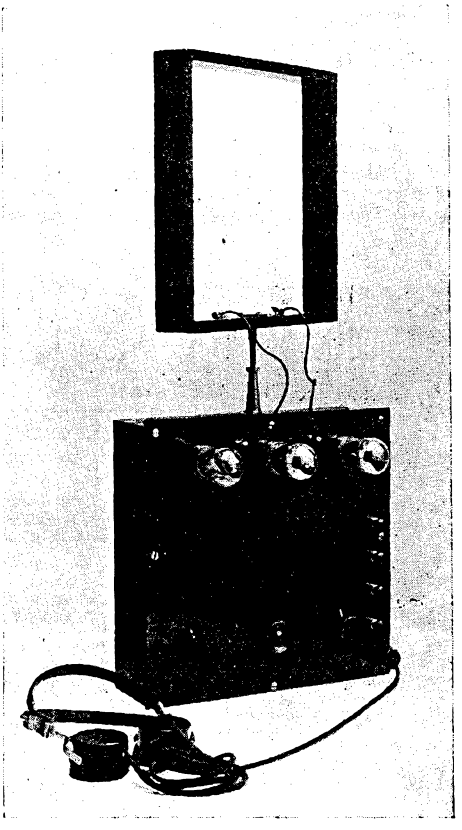
The Inverse Duplex System of Amplification

By Boyd Phelps, Assistant Editor

THE Inverse Duplex system of amplification receives its name from the manner in which the tubes are used. It is an adaptation of the circuit developed and only partially successfully used by the eminent French engineer, Marius Latour. A recent commercial adaptation of this French circuit has been called the "reflex," but Mr. David Grimes, of New York City, the inventor of the circuit we are about to describe, prefers to call his system "duplex," which more clearly indicates the double function of the valves.

The best known so-called reflex circuit is a hook-up whereby three amplifying tubes are used for three stages of radio and two of audio at the same time, employing a crystal for detection. This arrangement is shown schematically in Fig. 1. Mr. Grimes, who during the war was assigned to special investigation work in the radio branch of the Air Service, tried to adapt the French circuit to the Air Service circuits in order to decrease the number of tubes and consequently reduce the size of the storage battery.

It was soon appreciated that the ordinary system of duplexing had several inherent disadvantages. A casual glance at Fig. 2, which attempts to duplex all of the tubes of a three-tube amplifier set and which also employs a tube detector, will show that the third amplifier tube is very easily overloaded due to the presence in that tube of both powerful radio and powerful audio energy. Thus the total amplification of the arrangement is limited to the output of the third tube. It is also seen that there exist three stages of secondary radio-frequency "leakage amplification" between the output and input of the detector. By this it is meant that a small amount of radio frequency energy leaks thru the detector and associated apparatus by capacity paths and is put back on the input of the three-stage radio amplifier. This causes the circuit to be very unstable, it being next to impossible to stop oscillation without greatly reducing the amplification efficiency of the series. A third and big drawback is the fact that the phones are in the plate circuit of the third amplifying, thus placing three stages of audio amplification between the loop and the phones. Under ordinary



The Set Described in Fig. 4.

conditions this means that the circuit cannot be satisfactorily operated because of the proximity of sixty-cycle circuits or other electrical apparatus which produce fields of audio frequency which would be amplified by the three audio stages in succession. (In the ordinary set this does not occur because the detector is placed between the loop and the audio stages.)

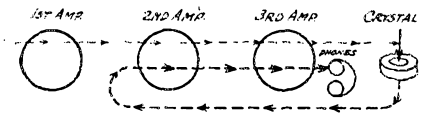


FIG. 1

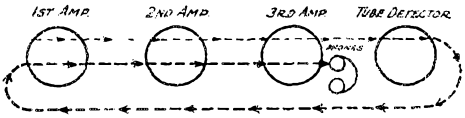


FIG 2

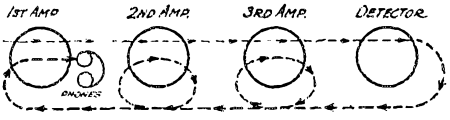


FIG 3

LEGEND (RADIO) (AUDIO)

In Fig. 1, the last-mentioned objection is overcome by using the first tube for adio only. If a tube detector is used in Fig. 1 in place of the crystal, however, there is still a tendency to overload the third tube which now constitutes the third radio stage and the second audio stage. While the tendency to oscillate is reduced in Fig. 1, there still remain two stages of radio frequency "leakage amplification" between the output and input of the detector. The use of a crystal detector in place of the tube detector makes the circuit much more stable, as the crystal only rectifies the radio frequency, but a tube detector also performs an amplifying function which a crystal cannot accomplish. The crystal detector also reduces the initial amount of audio currents going into the first audio stage and this results in less crowding of the third tube.

The system developed by Mr. Grimes is the result of many experiments during and since the war on the Latour circuit. He came to the realization that the only ideal solution of the reflex circuit was in such an arrangement that the stability would be increased, overloading would be reduced, and audio noises minimized; and where all the tubes could be duplexed if desired. The "inverse duplex" accomplishes these results. See Fig. 3.

It will be easily seen by Fig. 3 that the radio-frequency energy passes thru the tubes in the ordinary sequence. The difference comes after the detector tube, where the audio, instead of going thru the tubes in the same order as the radio, passes first into the third tube. This makes the third stage of radio function as the first stage of audio amplification. From there the audio is led thru the second tube so that this tube acts as the second stage of audio and the second stage of radio. Finally the third stage of audio is achieved through the first tube, which is carrying the first stage of radio. The phones are in the plate circuit of the first tube.

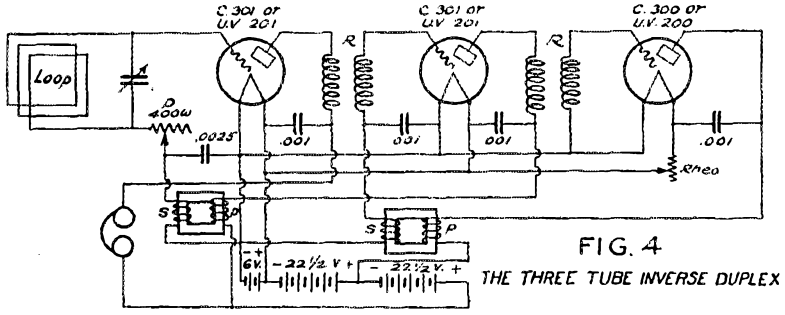


FIG. 4

THE THREE TUBE INVERSE DUPLEX

This is the hook-up of the set shown in the photograph. The loop consists of 20 turns on a frame 11½ in. square, while its tuning condenser is .0005 mfd. maximum capacity. The transformers R are for the radio-frequency—Mr. Grimes used an Acme R2 for the first stage and R3 for the second. P denotes the winding of a 400-ohm potentiometer which is used as a series resistance as explained in the text. SP indicates the ordinary type of audio transformers. It is important that the radio-frequency paths be kept as short as possible from the radio transformers to the tubes on either side of it. Mr. Grimes uses the well-known "micadons" for his .001-mfd. fixed condensers, mounting them directly upon the filament binding posts of the sockets, thence direct to the transformers.

All tubes are then loaded uniformly and may be used to the maximum limit of all instead of being limited to the crowded output of the third tube. The first tube

carries weak radio and strong audio energies, the second tube carries medium values of each, while the third tube carries strong radio and weak audio. Also, no matter how many tubes are used, there never is more than one stage of radio "leakage amplification" between the input and output of the detector tube and there never is more than one tube of audio amplification between the loop or aerial and the phones, as the phones are on the output circuit of the first tube.

Fig. 4 is a diagram showing the detail connections employed in an inverse duplex set using three tubes. This arrangement is recommended for all ordinary purposes, as sufficient amplification is usually obtained. It is the practical adaptation of the theoretical case discussed in connection with Fig. 3. It is rarely necessary to add the third amplifying tube, which of course would give three stages of radio and three stages of audio. However, if desired, a third amplifying tube may be easily inserted by following the same general scheme as presented in Fig. 4. Substituting a loose-coupler in place of the loop, the set may be readily operated on an aerial where shielding conditions prohibit the use of a loop.

The by-pass condensers in the Grimes circuit carry the radio currents, after passing thru the radio transformers, directly back to the filaments instead of merely bypassing them around the audio transformers and then allowing them to pass thru the common B-battery where they would "cross-fire" with the radio energy from the other tubes. This of course places the full B-battery potential across the condensers continually and necessitates their being of mica construction, such as the small square "micadons." Paper condensers here will "blow" after only a few hours of use.

All of them are of .001 microfarads capacity except the one connecting the loop circuit to the filament of the first tube and this is made .0025 mfd. to reduce the radio frequency impedance here so that if needed as much as possible of the available radio potential from the loop can be placed across the tube. Increasing the others to .0025 will not materially aid the radio amplification and at the same time starts to by-pass the higher frequencies of the audio currents causing distortion.

In order to regulate the amount of radio frequency energy passing thru the amplifiers, a 400-ohm non-inductive rheostat is connected as shown between the fixed condenser and loop. This produces a straight IR drop in the grid voltage impressed on the first tube. On nearby stations the radio energy, if not reduced, may easily crowd the tubes to capacity, allowing no available energy for audio amplification. In view of the fact that a tube detector will only handle a certain maximum of radio energy it is therefore foolish to sacrifice the audio capacity of the tube by excess radio amplification. The 400 ohms will be found sufficient to reduce even the strongest stations to reasonable intensity. On weak signals these 400 ohms will be decreased, sometimes even to zero. This system of regulating the radio energy has several distinct advantages over the common practice of placing positive biases on the grids of radio amplifiers by means of potentiometers. In the first place, altho biasing the grids positively accomplishes the reduction of the radio energy and stabilizes the circuit, it also causes distortion and reduces the audio volume, which is not a condition that is desired. And in the second place, if the grid of the first tube is made positive it becomes a relatively low-resistance path across the tuning element which consider-

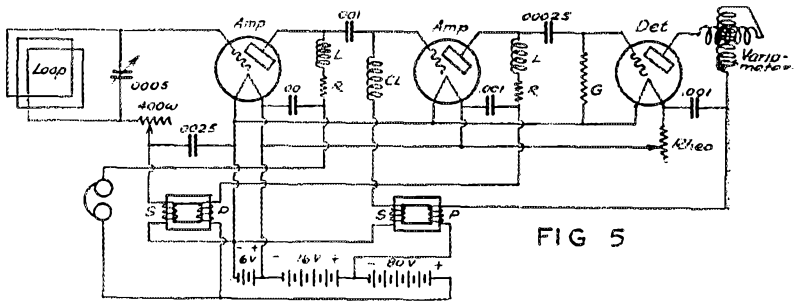


FIG 5

A hook-up presenting some suggested possibilities for 200-meter experimental work. The radio stages are coupled by a reactance-resistance combination LR as shown. It is suggested that L may be a single-layer winding of about 100 turns on a cardboard tube, adjusted to have a natural period of about 210 meters. Resistance R, which may be a non-inductive poentiometer, is then added until oscillation is under control, by which time the tuning will have broadened, probably to a band 185-235 meters. CL is an inductance similar to L, designed to keep the radio-frequency voltages from leaking thru the audio transformer. G is the detector grid-leak. The variometer in the detector plate circuit will make that tube oscillate for C.W. reception.

ably broadens its tuning. This is the reason for the broad tuning of most radio frequency sets. In the Grimes scheme the grids of all the tubes run directly back to the negative side of their respective filaments. Thus the first tube acts only as a small capacity across the tuning element and the controlling resistance is in series with this small shunt path. Therefore the tuning remains very sharp and the audio amplification is entirely undisturbed by the system of controlling the radio.

Another feature of the Grimes arrangement is that the phase angles of the audio currents are so arranged on the grids of the amplifying tubes as to aid the radio energy when it is increasing and diminish it when it is decreasing. It is a well known fact that small changes of grid biasing potential will greatly affect radio frequency amplification. Then at the instant when the voice-modulated radio-frequency energy is passing thru a given tube at a maximum the fed-back audio voltage resulting therefrom should be applied to the grid as a negative potential. When the voice-envelope is diminishing in amplitude, the audio voltage resulting therefrom should be applied to the grid as positive. In this way there results in the receiver an inherent or self modulation *which tends to increase the amplitude of modulation of the distant transmitting station.* The audio currents thus applied to the grids also tend to supress in a super-regenerative manner any tendency toward oscillation resulting from the use of radio transformers of insufficient resistance. These phase relations are obtained by the use of audio transformers having a certain ratio between the resistance and inductance, the "Viking Audio," made by the Viking Transformer Co., of New York City, having been found nearest to requirements. To determine whether or not the phase is correct, the primary transformer leads may be interchanged and the result noted. The secondary leads should remain fixed, and with the lead from the outside layer of the winding connected to the grid circuit of the succeeding tube.

In New York City Mr. Grimes is able to tune out completely the local broadcasting stations and bring in many distant stations such as Atlanta, Pittsburgh, Schnectady, etc. This is done on a small loop one foot square having twenty turns. Chicago and Davenport pour in on this set with sufficient volume to fill a large room. Even on the most distant stations the set is remarkably free from high-power telegraph interference such as from WNY and ship traffic, even when operated on Staten Island, right in the heart of New York harbor interference.

One of the interesting features of the Grimes Inverse Duplex set, as it has been quite generally called, is its simplicity of adjustment—one knob does all the tuning, one knob operates the detector rheostat, and the third and last knob controls the 400-ohm radio-frequency rheostat previously described. Mr. Grimes has found after experimenting with many types of transformers that in his particular circuit the Acme R2 and R3 are best suited for the radio input to the second and third tubes respectively. On 200 meters this set is just as good as the R.F.A. transformers used in it. Right here let us put in a loud wail because of the poor radio transformers that are supposed to get down to 200 meters. Until manufacturers answer our requests for a good 200-meter transformer, the above-discussed circuit will be best suited for broadcast reception. With the transformers mentioned above (obviously very inefficient on 200 meters) reception was tried on 200 meters with the small loop for about an hour in New York City and a large number of one's, two's and three's were logged with an occasional eight and five. The marvelous freedom from QRM and the ease of adjustment (what could be simpler than one knob?) made the writer yearn all the more for some decent 200-meter radio amplifying transformers.

Although in its present form, for the reason just stated, this circuit is perhaps not directly adaptable to 200 meter work, we are presenting it because it brings out so many new and novel features. Mr. Grimes was informed that on turning loose our gang with this dope he could expect we would twist his circuit inside out with modifications as found best for our purpose, but at this he expressed no special worry. So here we are, fellows; *go to it.* Some of us will try tuned stages with two or three variometers on the same wooden shaft, others will try resistance coupled amplifiers with quite probable success, some in addition will use A.C. on the filaments, and others may drag in some features of proven merit in other fields.

At this writing we have not had time to try any extensive experiments. A variometer next to the plate of the detector or a separate oscillator may be used for the reception of C.W., the former being preferable. The use of a grid condenser and leak for the detector or grid biasing batteries for the amplifiers may be worth experimenting with. Fig. 5 shows some such suggestions. It is especially worthy of note that this receiver will not radiate energy and interfere with other receivers in the neighborhood. At any rate, it has possibilities in our field, especially where the average ham can not afford to buy and operate a large number of tubes.

We would appreciate hearing from any of our readers who get good results on 200 meters with this arrangement or modifications thereof.

Across the Pacific Again

AMERICAN amateurs are being heard regularly by amateurs in New Zealand over a distance which approximates 8200 miles from the center of the territory heard! This is good news, for here is another English-speaking country with which we may some day hope to "work."

The omnipresent 6KA is the star U.S. station in New Zealand, as might be expected, and it is thru his kindness that we have been put in possession of a record of the reception of Mr. R. Slade, of Timaru, South Island. Mr. Slade's report is verified by several other N.Z. amateurs.

The record-breeaking one-tube set of Mr. R. Slade and M. J. Lough, at Timaru, N. Z. (We're sending them QST now, by the way.)

Transmission is prohibited in New Zealand, the amateur is much restricted, and special permits have to be secured even for reception. Instruments are hard to get, prices high, and in general it is discouraging. Mr. Slade has felt for a long time, however, that American amateur signals could be heard in his country, and has experimented to that end. At last his efforts were fruitful, and from 1:50 to 3:20 A.M. P.S.T. on Sunday, Nov. 5th, 6KA was in his phones loud and clear. That same night he heard 5PX calling CQ, 6BCR calling 9BED, 9BED working, 9UU working, 9YAJ calling CQ, and two unidentified stations. On Nov. 6th two unknown stations were heard, and the following night 6KA and two others. Altho the latter were too weak to read, part of a message was copied from 6KA. On Nov. 8th 6KU was heard calling 9AMQ, 9AJP calling CQ, and 9CNS working. Nov. 9th brought in 5XAD calling CQ, 6XAD calling 8UM and 5XAD, 6EN working, 9AWM calling CQ, while 6KA was in all evening and part of his messages copied.

Altho we are rapidly getting inured to super-DX records, we get a real kick out of this reception. Now how many stages of radio amplification do you suppose Mr. Slade uses, or what new discovery has he got that makes this work possible? Get this: *He uses a home-made single-circuit tickler regenerator and a single detector tube!* (Owners of super-heterodynes will kindly tear their hair in proper manner at this point, and plug in additional stage in the tooth-gnashing act.) It's almost unbelievable, but "there she be, derned if she ain't." The tube, of course, was a good one, an "Expanse," which is a model not now made, and akin in appearance and characteristics to that detector which pre-war amateurs regard as the best we fellows ever had, the old-time tubular Audiotron. If it's a detector like that, perhaps the reception becomes understandable.

We offer our congratulations both to Mr. Slade and to the transmitters who were heard. We call this real work. As far as we know, this is the first recorded amateur reception in New Zealand.

Another New Zealand amateur, in the North Island, copied an unknown 9th-district station on the early morning of Nov. 10th (9th district time) calling 9AFD. This amateur used a detector and two-step. We are hoping to identify the station heard by an examination of station logs.

Signals in China Again

The same ship operator whom our last issue reported as copying stations in Asiatic waters has now capped the climax by further reception while at anchor in Asiatic ports. On Nov. 25th, while running 100 miles west of Port Authur, China, in the Gulf of Chihli, 6KA was copied solid for several minutes and his message logged. This distance is 6300 miles. Again on Dec. 5th at 12:25 A.M. P.S.T., 6KA was copied calling 1BX while at anchor at Tsingtau, China, distance 6100 miles.

One of the best records, mentioned in *January QST*, has been confirmed. This unusual distance was made by 9CXP of Waterloo, Iowa, with two fifty watt tubes and with an aerial far from ideal in many ways. The first part of this distance was across over half the continent and a mountain range in addition, making the total distance to the point near Australia where 9CXP was heard 8,100 miles.

Ploughing eastward across the Pacific on Dec. 17th, 4470 miles west from San Francisco, 6ANH was copied, and the next night at 4225 miles 6TI and 6AWT were added to the list. At 4000 miles 6's and 7's were numerous, and 5's and 9's were coming in. For further particular see Calls Heard.

It looks like we'll have to have some Trans-Pacific Tests soon.

K.B.W.

Exploring 100 Meters

By S. Kruse, Technical Editor

WE have been a very long time in beginning to appreciate the short radio waves. In 1912, the amateur was given the waves below 200 meters because no one else wanted them and when we began working a thousand miles with our sparks, no one else would believe it.

The coming of the tube set started the same circus all over again. Nobody wanted to work on a short wave; yet we have 200 meter tube sets that work across the continent with less than half a kilowatt.

Now we are ready for the third step, moving on down into the thinly settled territory below 180 meters.

A Resume of Some Short-Wave Work

In the winter of 1920-21, mainly to get away from NSF's chopper and NAA's arc mush, we at Washington, D. C., began to feel our way downward. To our pleased surprise we found that our regular sets would work easily below 170 meters if anyone could be induced to get down and listen for them. A low-power tube set in Washington and a small spark-tube set in Hyattsville, Md., were able to work beautifully without any interference at all from NSF, NAA or *anything* else on *any* wavelength, altho 3RP at Hyattsville was using only a Western Electric "E" tube driven by a Ford spark coil. His signals at Washington (8 miles) were so intense that the phones were normally left on the table. The other station, 3ABI, was able to work 1TS and 1QP whenever they could be induced to tune down—again there was *no interference.*

During January of 1922 Mr. Boyd Phelps made tests at Minneapolis to find out how far down the 100-watt tube set at 9ZT would go. Good antenna currents were gotten as far down as 35 meters but no one seemed to have a tuner that was fitted to the job of listening. However, in the spring of 1922, after Mr. Phelps had joined the *QST* staff, he ran some further tests with Mr. J. C. Ramsey of 1XA and Mr. Frank Conrad of 8XK, with 1RD acting as listening station. Further tests between 1XA and 1HX (Mr. Phelps' Hartford station) resulted in immediate communication at 135 meters with good signals all the way down to 100 meters. The set at 1HX consisted of two 50-watt tubes working in a Hartley circuit on 1500 volts A.C. This set at 100 meters put 3.6 amperes into a single wire antenna 30 feet off the ground and 60 feet long; at 135 meters the current was 6.5 amperes.

In January of this year "DN" (L. E. Dutton) of 9ZN got the big tube set of that station down to 100 meters and a bit later to 70 meters. Weekly listening tests were at once arranged. In these tests 9ZN called 1HX at 200 meters, announced his wave and then said "QSY 190," and so on down in 10 meter jumps to 100 meters.

In the second test excellent signals at waves down to 145 meters were put into 3XM, 1QP, 3ALN, and Mr. C. A. Service's listening station at So. Manchester, Conn. On a third test good signals all the way down to 100 meters were put into 1HX, 3ALN, 3JJ, 3APV, 3XM, and the listening station of Mr. A. L. Budlong at Washington, D. C.

On February 11th there was run a three-cornered test with 3ALN, 1QP, and 9ZN sending one after the other. 3ALN went down to 110 meters and everything was copied solid by both 1QP and 1HX. 1QP also went down to 110 meters and was copied solid by 3APV and 3ALN. 9ZN did not send but was heard faintly (by Mr. Budlong) saying "In trouble--shot——," 3ALN accordingly sent a second test with about the same results at 1HX.

What the tests mean to us

Why all these logs? For this reason—*in every single test,* with one solitary exception, *the best signals were heard at some wave length below 170 meters.* Even if we forget all about the decreased interference it is possible for us to move downward, work our antennas near their fundamentals (or below), and get better signals thru.

The early settlers have found the region of 100 meters good; they invite the amateur world as a whole to come along, and by way of a starter the Operating Department announces -----

A 100-Meter CQ. Party

By F. H. Schnell, Traffic Manager

For the benefit of those stations which think they can get down to 100 meters or thereabouts with both transmitter and receiver; a 100 meter CQ Party is arranged for the nights of March 24th and 25th. Beginning promptly at 10:30 P.M., Eastern Standard Time, the short-wave stations of each district will call CQ in accordance with the following schedule.

District	Time
First	10:30 to 10:40
Second	10:40 to 10:50
Third	10:50 to 11:00
Fourth	11:00 to 11:10
Fifth	11:10 to 11:20
Sixth	11:20 to 11:30

Seventh	11:30 to 11:40
Eighth	11:40 to 11:50
Ninth	11:50 to Mid.
Canada	Mid. to 12:10

Don't call CQ 135 times and sign once; no one is going to camp on your wave forever—keep signing at intervals. Everybody is invited to try both sending and listening and to send the logs to the *QST* Shop. They must be clean logs—not logs written on scrap paper or in the middle of a letter.

Weekly Short-wave Tests

We are planning a system of short-wave tests stations which will, at the same day and hour each week, start at 200 meters and send tests down to 100 meters or lower. The schedule is not ready but will be broadcasted on 200 meters on March 3rd and 10th by picked A.R.R.L. stations in each district, including Canada. These stations will send at 11:30 P.M. *their own local time.*

Receiving Tuners to Work Below 200 Meters

By Boyd Phelps, Assistant Editor

It is more difficult to make a receiving tuner that will work in the neighborhood of 100 meters than it is to get a tube sending set down to that wave. We have lots to learn in this connection but can use as a basis that which has already been done.

Mr. J. C. Ramsey of 1XA, for waves somewhat below 100 meters, recommends the familiar three-coil regenerative circuit using coils with a diameter of about 3½ inches with 10 turns on the secondary, 5 on the tickler, and about 8 on the primary, which latter is put in series with a small variable condenser. No condenser is needed across the tickler but a good fixed mica condenser (probably between .0005 and .001 microfarads) should be connected around the phones and the B battery. Any inductive-wound rheostats should also be shunted by condensers. Several different tickler coils should be kept handy.

Mr. B. J. Kroger, 3APV, uses a receiving circuit that looks like the familiar "1DH" reversed-feedback transmitting circuit.

Because the tuners at 1HX are handy they can be described in detail. Tuner No. 1 will oscillate between 250 and 100 meters and tunes down (non-oscillating) to 50 meters. It uses the Reinartz circuit and all coils are wound on an untreated cardboard tube with an outside diameter of 2½ inches. The plate coil is tapped at 0, 15, 30, 45 and 60 turns; the antenna coil is tapped at 1, 2, 3, 4, 6 and 8 turns, and the secondary coil is tapped at 20, 26, 33, 40 and 55 turns. The secondary condenser has 5 plates double spaced and the plate condenser should be about .0005 microfarads. Tuner No. 2 oscillates from 160 meters to 75 meters and tunes non-oscillating to 10 meters. It is wound on a 1½ inch tube with No. 22 D.C.C. wire. The tickler plate coil is tapped at 5, 10, 15 and 20 turns, the secondary coil also at 5, 10, 15 and 20, and the antenna coil has six turns, each of which is tapped. "Signal" 11- and 21-plate condensers are used in the secondary and plate circuits, respectively. It is very important that the rotary plates of the feedback condenser be connected to aerial and the rotary plates of the tuning condenser to earth.

It is not necessary with this sort of tuner to tune the antenna to the short wave, altho the setting of the primary switch does have an effect on the secondary wave length. In the tests with 9ZN, 1QP and 3ALN, a single WD-11 tube was used with the filament operated by alternating current from a small bell-ringing transformer. The 60-cycle hum was balanced out by a "Bradleyometer" 200-ohm potentiometer, to the center-tap of which both the grid and plate circuits were returned. A buzzer-driven wave meter was used to check each wave as it was tuned in.

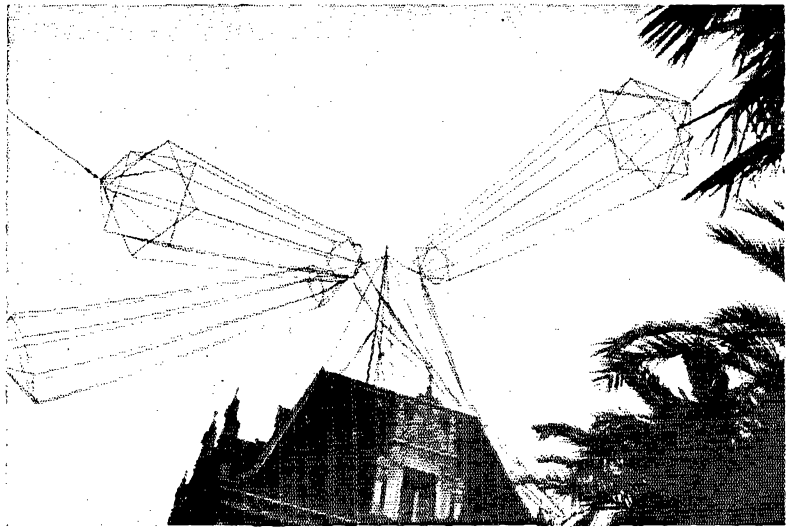
Two-way Tests with Europe

NOT content with the success of the Transatlantic Tests the Traffic Manager immediately upon their conclusion started arrangements for a definite attempt to establish two-way communication between European and American amateurs. Plans for the tests with England have not yet been completed, but the first series of French tests has been run off, unfortunately without success.

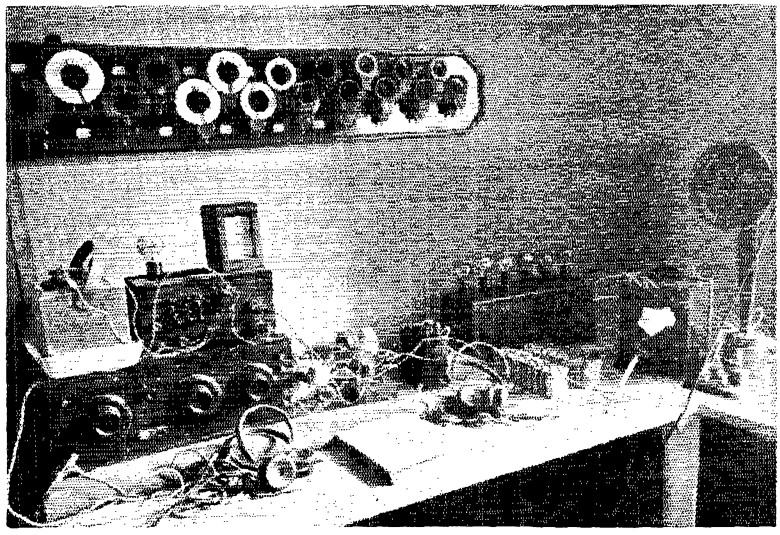
Station 1CKP in South Manchester, Conn., which was heard in England, France and Holland during the December tests, was chosen as the American station for the first trials, and 8AB of Nice as the French terminal. A schedule was arranged by cable providing for transmission and listening periods from Jan. 26th to Feb. 3d, between 5:00 and 7:00 P.M. and between 10:00 and 12:00 P.M. E.S.T. Communication was not established, altho 8AB was heard on two nights. The first reception is credited to Mr. E. Laufer, of 2AQP, New York City, who, reading in the newspaper of the tests, straightway re-

paired to his set and slipped on the cans. This was at 5:30 P.M. on Jan. 27th. Local QRM was so bad that he was about to despair, when at 6:20 he picked up Deloy, sending slowly and signing "8AB French." Wave 195 meters, 25-cycle C.W., slight QSS, good audibility but QRM'd; which checks up OK. On the night of Feb. 2d 1CKP was successful in picking up 8AB on both transmission periods. Under better conditions the signals would have been readable practically thruout, but heavy QRM, considerable QRN, and slight QSS combined to make a hard job of it. He was heard many times calling and signing, but the only text copied was "Arc QRM terrible—nothing heard." From this it is known that 8AB was having his troubles too and did not hear 1CKP.

Mr. Deloy has cabled us that on Sunday Feb. 4th at 0632 G.M.T. he heard 1XM calling him. Communication was not established, but in the hope that this may be accomplished soon 8AB has arranged to be on the job regularly until March 15th. Here's your chance, fellows. The two-way



The aerial at French 8AB



The receiver at 8AB

trans-atlantic test is wide open to everybody, a free-for-all. Every man with a good station is invited to participate. 8AB advises that he will transmit every Sunday, Tuesday, and Thursday from this writing until March 15th, from 0500 to 0530 G.M.T., which means from midnight to 12:30 A.M. of those days in E.S.T. Anyone who hears him is privileged to answer from 0530 to 0600 G.M.T. (12:30 to 1:00 A.M. E.S.T.), during which time 8AB will listen for replies.

And *QST* hereby offers one genuine Brown Derby to the first American amateur to establish two-way communication with Europe. Up and at 'em, lads!

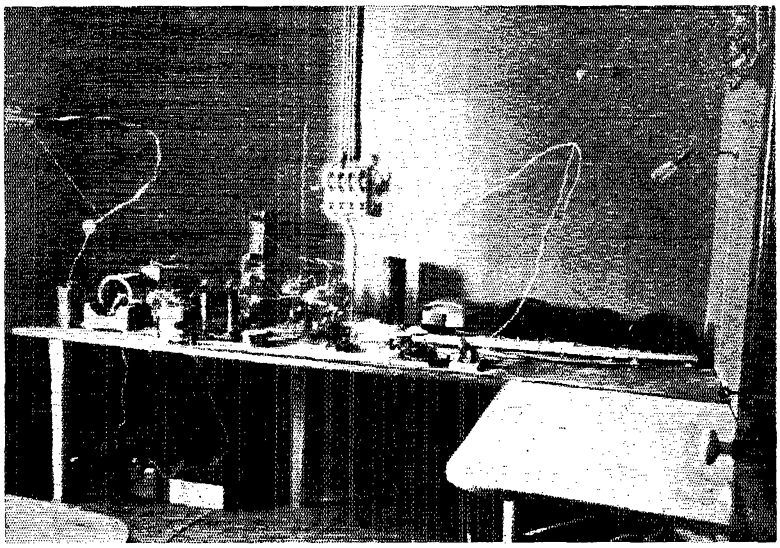
1CKP is a 500-watt 500-cycle I.C.W. set putting 8 amperes into an inverted-L cage aerial 65 ft. high. Altho a new station, it has been heard in every district. Chas. A. Service, jr., assistant A.R.R.L. secretary, is its chief operator.

We take pleasure in presenting several photographs of 8AB, the only French amateur station so far heard in this country. M. Leon Deloy, its operator, was introduced to our readers in "Who's Who" in our December number.

8AB's aerial consists of three 8-wire cages radiating from a main mast on his home at Nice. The top of the 30-ft. mast on the house is about 105 ft. above ground; the other three masts, not shown, are 75 ft. high. At their far end the cages are 12 ft. in diameter, tapering to 6 ft. at the house end; the lead-in cages are 8 inches in diameter.

The first thing to impress the reader in the photograph of 8AB's receiver is the American-built Tuska 3-circuit tuner. This was used during the Tests, with the detector and its battery to the right of the tuner, and the one-step audio amplifier on top of the cabinet. The 6-valve R.F. amplifier, heterodyne, and Magnavox, at the right of the picture, were not used during the tests. 8AB logged 1ARY, 1BCG, 1BDI, 1BGF, 1NY, 2KL, 8AQO, and 8MS on this equipment.

Particular interest attaches to Deloy's transmitter, of course, but unfortunately the picture is not a good one and requires considerable explaining. Left to right are the aerial lead, antenna meter, short-wave condenser, grid coil, aerial and plate coil,



The transmitter at 8AB Nice, France.

two 50-watt tubes used as grid-leak *a la* 3ZO, grid condenser, rheostat for the 50-watt tubes, two rheos in parallel for the main tubes, insulation condensers (two in series), four 250-watt valves, filament voltmeter, choke coil, H.T. milliammeter, keys, high-tension transformers (four with secondaries in series, delivering 5,000 volts), switch in transformer primary circuit. Below the table is a storage battery for the 50-watt tubes, while on the wall above is the main switch on the 25-cycle 110-volt 3-phase town supply. Filaments of the 250-watters are heated by a step-down transformer located between the O.T. and insulation condensers.

Who will be the first U S. ham actually to *work* 8AB?

K.B.W.

The Trans-Canadian Relay

By The Traffic Manager

IF we had a bugle we would mount the highest peak in Canada and blow it loud enough for all Canadian Amateurs to hear this Call to the Key in the first attempt at a Trans-Canadian Relay.

The time is ripe for this affair and we are firmly convinced that it will be successful if the stations can be on the air and will do their best to put the relay through. Not one "Yank" is going to help unless it is absolutely necessary, yet if help is needed every "Yank" in the country stands ready to assist in bridging a gap of too great a distance.

Even the arrangements for the relay will be in the hands of a Canadian, as W. C. C. Duncan, member of the A.R.R.L. Board of Direction, (9AW), 196 Ellsworth St., Toronto, Ontario, will have charge of the affair.

The dates selected are March 24, 25, and 26, 1923.

The idea is to relay a message across Canada and get a reply back during one of the nights, and thismessage is to be handled by Canadian Amateurs only. These good chaps have long wanted a chance to exhibit their skill, and here it is. With so many good Canadian stations on the air, it is but a small matter to get routes lined up.

All Canadian stations (and American stations on the Canadian border) are urged to get ready for the tests and are requested to forward information as to what they can do to Mr. Duncan, who will lay out the route. He will call on American Amateurs if in his judgment they are needed. For the benefit of all stations the following men will be glad to furnish further information:

A. H. K. Russell, Manager of the Ontario Division, 11 Pinewood Ave., Toronto. Ont.

A. J. Lorimer, Manager of the Quebec Division, c/o Buzzell-Lorimer Co., Cowansville, Que.

P. Socolofsky, Manager of Winnipeg Division, Loreburn, Sask.

J. T. North, Manager of the Vancouver Division, 2017 15 Ave., Vancouver, B.C.

We want to see the following Canadian stations doing their bit along with the others: 2EI, 2AF, 2AN, 2BG, 2DA, 2HG, 3CO, 3XN, 3BV, 3DH, 3DS, 3JH, 3OT, 3DE, 3GK, 3SX, 3JK, 3JL, 3AD, 3FA, 3GE, 3GK, 3NB, 3MN, 4AB, 4AO, 4CG, 4HH, 4BV, 4FN, 4BR, 4DQ, 4GB, 4AQ, 4EA, 5CN, 5AC, 5BQ, 5EJ, 5GO, 5CW, 5CT, 5AK, 9AX, 9CD, 9BX, 9BD, 9AL, 9AW, 9AC, 9BA, 9BH, and 9BV.

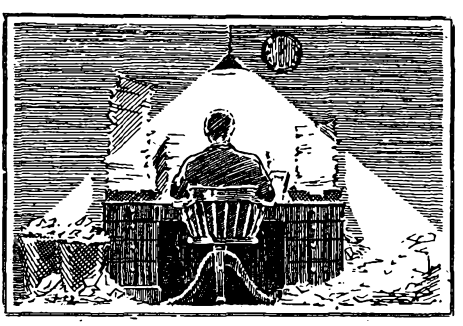
Canada, what do you say?

Transatlantic Test Notes

THE A.R.R.L. Transatlantic Tests were so hugely successful in the eastward transmission that the analysis of the reports of the European operators who copied signals has assumed enormous proportions. As a result, up to this writing we have not received official reception reports from either England or France. We are advised that Mr. Coursey's report is a week from completion, altho he has been working on it night and day. Because of the huge size of the task, then, we are not yet able to present anything more official than our preliminary report last month.

Reception in Holland

The January 6th issue of the Netherlands amateur magazine *Radio Nieuws* reports the very successful efforts of Mr. G. J. Eschauzier, of The Hague, who a year ago by receiving 1BCG became the first Holland amateur to hear an American amateur station. In the last tests he succeeded in copying the code words of 34 stations, and in addition heard a total of 53 stations without codes, embracing every U. S. district but the 7th. Among the code groups copied were three not previously reported from Europe: 1FB, 3NH, and 4ID. This



This is the way the "Wireless World" shows what Mr. Coursey is up against. Any night since the Transatlantic Tests—sorting out results.

has provided a positive identification of the transmission of these stations, and illustrates the great value of qualification in the preliminary tests; in fact Mr. Eschauzier listed codes in several places where the calls were not caught at all, and even tho some of the codes were somewhat garbled the identification was certain. In his list, which follows, asterisks have been used to indicate reception on more than one night, the number indicating the total number of nights logged:

Code letters verified: 1BCG. 1BET, 1AJP, 1BDI, 1ASF, 1XM***, 1YK, 1CNF, 1FB, 2ZK**, 2EL**, 2BML, 2AWF***, 2GK**, 2AWL, 2CQZ, 2CKN, 2HJ, 2LO, 3BGT, 3ZZ**, 3XM, 3BG**, 3NH, 3AAU, 3FS, 3CG, 4BY**, 4ID, 4KM, 5XK, 6ZZ, 8AQO, 9ZN**.

Heard without codes: 1BET***, 1BDI, 1CMK, 1BCF, 1ASF, 1XM, 1BDT**, 1ZE, 1BRQ**, 1CKP, 1II, 1CDO**, 1CDR, 1XK, 1BNT, 1FB, 2BML**, 2ZK, 2CKR****, 2AWF, 2FP*****, 2CPD**, 2CBX***, 2BET, 2AWL, 2AYV, 2BQN, 2CJN, 2ZN, 2BQH, 2YK 2HJ, 2GK, 3HG**, 3ZZ, 3BG, 3ZW, 3AFB, 3XM**, 3BF, 3BNU, 4ZW, 4ZS, 4OI**, 4EA, 5AGJ, 8BUM, 8XAE, 8AQO*** including two messages in French, 8AGD, 8DET, 9CXA, 9CM.

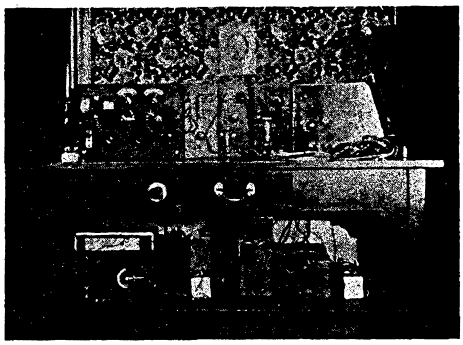
This work was done on a honeycomb-coil tuner, detector, and two stages of audio amplification. (On the last night signals were good on but 1 audio stage.) The tubes used were double-grids, but we do not know the hook-up.

Another Dutch amateur, Mr. Y. L. Leistra, of Rotterdam, was also successful in copying 1ZE and his code letters, 1OR working 2CT, 2FP calling Test, and 4BY and 4FT working. 1ZE was the best station, being very QSA, and 2FP next. In the 1921 tests Mr. Leistra heard several stations but too weak to read. This year he used three stages of R.F.A. with V-24 tubes, a W.D.11 detector, two audio stages, and a separate heterodyne. The aerial was a single wire 190 ft. long and 105 ft. high at the far end, with a counterpoise 40 ft. high. This was an excellent aerial but its proportions were such as to give it a marked directional property and this unfortunately was at right angles to the Great Circle of reception. After four nights of listening the aerial came down in a storm, so his effort covers only Dec. 12th to 16th. The last night was poor, with heavy fog and terrific QRN. He reports signals of good audibility but an unfavorable signal-stray ratio, QSS annoying, and many calls lost thru "bum fists" or failure to sign.

Mr. Eschauzier's night-to-night variation in reception was very much in accord with the experience of other European amateurs. For example, on the 16th (G.M.T.) 2BML was the only station heard, while none were logged on the 17th. Yet the 18th was good, and the 20th and 21st excellent. There is every indication that whatever phenomenon it is that governs transmission at such distances was rapidly approaching a peak as the tests concluded; it would have been very interesting indeed, considering the huge lists logged on the last two nights, if transmission could have continued a few nights longer and the shape of the reception curve noted.

A Seven in England

Mr. W. Witt Burnham has sent us the log of the chief operator of his firm, Mr. J. H. D. Ridley, who was shown seated at his set in the photo on page 9 of our January issue. Mr. Ridley lists 13 stations with the proper codes and 34 without, all of which were reported thru Mr. Coursey's daily messages except 7ZV of Douglas, Wyo., which was not previously mentioned. This station was logged at 0447 G.M.T. Dec. 20th, Eccles



Mr. Y. L. Leistra's station in Rotterdam.

audibility 5, QSS, calling unknown station. Unfortunately nothing further was copied for verification, but if Mr. Felix Thompson was on the job at that moment he may pat himself on the back and say that he got over.

Some Duds

As we mentioned in our February report, some of the calls reported are obviously mistaken. 1GH was not operating when reported from Switzerland; apparently it was 1GV who was heard, as the latter was reported frequently. 3WR is believed to have been 2WR. 8BXF has no C.W. set and was not in commission. 7PO was at sea, but writes to say that he does not believe the mistake is on the part of the listener for he has received cards from Wisconsin and Illinois points reporting his sigs while the set was idle. 1XP comes to light as the station which was reported as "one xray." 3BL was not transmitting altho reported; he has cards from every district but somebody else is being misread. 8AJ has not been in operation for a year.

British 2FZ Queried

As reported last month, no less than nine different amateurs, from the Atlantic seaboard as far west as Michigan, copied signals from station 2FZ, unmistakably of foreign origin, during the American listening periods of several nights. This station is listed as belonging to the Wireless Society of Manchester, England, who also built a station with the call letters 5MS for the tests. 2FZ was not among the stations issued code letters by Mr. Coursey's committee, but it was believed that it was participating in the free periods. The British representatives have cabled for particulars and a prominent British amateur writes us that no such station was transmitting on their side during the tests. American 2FZ is known to have been QRX. The mystery is still unsolved at this writing, pending word from England. If 2FZ doesn't turn out to be European amateur, the editor of this sheet may yet lose that coat to O.M. Burnham.

5MS Reported Here

The Manchester station 5MS seems to have been heard in this country prior to the tests. Mr. John Leighner, operator JL at 8ZD Pittsburgh (and 8ALF at home) copied signals from a station signing 5MS from 0511 to 0514 G.M.T. December 10th. Wave about 270; QSS medium; note like D.C. supply but not smooth. The Manchester Society verifies transmission at that time; no further check seems possible.

2BGI, Lakehurst, N. J., reports hearing 5MS on the nights of Dec. 28th, 29th and 30th. On the first two nights no attention was paid to it, Mr. Cranmer supposing it to be a U.S. station. On the 30th he learned that 5MS was British and listened for it in particular that night; at 9:30 E.S.T. he found him, sending his QRA. Detector and one-step audio were used. This report has not yet been verified.

European Signals at Sea

In our last issue we published the logs of some ship operators who copied American stations while in European waters during the first half of the tests. Now we have a log from an operator who sailed from New York for a European port shortly after the beginning of the second half of the tests—fortunate boy! He reports 5WS on Dec. 23d, 900 miles east of New York. The next night, 1100 miles east, he copied French 8AB and a British station believed to be 2SH sending "Great Britain sends Xmas greeting," etc. On Christmas night, 1400 miles east, an unknown British station was received sending the code group MUPZN, which reference to our records shows to have been British 2OM. Dec. 26th, 1600 miles east, British 2SH and 5WS were heard, and on the 27th 5WS again at 1800 miles. On Dec. 29th, 2200 miles east and only some 800 miles west of London, British stations 2AW, 2OM, 2SH, 5MS, and 5WS were copied, and French stations 8AB and 8RRX, the latter sending his code-group ULMON. Altho 8RRX is a queer call, it checks with Dr. Corret's list.

This reception was made on a ship's set with but one tube, and is probably representative of the respective abilities of the various European transmitters.

Some Features of 5WS

We expect to have a detailed description of British 5WS, the European star of the

tests, in an earlier issue. This station was assembled and operated by a committee of the Radio Society of Great Britain and was located at the Wandsworth generating station of the County of London Electric Supply Co., where a brick chimney 170 ft. high provided an excellent antenna support. A 6-wire cage, 5 ft. diameter, and having an over-all length including lead-in of about 160 ft., was suspended nearly vertically from the stack. Local power of 50-cycle 220-volt A.C. operated an induction motor which was belted to a 350-cycle generator. The generator output was fed to two 1½-k.w. step-up transformers for full-wave rectification by rectifiers of the kenotron type. We have no particulars as yet on the circuit or tubes used. The input was 1.5 k.w. and the antenna current on 200 meters was 4.3 amperes, representing nearly 750 watts.

K.B.W.

What the Department of Commerce Thinks of our A.R.R.L. Voluntary Lid

WHEN we amateurs recently evolved a definite plan for co-operation with broadcast listeners in congested communities, the "Rochester Plan" whereby local agreements have been worked out based on mutual concessions and providing that in such localities amateurs will not operate transmitters that can cause interference to concert reception between the hours of 7:00 and 10:30 P.M., our headquarters office wrote letters to the various offices of the Radio Inspection Service inquiring their opinion of our action. We are very happy to say that all the replies were very favorable in their tenor, some of them even gently rebuking us for too full a measure of generosity. This is exactly what we desired to do, however—to have us amateurs assume a position where all fair-minded judges would say that we have been *more than square and more than liberal.*

For the information of our members we quote, with permission, extracts from the letters received from our bosses, the Department of Commerce:

Hon. D. B. Carson, Commissioner of Navigation

"This plan, if it can be carried out successfully, should eliminate much of the interference experienced from spark transmitters nearby, and will certainly convince broadcasting audiences that the amateur organization desires to co-operate with the Department and are willing to voluntarily do their part in solving the interference problem.

"This office does not want to see anything done which will discourage the amateur and believes that the plan you have worked out while it does restrict them to some extent and may deprive a few of them of the enjoyment they have formerly had, it still leaves open sufficient time for the beginners to practice and the older ones to do good work in long distance relaying and experimenting.

"The Bureau fully appreciates co-operation in its endeavor to improve radio operating conditions."

Inspector C. C. Kolster First District

"I consider the concession made to the broadcast listeners....very liberal on the part of the American Radio Relay League and sincerely hope that this will solve the present day problem. A thorough study of the present day situation should readily convince every 100% radio amateur that the establishment of this silent amateur period is essential for the good interest of future amateur radio.

"I am of the opinion that the establishment of this silent amateur period is but temporary, and that this perplexing problem will bring about certain developments in amateur transmitting equipment which will permit amateur and broadcasting activities to be carried on simultaneously without any serious interference to each other.....

"As an amateur, radio operator, radio inspector having served in four districts, and also having served in the Naval Service during the late war, at which time the actual value of amateur radio was put to a real test, I have been in close touch with several hundreds of radio amateurs and no one can better realize than I do the great value of amateur radio and I sincerely hope that the amateurs who have the advantage of many years experience will do all in their power to co-operate with the broadcast listeners and bring about a condition whereby each can enjoy the radio privileges offered them to the best advantage.

"The success of amateur radio to date can be solely attributed to the fact that the amateurs have been so well organized under the American Radio Relay League. The future success of amateur radio depends entirely upon the earnest support of each individual amateur to the organization and it is urged that these amateurs adhere strictly to the future policies outlined by the League."

Inspector Arthur Batcheller, Second District

"I do not hesitate to say that the American Radio Relay League has displayed a splendid spirit of co-operation, and is making sacrifices in order that the radio public can "listen in" and not suffer interference from amateur transmitting stations.

"This office recognizes the rights that the amateur has under the law, and the technical difficulties encountered by the radio novice. You can rest assured that this office will co-operate with you fully as regards the matter which you have brought to our attention."

Inspector Theo. G. Deiler, Fifth District

"...we of course very highly approve of the arrangements as set forth. We realize also the sacrifice made by the amateurs and will do all in our power to see that it is appreciated by the listeners. To this end we would like very much to have, if possible, a number of copies of the reprint of the editorial referred to, and we will see that they are placed in the hands of representative listeners thruout our district....

"This office has, of course, had its share of trouble in trying to smooth out differences between the amateur and listener, but we do not consider that the amount of difficulty has been either hopeless or very deplorable.....It is believed that the stand of the A.R.R.L. will be of material assistance.

"You can rest assured that the writer and the other members of this office staff not only approve and sympathize in the undertaking but also that we can be depended upon for whatever assistance you consider worthy of asking for."

Inspector J. F. Dillon, Sixth District

"Insofar as this district is concerned we have, by mutual agreement between the broadcasters and the amateur stations, arranged for a period of silence between 7:30 and 8 P.M. and for the exclusive right to the space for broadcasters and pure C.W. Spark transmitters and I.C.W. are to keep off the air during the period from 8:00 to 10:30 P.M.; and at all other hours all stations have equal rights. In view of this I do not think it will be necessary for the League to impose any restrictions upon its membership within this district, as the agreement was really between the membership of the American Radio Relay League and the broadcasters associations of the various communities. Hence, there can be no friction between the two bodies.

"Of course I am very much interested in the amicable co-operation of these parties and am constantly exerting every effort to maintain harmony among them. We all recognize that in the present stage of radio communication, it requires the earnest co-operation of all factions interested in the art in order to permit all of our people to obtain the maximum amount of pleasure and benefit from its operation."

Inspector S. W. Edwards, Eighth District

"I read Mr. Maxim's letter and your editorial with more than ordinary interest. Examining the proposal from all angles, it is my opinion that the American Radio Relay League have conceded too much. I believe that it would have been better had you endeavored to put thru a plan whereby a more equal division of time between listening and transmitting stations existed. The present plan....works a severe hard-

(Concluded on page 23)

The Best American Amateur Transatlantic Sending Stations

THE Tables on the next two pages are intended to describe the best of those American amateur sending sets which were heard in Europe during the east-bound Transatlantic transmission tests conducted from December 12 to 21 of 1922 by the American Radio Relay League in co-operation with the Comite Francais des Essais Transatlantiques and a committee of the Radio Society of Great Britain. Reception was however not confined to these countries but was aided by amateurs in Switzerland, Holland and Italy.

The stations here described were heard more than twice in one country or else were heard in two or more countries.

The list is not entirely complete; some station owners did not respond to the request for data in time for publication. In one case, that of 4OI at Porto Rico, it was impossible to obtain data in time because of slow mail service.

The list is not absolutely accurate. There will be noticed curious groupings of similar calls that which lead to the suspicion that there was inaccurate copying or sending. It is also probable that the list does injustice to the stations of Canada. The only distinction between a United States station and a Canadian is that the former uses "de" between the call and the "sine" while the Canadian uses "fm." This slight difference does not seem to have been adequately appreciated in Europe hence some calls listed here as American may have been Canadian.

CALL	LOCATION	TUBES NR.	TUBES TYPE	PLATE VOLTS	PLATE WATTS	ANT. AMP.	λ	ANTENNA	GROUND	CIRCUIT
1ASF	MEDFORD, MASS.	2	UV203	1200	320	4.3	206	CAGE 67' LONG 70' HIGH	10 WIRE FAN C/P	REVERSED FEEDBACK
1AJP	BRIDGEPORT, CONN	2	UV 203	1000	250	5.5	200	COMPROMISE 65' LONG 30 & 70' HIGH	7 WIRE FAN C/P	HARTLEY
1AKG	SALEM, MASS	2	50 ω	1000	400	4.5	200	50' LONG 65' HIGH FLAT TOP	C/P 15 X 80' LONG	REVERSED FEEDBACK
1AZL	WELLESLEY, MASS.	1	W.E. "G"	1500	262	4.5	210	10" CAGE 60' LONG 40' HIGH	C/P 60' LONG	REVERSED FEEDBACK
1AZW	NEWPORT, R.I.	4	UV202	1000	180	4.0	230	4" CAGE 55' LONG 30 & 50' HIGH	10 WIRE C/D AND PIPE GROUND	REVERSED FEEDBACK
1BCF	So. DUXBURY, MASS.	4	UV202	525	158	2.3	215	FLAT TOP 80' LONG 80' & 60' HIGH	80' SQUARE C/P	REVERSED FEEDBACK
1BCG	GREENWICH, CONN	2	"P"	2000	1000	6.0	200	CAGE 100' LONG 70' HIGH	RADIAL C/P	MASTER OSCILLATOR
1BDI	ORONO, ME.	3	50 ω	1850	830	7.0	212	FLAT TOP 50' LONG 50 & 68' HIGH	10 WIRE C/P	HARTLEY
1BDT	ATLANTIC, MASS.	4	UV202	600	168	1.6	204	FLAT TOP 65' LONG 60 & 85' HIGH	30 WIRE FAN C/P	REVERSED FEEDBACK
1BEP	LITCHFIELD, CONN	1	CG 1144	1500	300	4.0	220	CAGE 99' LONG 34 & 66' HIGH	6 WIRE C/P	NOT GIVEN
1BES	PROVIDENCE R.I.	1	UV203	1500	240	4.5	210	6 WIRE SLANTING FAN 70' LONG 35 & 70' HIGH	7 WIRE FAN C/P	REVERSED FEEDBACK
1BET	WORCESTER, MASS.	2	UV203	1200	276	4.3	220	12" CASE 80' LONG 17' & 60' HIGH	34 WIRE C/P	INDUC. COUPLED HARTLEY
1BGF	HARTFORD, CONN	2	UV203	1500	450	2.9	200	4 WIRE 68' LONG 55' HIGH	14 WIRE FAN C/P	REVERSED FEEDBACK
1BKQ	WORCESTER, MASS	4	UV202	500	150	2.2	255	16" CAGE 58' LONG 34' ABOVE C/P	6 WIRE C/P ON 9 STORY BLDG	HARTLEY
1BRQ	LEWISTON, ME.	2	W.E. "G"	1000	280	4.2	212	4 WIRE 60' LONG 40' ABOVE C/P	FAN C/P ON BUILDING TOP	
1CDO	BATH, ME.	1	UV203	1500	210	5.5	218	3" CAGE 60' LONG 40' HIGH	GROUND + FAN C/P	HARTLEY
1CDR	BELMONT, MASS.	3	UV202	1350	368	3.5	210	21/2" CAGE 35' HIGH	6 WIRE C/P	MEISSNER
1CDX	GEORGETOWN, MASS.	1	UV202	350		0.6		18" CAGE 60' LONG 40' HIGH	2 WIRE C/P	REVERSED FEEDBACK
1CKP	So. MANCHESTER, CONN.	2	UV204	4500	970	6.0	225	15" CAGE 45' LONG 55 & 80' HIGH	13 WIRE 100' C/P	REVERSED FEEDBACK
1CMK	HOLYOKE, MASS	2	UV203	1500		4.5	225	18" CAGE 45' LONG 75 & 55' HIGH	4 WIRE C/P	HARTLEY
1CNF	SOUTHBORO, MASS.	4	UV203	1200	600	6.0	225	6 WIRE 75' LONG 50' HIGH	8 WIRE FAN C/P	HARTLEY
1GV	PROVIDENCE, R.I.	4	UV202	1500	300	8.0	230	10 WIRE 70' LONG 70 & 40' HIGH	16 WIRE FAN C/P	COLPITTS
1II	PROVIDENCE, R.I.	4	UV202	1000	148	3.2	240	6 WIRE 65' LONG 70' HIGH	12 WIRE FAN C/P	HARTLEY
1OR	PLYMOUTH, MASS.	4	UV202	550	123	1.5	215	20" VERTICAL CAGE 55' HIGH	8 WIRE C/P	REVERSED FEEDBACK
1XM	CAMBRIDGE, MASS.	1	UV203	1500	225	4.2	219	8' SLANTING CAGE 50' LONG 120' MAX. HGT.	7 WIRE C/P	HARTLEY
1ZE	MARION, MASS.	3	UV204	2000	1500	8.0	215	22 WIRE SLANTING FAN 60 & 100' HIGH	50 WIRE C/P 100' LONG	HARTLEY
1YK	WORCESTER, MASS.	2	UV203	1000	250	4.8	220	MULTIPLE TUNED CAGE 90' LONG 30' ABOVE ROOF	COPPER ROOF AS C/P	HARTLEY
2AFD	PATERSON, N.J.	2	UV203	1500	510	3.8	200	2 WIRE 65' LONG 30 & 75' HIGH	IRREGULAR FAN C/P	COLPITTS
2AHO	IRVINGTON, N.J.	2	UV203	1400	350	3.7	210	18" CAGE 50' LONG 100' HIGH	8 WIRE C/P 30' HIGH	HARTLEY
2AWF	ALBANY, N.Y.	2	UV203	1500		5.5	200	6" CAGE 60' LONG 30 & 70' HIGH	MULTI WIRE FAN C/P	HARTLEY
2AWL	REDBANK, N.J.	4	50 ω	1000	500	4.2	206	2' CAGE 35' LONG 100' HIGH	12 WIRE C/P	HARTLEY
2AYV	NEW BRUNSWICK, N.J.	3	UV202	550	83	3.0	215	4 1/2" CAGE 30 & 60' HIGH 80' LONG	8 WIRE FAN C/P	HARTLEY
2BLP	LOCUST VALLEY, N.Y.	2	UV203	1500	330	4.2	208	2' CAGE 53' LONG 60 & 80' HIGH	37 C/P'S 40' LONG EACH	HARTLEY
2BML	RIVERHEAD, L.I.	1 / 1	UV 202 UV 204	2000		8.5	200	18" CAGE 60' LONG 60' HIGH	CIRCULAR C/P 100' DIA. + GROUND	MASTER OSCILLATOR
2BQH	MAMARONECK, N.Y.	4	UV203	1200	576	3.0	208	21/2" CAGE 80' LONG 35' HIGH	C/P 80' LONG 30' HIGH	HARTLEY
2BQU	STATEN ISLAND, N.Y.	2	UV202	450	72	2.0	200	4 WIRE 50' LONG 30' HIGH	10 WIRE FAN C/P	HARTLEY
2CBW	ELIZABETH, N.J.			1700		5.0	220	2' CAGE 65' LONG 50' & 45' HIGH	9 WIRE FAN 60' LONG C/P	HARTLEY
2CJN	NEWARK, N.J.	2	UV203	1000	360	4.4	205	4 WIRE 60' LONG 30 & 70' HIGH	4 WIRE 60' LONG C/P	HARTLEY
2CKN	SCHENECTADY, N.Y.	2	UV203	1250	440	7.8	200	3' CAGE 45 & 73' HIGH	FAN 60' LONG C/P	REVERSED FEEDBACK
2CKR	SCHENECTADY, N.Y.	1	UV204	2300	690	9.5	203	8" CAGE 60' LONG 20 & 60' HIGH	21 WIRE FAN C/P	HARTLEY
2CPD	BRIELLE, N.J.	2	UV203	1500	450	4.0	200	4 WIRE 67' LONG 45 & 50' HIGH	7 WIRE 70' LONG C/P	HARTLEY
2CQZ	ELIZABETH, N.J.	2	UV202	1000	140	4.5	210	6 WIRE 40' LONG 50' HIGH	FAN 50' LONG C/P	HARTLEY
2EL	FREEPORT, L.I.	3	50 WATT	1200	540	5.8	200	FLAT TOP 68' LONG 42 & 88' HIGH	10 WIRE C/P	
2GK	SCHENECTADY, N.Y.	2	UV203	1500	600	6.5	210	6' CAGE 70' LONG 40 & 70' HIGH	IRREGULAR C/P 125' LONG	HARTLEY
2GR	RIVERDALE N.Y.C.	2	UV204	1800	900	6.3	205	FLAT TOP 4 WIRE 100' LONG 30 & 90' LONG	4 WIRE 125' LONG + GROUND	CAPACITY COUPLED HARTLEY
2LO	NEW BRUNSWICK, N.J.	3	50 WATT	1000	450	4.5	200	FLAT TOP 80' LONG 55' HIGH	4 WIRE C/P	COLPITTS

H.R.H.

CALL	LOCATION	TUBES NR.	TUBES TYPE	PLATE VOLTS	PLATE WATTS	ANT. AMP.	λ	ANTENNA	GROUND	CIRCUIT
2NZ	TOTTENVILLE, N.Y.	2	UV203	1000	280	4.6	210	3' CAGE 60' LONG 55' HIGH	5 WIRE 70' c/p	HARTLEY
2RP	NASSAU, N.Y.	2	UV202	750		1.8	200	2 WIRE 62' LONG 60-65' HIGH	4 WIRE 80' c/p	COLPITTS
2UD	BROOKLYN, N.Y.	2	50 ω	1500	450	6.0	200	CAGE 90' LONG 70' HIGH	8 WIRE 50' c/p	HARTLEY
2XAO	BELMAR, N.J.	1	UV206	8000	1000	7.2	212	6" VERTICAL CAGE 120' HIGH	6 WIRE RADIAL c/p 200' DIAM.	INDUC. COUPLED HARTLEY
2XAP	TROY, N.Y.	2	¼ K.W	1600	1040	8.0	260	24" VERTICAL CAGE 100' HIGH	STEEL FRAME OF BUILDING	MEISSNER
2ZK	NEW ROCHELLE, N.Y.	4	W.E."G"	1250	625	4.5	220	FLAT TOP 60' LONG 60 & 105' HIGH	90' c/p	HARTLEY
2ZL	VALLEY STREAM, L.I.	2	UV204	2200	880	10.0	250	4 WIRE 100' LONG 65 & 75' HIGH	7 WIRE 100' c/p	HARTLEY
3AFB	WASHINGTON, DEL.	1	UV203	1800	388	4.6	220	CONICAL CAGE 64' LONG 51 & 60' HIGH	60' X 20' c/p + GROUND	HARTLEY
3AQR	SWATARA PA.	2	UV203	1500	660	5.7	218	4 WIRE 50' LONG 70 & 103' HIGH	35'X100' T c/p	HARTLEY
3AUU	PETERSBURG, VA.	2	UV203	1000	400	5.5	200	4 WIRE 50' LONG 60 & 40' HIGH	6 WIRE 55' c/p	REVERSED FEEDBACK
3BFU	LONGPORT, N.J	3	UV202	700	84	3.5	215	7 WIRE 70' LONG 45 & 73' HIGH	BURIED EARTH CONNECTION	REVERSED FEEDBACK
3BG	FOLCROFT, PA.	4	UV202	1000	200	3.7		5 WIRE 55' LONG 55 & 65' HIGH	c/p AND BURIED GROUND	REVERSED FEEDBACK
3BGT	ATLANTIC CITY, N.J.	4	UV202	500	100	2.0	200	12 WIRE 80' LONG 38 & 72' HIGH	FAN c/p 12' HIGH + GROUND	REVERSED FEEDBACK
3BNU	BETHLEHEM, PA.	4	UV202	750	180	3.3	202	4 WIRE 70' LONG 44' HIGH	7 WIRE c/p + GROUND	HARTLEY
3CC	ABINGTON, PA.	2	50 ω	1500	450	10.5	200	18" CAGE 60' LONG 65' HIGH	7 WIRE c/p 11' HIGH	HARTLEY
3HG	BALTIMORE, MD.	2	UV203	1200	276	5.5	220	28" CAGE 75' LONG 60' HIGH	IRREGULAR c/p	REVERSED FEEDBACK
3XM	PRINCETON, N.J.	2	UV203	1500	338	4.5	240	2' CAGE 60' LONG 80 & 100' HIGH	IRREGULAR c/p ABOVE BLDGS.	REVERSED FEEDBACK
3ZW	WASHINGTON, D.C.	2	¼ K.W.	6000	1200	12.0	250	4 WIRE T 80' LONG 55' HIGH	7 WIRE c/p 10' HIGH	REVERSED FEEDBACK
3ZZ	CRADOCK, VA.	1	DE FOREST 500 ω	1500	240	6.0	240	18" CAGE 60' LONG 45 & 100' HIGH	7 WIRE FAN COUNTERPOISE	MEISSNER
4BY	SAVANNAH, GA.	2	UV204	2000	700	5.0	212	8 WIRE VERTICAL FAN 95' HIGH	17 WIRE c/p + GROUND	REVERSED FEED BACK
4EA	NEW BERN, N.C.	4	UV202	1000	240	4.3	200	4 WIRE 50' HIGH	4 WIRE c/p	REVERSED FEEDBACK
4KM	ATLANTA, GA.	3	W.E."G"	1000	250	4.0	200	4' CAGE 80' LONG 30 & 80' HIGH	22 WIRE c/p 8' HIGH	REVERSED FEEDBACK
5XK	KNOXVILLE, TENN	2	UV203	1200	144	5.5	225	18" CAGE 75' LONG 60 & 65' HIGH	18" CAGE T c/p 110' LONG	REVERSED FEEDBACK
6KA	LOS ANGELES, CAL.	1	250 ω	3000	975	12.5	205	5 WIRE T 57' LONG 73' HIGH	T c/p 70' LONG 10' HIGH	MEISSNER
6ZA	SALT LAKE CITY	1	UV203	1200	180	6.5	220	18" CAGE T 150' LONG 240 HIGH	T c/p 205' ABOVE GROUND	REVERSED FEEDBACK
6ZZ	DOUGLAS, ARIZ.	2	UV203	1450	397	10.0	217	77' VERTICAL CAGE WITH "EARS"	10 WIRE c/p 12' HIGH	REVERSED FEEDBACK
8ADG	UTICA, N.Y.	2	UV203	1500	325	4.8	220	2' CAGE 70' LONG 60' HIGH	11 WIRE c/p 15' HIGH	HARTLEY
8AIO	E. PITTSBURGH, PA	2	50 ω	1100	242	4.0	206	20" CAGE 80' LONG 50' HIGH	90' FAN c/p	HARTLEY
8AQO	CAZENOVIA, N.Y.	3	UV204	2700	1620	8A	214	6 WIRE T 60' LONG 100' HIGH	RADIAL c/p	INDUC. COUPLED HARTLEY
8ATU	ROCHESTER, N.Y.	2	UV203	2500	750	7.0	206	2' CAGE 45' LONG 35 & 55' HIGH	11 WIRE c/p	HARTLEY
8AWF	CLEVELAND, OHIO	2	UV202	1000	120	1.7	280	18" CAGE 100 LONG 30' HIGH	BURIED GROUND	REVERSED FEEDBACK
8AWP	SYRACUSE, N.Y.	1	UV204			12.0	222	2 WIRE 60' LONG 60' HIGH	6 WIRE c/p 15' HIGH + GROUND	HARTLEY
8AXC	MARIETTA, OHIO	2	50 ω	1500	390	4.4		2 WIRE T 60' LONG 95' HIGH	26 WIRE c/p 25' HIGH	REVERSED FEEDBACK
8BK	E. CLEVELAND, OHIO	1	250 ω	4500	675	12.5	208	55' 12 WIRE SLANTING 45 & 82' HIGH	12 WIRE c/p 37' ABOVE GROUND	HARTLEY
8BSS	CAZENOVIA, N.Y.	3	UV202	650	136	1.2	205	6 WIRE T 60' LONG 100' HIGH	75' RADIAL c/p	COLPITTS
8BXH	COLUMBUS, OHIO	2	UV203	1800	810	9.0	200	6 WIRE CAGE 55' LONG 43 & 60' HIGH	10 WIRE c/p	HARTLEY
8IB	COLUMBUS, OHIO	2	UV203	1800	450	6.0	200	6 WIRE 60' LONG 45 & 80' HIGH	50' c/p AND GROUND	HARTLEY
8ML	CLEVELAND, OHIO	4	UV203	1500	450	5.5	200	10' FUNNEL CAGE 110' HIGH	27 WIRE FAN c/p	REVERSED FEEDBACK
8SP	FAIRMONT, W. VA.	3	UV203	1500	315	6.5	200	40' CAGE 75' HIGH LEADS BOTH ENDS!	200' T c/p	REVERSED FEEDBACK
8UE	LANCASTER, N.Y.	4	UV203	1200	480	7.0	210	10" CAGE T 78' LONG 78' HIGH	8 WIRE c/p 8' HIGH	HARTLEY
8XE	STATE COLLEGE, PA.	1	250 ω	1500	300		275	4 WIRE 80' LONG 50' HIGH	c/p 50' LONG 11 WIRES	NOT STATED
8YD	E. CLEVELAND, OHIO	3	50 ω	1400	525	6.5		4 WIRE T 100' LONG 105' HIGH	5 WIRE FAN c/p HEIGHT NOT STATED	HARTLEY
9AUL	MINNEAPOLIS, MINN.	2	UV204	2000	1100		200	8" CAGE 45' LONG 60' HIGH	6 WIRE c/p 8' HIGH	HARTLEY
9DWK	JACKSON, MO.	1	UV203	1000	150	5.5	220	6 WIRE 67' LONG 59' HIGH	6 WIRE c/p 12' HIGH + GROUND	HARTLEY
9OX	LOUISVILLE, K.Y.	2	UV203	1500	300	5.0	200	4' CAGE 49' LONG 48' HIGH	9 WIRE FAN c/p + GROUND	HARTLEY
9ZN	CHICAGO	2	UV204			10.0	209	10 WIRE VERTICAL FAN 90' HIGH	CONDUCTIVE GROUND	HARTLEY
9AL	TORONTO, ONT.	2	50 ω	1250	425	7.2	265	3 WIRE CAGE 75' LONG 30 & 60' HIGH	9 WIRE c/p 4' HIGH	HARTLEY

WHAT COMMERCE THINKS OF OUR A.R.R.L VOLUNTARY LID

(Concluded from page 20)

ship on the vast number of amateurs of the younger set who necessarily, because of their age, must retire early.....My argument against the present plan is that you have given up certain rights which you may not be able to ever again have returned to amateur transmitting stations. As I see it, listening stations will be demanding more and more time and as you have at one time given up the major portion of the evening hours, you will not have any time left to barter in case the listening stations make demands for an additional quiet period during the evening. Listening stations will probably now desire hours after 10:30 P.M. so that they can receive long distance concerts.

"The scheme that I have in mind to satisfy the demands of listening stations was to arrange quiet periods in various cities thruout the District two or three evenings during the week. This quiet period not only covered amateur stations but broadcasting stations as well.

"The whole thing simmers down, after all, to a question of efficient transmitters. Your statement "Our transmitters must improve" is the answer to the whole thing.....

"However, because we seem to hold different opinions on the division of time, I do not want to give you the impression that your plan will not have my support. My only objection is that I feel that too much has been given at this time....."

Making Edison "B" Batteries for C. W. Transmission

By Gerard H. Hall, 8AHG

FOR some months I have been operating my 10-watt transmitter from a "B" battery made up of Edison cells. The idea of supplying the plate circuit power for a transmitter of any size from batteries is supposed to be a difficult and expensive proposition, but that has not been my experience. My results have been so satisfactory that I believe others will be interested in it.

A storage "B" battery gets very rough usage. It is likely to be discharged at any rate, right up to a short circuit, and then left standing until it hapens to suit the operator to charge it. This sort of thing is ruin to a lead cell but the Edison cell thrives on it; its operation is actually improved by an occasional violent discharge and rapid charge. Unlike either dry cells or lead cells the Edison type may be charged and then neglected for long periods and yet remain in working order. When used for reception it has the usual advantages of the storage battery as to noiselessness.

Small Edison cells may be purchased ready-made but they are very expensive and a transmitting "B" battery for even a 5-watt tube can hardly be considered. It is much cheaper to purchase small elements and assemble them, or to tear down a large cell and use the separate "pockets" to form the plates of the small cells.

Begin by securing several cells of regular Edison storage battery and discharge them completely. They are rugged and will not be damaged if this is done by direct short-circuit. Then pour the electrolyte down the sewer and wash the cell out with distilled water. Wash it carefully before beginning to tear down the battery, for potassium hydroxide is fearful stuff. The top of the cell may be cut loose with a sharp cold-chisel and light hammer and the entire assembly lifted out. Its general appearance is shown in Figure 1. The negative elements are made of nickled sheet

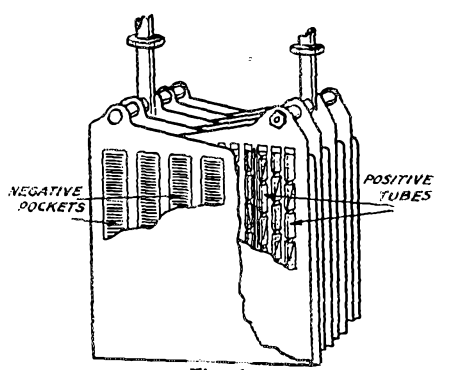


Fig. 1.

steel. In these are punched windows, about 3" x ½", so that the plates become a sort of gridiron. Each window is filled by a flat perforated steel "pocket" containing powdered iron oxide. These pockets are to be removed for use as the negative elements of our small cells. The positive plates of the large battery are also made of nickled sheet steel but the windows are

about 4½" x ¼" and contain perforated spiral metal tubes packed with alternate layers of flake nickel and nickel hydroxide. The tubes are crimped shut at the ends and are banded by small steel rings. They are to be removed for use as the positive elements of our small cells.

The pockets and tubes that we now have are without connecting lugs and these must be provided. Drill thru each pocket and tube a ⅛" hole about ½" from one end. Use a sharp drill running at high speed and feed lightly. If the drill is crooked or ground off-center it will tear up the thin metal of the pockets. Some nickel wire (24 to 16 A.W.G.) is now cut in lengths of about 7 to 9 in. and one end of each piece is fastened to a positive tube by passing thru the hole and twisting tightly to secure good connection; the other end is then secured to a negative pocket in the same manner. The joints must be tight or the battery will be terribly noisy; to make sure they had better be mashed down hard with heavy pliers or in a vise after twisting.

We now have pairs of elements connected by a length of wire so that they may be hung in small battery jars set close together or in test tubes set in a rack. We need separators and battery jars. The separators may be made by breaking up the rubber strip separators found in the large cells, so that one of the bosses is left at the end of each piece. The elements are then assembled with these spacers between them and held together by two small rubber bands. Almost any small jar may be used as a container but test tubes, specimen tubes or culture tubes are cheapest and are also compact. A good tube is the 20-millimeter by 150-millimeter culture tube. Fifty of these can be set in a wood rack six inches wide and a foot long, as shown tubes are to stand, the ½" augur should be preceded by a ⅜" drill as the worm of the augur will otherwise split the thin wood used for the rack. Because of the action of the solution it is well to use iron screws in assembling the rack.

The Solution

The tubes are now set in place, the elements inserted, and everything is ready for the solution. This is made of distilled water with potassium hydroxide added until a hydrometer test of 1250 is obtained, i.e., 21% solution. The solution should be made up in a carefully cleaned jar and the hydrometer well washed out if it has been previously used with lead-and-acid batteries. For a rack of 50 cells about a pound of potassium hydroxide will be needed. The kind that comes in white sticks is preferred and costs 50 to 60 cents a pound.

Now remove the float from the hydrometer and use it as a syringe to put in each tube enough solution to stand ¼" above the elements. To prevent evaporation and also the very messy "crawling" of the solution it is well to put in each cell about ½" of paraffin oil, which will float on the solution. Water may be added at any time thru this oil layer. It is well not to use "any old oil;" better stick to paraffin, "Nujol," or some other oil that is sure to be non-acid and not likely to mix with the solution.

Suggestions

The procedure given above gives best results but need not be followed exactly. Iron wire may be used for connecting the elements if nickel cannot be secured. In filling the jars and at all other times *the solution should be handled with great respect*—its destructive effect is much greater than that of the acid solution of a lead cell and its effect on the skin is much more prompt, painful, and permanent. However, once assembled it is a perfectly safe battery.

Charging

The charging current for a battery like that described should be 0.3 ampere, to be continued for 8 hours. There is no way of telling when an Edison battery is charged. The specific gravity of the solution does not change so a hydrometer will always read the same, and the voltage has an unhappy way of remaining the same over quite a long part of the charge period. An overcharge does no harm, so one simply charges the battery about 50% too long and then uses it until it stops working. The charge may be rushed more than this—the only limit is that the cells must not boil; they should gas freely, however. When fully charged the voltage of the 50-cell rack will be about 70, which will run a detector and two-step amplifier nicely.

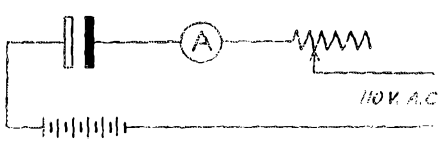


Fig. 2.

When charging on D.C. a series resistance (lamp) is all that is needed. When charging on A.C. the connection shown in Fig. 2 is used. The rectifier is a purchased or home-made electrolytic of the usual type with lead and aluminum plates. (If home-made it can have 2" x 3" plates in any of the solutions described in the "Rectifier Symposium" in June *QST*; see also the article on "An Electrolytic "A" Battery Charger" on page 39, December *QST*—Ed.)

Low-Power Transmission

As stated above, each 50-cell tray delivers about 70 volts. It is then possible to use five or more such racks to operate a sending set using 5-watt tubes, as the batteries are well capable of delivering a

sufficiently heavy current for this purpose. This gives *real C.W.*— a thing we have mighty little of. A little of this is better than a lot more of some of the various brands of "near C.W." The note is perfectly clean, steady, and causes absolutely no local QRM.

At 8AHK five of these 50-cell racks are used in series with a 220-volt D.C. line to give a total voltage of about 570, which is supplied to the plate circuit of two 5-watt tubes drawing 120 milliamperes. The cells require charging only once in ten days, and when the plate current is reduced to 50 m.a. they last for a month on one charging. When used for receiving with a detector and two-step audio, they are charged twice a year.

*The materials required may be purchased from any wholesale house. If you do not happen to know of one your local druggist will be able to advise you or secure the material for you.

Seventh District Executive Council Formed

Reported by H. F. Mason, 7BK.

AMATEURS of the seventh district "made history" on December 30th, 1922. The "Executive Council, Amateurs of the Seventh Radio District" was formed by a representative body of amateurs who met at Portland, Oregon. L. C. Maybee, (7GE) of 110 South 7th Street, Pasco, Wash., was elected president of the council. P. R. Hoppe, (7IW) of Eugene, Oregon, was elected Vice-President, and Geo. W. Carmeron, (7DP) of Portland, secretary-treasurer. All three are eminent brass pounders.

Away last June, when Traffic Manager Schnell attended our A.R.R.L. Convention in Seattle, the idea of a good solid organization of the seventh district amateurs got into our heads. There it has stuck until the gang decided that "something gotta be done," and so the Portland meeting was called, after the time and place was chosen by a vote of all the hams in the district.

The Northwestern Radio Association, of Portland extended the glad hand in great style to the visiting hams, and invited us all to help them enjoy their annual banquet, to be held on the 28th. As the mere mention of the word banquet makes every amateur's mouth water, the whole gang couldn't help but show up pronto on the 28th.

Entering the banquet rooms, we were immediately engulfed in a riot of handshaking and greetings such as we had never been in before. All we can say is that when we came to, we found that the whole gang was there. For some time, the din of good fellowship prevailed, until Jack Tait announced that the feed was ready. After the ensuing scramble, the gang fell to, and did full honors to their host. Mr. Meyers entertained with some darn good magic between the courses.

When the last piece of cake had disappeared, 7JW, the toastmaster started the evening off by introducing Walt (alias "Tubby") Russ, president of the N.R.A. Russ extended greetings to the 200 guests, and spoke briefly of the history, and objects of the Portland Club. Howard Mason, A.R.R.L. Northwestern Division Manager was then given the floor, and began by announcing the latest returns from the T-A tests, which was met with much enthusiasm. He then told briefly, the history of the League and its accomplishments to date, and explained how each amateur can play an important part, as a member of the A.R.R.L. Lt. Commander S. M. Mathes, U. S. N. was the next speaker. He made a valiant speech for the amateur, and brought forcibly to our minds, the needs for the utmost co-operation between every ham in the country. He also explained to the B. C. L.s present just what the aims and objects of the amateurs were in a clear, straightforward manner. (And believe me, he sure converted a flock of B. C. L.'s) Dancing, and a general hamfest after the banquet continued till the "wee sma' hours."

The next day, Mr. A. H. Babcock, A.R.R.L. Director arrived from San Francisco. He was right on the job all the way through, and his assistance was more than valuable. Most of the day was spent in visiting the various ham stations where groups gathered and discussed the various points desirable in the Council organization. In the evening, the weekly meeting of the N.R.A. was held, and of course the whole gang attended and added considerable pep to the meeting.

The Executive Council was organized the following day. The meeting was called to order by the temporary chairman at 10:00 A.M. and the bunch immediately got down to business. The many and varied problems to be met were discussed from all angles. Delegates presented their views and contributed valuable material for the council organization. Finally, a committee of twelve was appointed to draw up a tentative constitution during the noon hour, and the rest adjourned.

This gang immediately pulled their coats off, rolled up their sleeves, pulled up

their chairs to the long table, and went to it. It was a hard battle, but at two o'clock, they emerged with the constitution. The general meeting was again called to order, and the gang proceeded to adopt the constitution, section by section. In a few hours, everyone had a clear understanding of everything in it, and it was ratified by the gang.

We're blamed sorry that *QST* hasn't room to print the whole constitution right here, but a few of the main points embodied in it are:

1. Every licensed amateur is a member of the council.
2. Affairs of the council are handled by:
   (a) An Administrative Board, which consists of 14 delegates, elected annually, one from each congressional district in the seventh radio inspection district, by the amateurs in that district.
   (b) An Executive Board, which consists of the three council officers, who are elected by the amateurs at each annual convention.

The next business of the meeting was the election of officers, which resulted as stated above.

Immediately taking the chair, Mr. Maybee, the president proceeded to get the council on the right track, and off on time. (He's a railroad man.)

The question of amateur vs. B.C.L. immediately arose. After much discussion, and heated arguments, the whole thing simmered down to the one fact that everyone present agreed upon: That a uniform plan for quiet period for broadcasts must be adopted by the amateurs, and that we must stick together, not by the dozens, but by the thousands, and make a definite stand on our policy. We must, if necessary, arrange our various local schedules to conform with this plan, for the sake of having something that the whole gang is behind, in the event that the rights of we amateurs are in danger.

The plan adopted is the Revised Pacific Plan, so-called because it is the plan that has been in operation thruout the sixth District for some time, and is a revision of the original Pacific Plan. Now that the plan is adopted by the seventh district amateurs also, we now have a uniform plan of quiet hours for *nine states*. Howzat? The plan is flexible, yet defines clearly the working hours for the broadcasters and the amateurs. It follows:

Sec. 1. That the half-hour from 7:30 to 8:00 P.M. be reserved daily, including Sundays, for the purpose of allowing long-distance reception by Pacific Coast stations without interference from amateur transmitters or broadcasters, and that during this half-hour listening period, no transmitting by amateurs or broadcasters be carried on.

Sec. 2. That all Pacific Coast broadcasting and amateur stations be allowed to operate up to the hour of 7:30 P.M. daily, including Sundays.

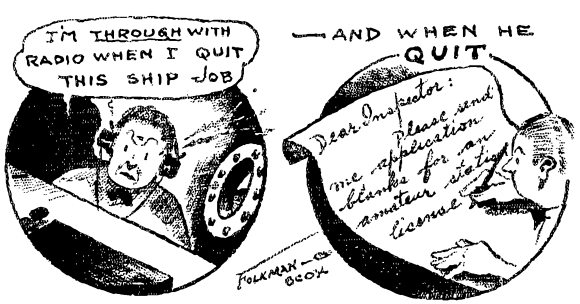
Sec. 3. That no spark, or damped wave transmitter be operated between the hours of 7:30 P.M. and 10:00 and that the hours from 8:00 to 10:00 P.M. be devoted exclusively to broadcasting, which shall cease promptly at ten o'clock.

Sec. 4. That amateur stations using the transmitting system emitting pure continuous waves be allowed to transmit at any hour of the day or night, with the exception of the silent half-hour as provided for in Section 1.

Sec. 5. That the traffic schedule after the hour of 10:00 P.M. daily, be maintained for the purpose of long-distance amateur transmission exclusively, and that this schedule remain in effect up to and including the hour of 12:00 midnight, daily.

So, we who contributed our part towards getting the council started all feel that we've done a good job by accomplishing what we did at the Portland meeting. To know that every amateur in the district is a member of an organization of just amateurs is a big step towards better co-operation, as is the fact that a uniform plan of quiet hours has been adopted and is being carried out thruout the district just the same as if it was a part of the Laws and Regulations.

Big things may be expected from the Northwest in the future, and we'll say we're on the job. 73's.



Conference on Radio Standardization

ON Jan. 12th in New York City a conference was called by the Bureau of Standards in co-operation with the American Engineering Standards Committee, to consider raido standardization, at the request of the Institute of Radio Engineers, National Radio Chamber of Commerce, Radio Apparatus Section of the Associated Mfgrs. of Electrical Supplies, National Retail Dry Goods Assn., the R.C.A., and the A.R.R.L. About one hundred representatives, from every radio interest, were in attendance.

After introductory remarks by various speakers the meeting took up the consideration of the Agenda, which had been compiled and circulated by the Bureau. Discussion on procedure for carrying out any conclusions which might be reached developed the fact that the procedure of the American Engineering Standards Committee is very suitable for the formulation of radio standards, and it was voted to form a sectional committee under the rules of the A.E.S.C. The conference then took up the question of sponsorship for this undertaking, as required under the A.E.S.C. procedure. After much discussion the American Institute of Electrical Engineers and the I. R. E. were selected as joint sponsors by a unanimous vote

Motions were carried leaving to the sectional committee the decision as to the type and scope of the standardization to be undertaken immediately, including the consideration of testing facilities and other related lines of activity.

Dr. A. N. Goldsmith and Mr. L. T. Robinson, having consulted with one another in behalf of the Institute of Radio Engineers and the American Institute of Electrical Engineers respectively, made a statement acknowledging the expression of confidence in the organizations shown by the action of the conference. They appointed the following advisory committee to assist in the organization of the sectional committee and the necessary technical subcommittees.

Department of Commerce, Dr. J. H. Dellinger and Mr. L. E. Whittemore.

Navy, Commander S. C. Hooper.

Army, Major L. B. Bender.

National Radio Chamber of Commerce, Mr. G. H. Lewis.

Radio Section of the Associated Manufacturers of Electrical Supplies, Mr. M. C. Rypinski.

National Retail Dry Goods Association, Mr. Wm. A. Fitzgerald.

Pacific Radio Trade Association, Mr. Max Loewenthal.

Consulting Engineers, Mr. J. V. L. Hogan.

American Radio Relay League, Mr. K. B. Warner.

As a representative of the Standardization Committee of the Institute of Radio Engineers and former member of the American Institute of Electrical Engineers Standardization Committee, Mr. Donald McNicol.

Institute of Radio Engineers, Dr. A. N. Goldsmith.

American Institute of Electrical Engineers, Mr. L. T. Robinson.

The action of the conference may be summarized by stating that it agreed unanimously (1) that standards for radio apparatus and service should be formulated, and (2) that a broadly representative national committee on radio standardization should be formed under the leadership of the Institute of Radio Engineers and the American Institute of Electrical Engineers following the procedure of the American Engineering Standards Committee.

A New Amplifying Tube

THE General Electric Co. has designed a new amplifying tube which is being manufactured by that company and the Westinghouse company and marketed by the Radio Corpn. of America under the name U.V.201-A and by E. T. Cunningham under the name C-301-A.

The new tube is announced as either amplifier or detector, but it is primarily as an amplifier that it is interesting. Its ability as a detector is not as great as the U.V.200 (C-300) altho it is better than the U.V.201. It is a high vacuum tube using a filament of new characteristics, the merits of which are long life, low power consumption, and copious electron emission. Similar to the U.V.201, it is 4⅞" in maximum height and 1¾" in greatest diameter. The elements are much larger than in previous tubes. The vacuum is the "hardest" possible. It is obtained by a new process which leaves the tubes with a brilliant silver-colored metallic coating.

The most interesting thing about the tube is that it consumes but 0.25 amperes at a terminal voltage of 5.0, which is but one-quarter the power required by its

predecessor. Four of these tubes may be operated with no more drain on a storage battery than one of the old-style amplifiers. This is possible by a newly-developed form of filament, known as the "X-L," about which no particulars are available except that it is neither a plain tungsten filament, as in older models, nor an oxide-coated filament as used by the Western Electric Co. Whatever it is, it is of very high activation, capable of emitting at least a thousand times as many electrons as preceding forms of Radiotron filament. It is accordingly possible to reduce the filament temperature greatly and still obtain 50% more electron emission than preceding models. The filament is sturdy and will stand rough usage; failure of a tube will rarely be due to actual burnout—the filament is gradually "used up" and the end of useful life is marked by a drop in electron emission. Due to the peculiar nature of the material, the tube may lose its activity if excessive voltage is accidently applied to it, but ordinarily it may be restored by "boiling out" more electron-emitting material from the filament by burning for a few minutes with plate voltage off.

Altogether aside from filament economy, the tube is an excellent amplifier. This is largely attributable to the dimensions of the elements and their relative spacing. The tube has a higher mutual conductance than any other amplifier available on the market. We amateurs should get better acquainted with this term "mutual conductance," as it is the proper unit for gauging the "goodness" of an amplifier. We are accustomed, we fear, to content ourselves with a consideration of the μ or "voltage amplification factor" of a tube, but this is merely a measure of the number of volts by which the plate potential must be changed to cause the same change in the plate current which is produced by one volt change in the grid potential. This measure takes no account of the impedance of various tubes, which may vary greatly in tubes of the same μ, and which in any given tube is dependent upon the plate voltage used, etc. The real measure of amplifying ability is a tube's mutual conductance, which at a given plate voltage and at a given grid voltage (usually zero) is expressed by the formula

$$G = \frac{\mu}{Z}$$

wherein G, the mutual conductance, is expressed in *micromhos;* μ is the voltage amplification; and Z the internal plate impedance in ohms. The new tube has a μ of 6.6 when operating with a plate voltage of 40, at which voltage (with zero grid potential) the impedance is 16,000 ohms. The mutual conductance is accordingly 400 micromhos. At 90 volts, with $\mu = 6.7$ and $Z = 9{,}000$, it is 750 microphos. Just how good an amplifying action this denotes is evident in a consideration of the U.V.201, which altho it has a μ of 6 to 6.5, has a mutual conductance at the respective plate voltages of but 300 and 465 micromhos, respectively. In the W.D.11, G approximates 310 for all the working plate voltages.

The 201-A (C-301-A) is particularly useful in phone work where a considerable volume of sound energy is handled. Because of its greater emission, saturation is not reached at reasonable plate voltages, and as a result there is much less distortion. Couple with this its economy and its greater amplifying efficiency and it will be seen to be a particularly useful tube.

At zero grid voltage, the plate current at 40 volts is 1 m.a.; at 90 volts, 6 m.a.; and at 100 volts, 7.4 m.a. Accordingly a negative grid bias is necessary, not only for plate battery economy but for distortionless amplification. It is important that the filament rheostat be placed on the negative side of the A-battery and the return lead from the grid circuit connected to the negative side of the battery. This ordinarily provides sufficient grid bias, due to the IR drop in the rheostat, for operation of the tube on 45 volts. At 60 volts the bias should be 1 to 3 volts negative; at 80 volts, 3 to 4.5 volts; and at 100 volts, 4.5 to 6 volts.

Used as a detector, the grid return should be connected to the positive side of the filament and a grid condenser of .00025 mfds. and leak of 2 to 5 megohms provided. Altho a soft tube is preferable for non-oscillating detection, such a hard tube as this new one of course is excellent for C.W. reception, and we have secured splendid results from its use.

The tube is also a good radio-frequency amplifier, so good in fact that the various "lossers" commonly used to stabilize R.F.A. circuits are quite unable to prevent oscillation. It is suggested that a variable non-inductive resistance be incorporated in the tuned circuit, after the manner described in our leading article this month, to control this tendency.

We had hoped that when new tubes came they would be cheaper in price, but the 201-A is $9. The Radio Corporation explains that the development expense incurred in research work in the development of any new tube, the changes in the lamp factories required for its manufacture, and the othe difficulties involved, are so great that there is a considerable time after production before the cost of the public reflects the cost of manufacture.

Like most powerful amplifying tubes, when used in a multi-stage audio frequency amplifier, U.V.201-A gives loud noises when jarred. It should therefore be mounted on cushion or spring supports to prevent noise from vibration. *K.B.W.*

EDITORIALS
de AMERICAN RADIO RELAY LEAGUE

"To Be, Or Not To Be"

ALL eyes these days are turned towards Washington, anxiously watching the fate of pending legislation, on which the hope of unscrambling our country's radio muddle so completely depends.

The White Bill passed the House on Jan. 31st and went to the Senate. Being there deprived of a place on the unanimous consent calendar it was on Feb. 8th referred to the Committee on Interstate Commerce. There it lies at the moment of writing, we fear with but slim chances of becoming law. Rumors are rampant that the folks who don't like it are safe as it won't be reported out of committee, and that even if it is the crowded Senate calendar will not permit its slating, so that it will pass out with the expiration of the 67th Congress on March 4th. Goodness only knows what actually will happen to it, but the die will be cast by the time this issue of *QST* reaches our readers and either we will have a new law or another year will have been lost.

The hearings on the bill (H.R. 11964) in the House Committee on the Merchant Marine & Fisheries were reported in our last issue. On Jan 11th Mr. White introduced a new bill, H.R. 13773, embodying the changes determined upon in committee, and this was reported out favorably. It came up for discussion in the House on Jan. 24th and was carried over to the 31st, when it finally passed at 4 P.M.

The changes made to the bill between the hearings on H.R. 11964 and the passage of H.R. 13773 were for the most part minor ones. The restriction in paragraph C of section 2 providing that licenses could be granted only to stations which were "in the interest of the general public service" was removed, as had been asked by A.R.R.L. representatives. The membership of the advisory committee provided for in section 5 was increased to fifteen, with eight representatives of government departments and seven non-governmental representatives, and the *per diem* of the latter originally contemplated was stricken out. And in section 10 A.R.R.L. desires were met in a change which provided that the words "naval and military stations" in the 1912 law should be changed to read "government-owned or operated," instead of merely "government," as the earlier drafts had it. Then there were small additions, of no importance to the amateur, respecting the revocation of commercial licenses, etc. And there you are.

Will it become law? We hope so, but your guess is as good as ours. Heaven knows this country needs a new radio law. We amateurs are well cared for by the 1912 law but we know other interests are not. It will be a burning shame if the White-Kellogg bill is not enacted, for, while far from a perfect document it represents substantial agreement among radio interests which have been trying for six long years to compose their differences, and without doubt it would be an immense relief to the general situation. We are watchfully waiting—and hoping.

A New Field

HAVE you ever noticed what a narrow escape 200 meters has from being the lowest amateur wave length instead of the highest? If you want to find almost blank silence, listen anywhere below 180 meters.

Notice we said "almost." It isn't quite blank, and it's liable to grow rapidly less so as a result of some very interesting experiments now in process among a group of amateur stations. Last winter considerable work on waves between 80 and 135 meters was done between some amateur stations in Boston, Hartford, and Pittsburgh, but the data seem to have become commercially interesting and the fellows in possession of it have shut up like clams and there is slight hope that those particular results will ever become available to us. As a result some of our own gang have determined to dig up the dope for themselves and the preliminary tests have been most encouraging.

Do you know that 100-meter transmission between Illinois and Connecticut is proving F.B.? It is! At the present time there is of course practically no QRM on such wave lengths except an occasional harmonic. That alone makes it worth while. There seems to be an appreciable increase in the efficiency of radiation as the wave *length*

is dropped; and there is the "kick" the experimenter gets in trying something new —and succeeding.

We'll have some data in *QST* very soon —perhaps somewhere in this issue—on how this work is done and how much it is worth while. Meanwhile peel off some turns on that tuner, O.M., and take a listen at it. Any form of tuner seems to do, if it will get down and has enough reaction to osciliate at the low waves. Some of the transmitting is done by actually tuning down to the short wave on a small aerial using a series condenser, and some of it is done by tuning the tube plate circuit to a harmonic of a bigger antenna and radiating on the harmonic. Some of the fellows have got down as low as 50 meters.

Get in on it, O.M. And if a B.C.L. can get QRM from a 100-meter wave, then we *know* it's his bum tuner.

C.W. Licenses

DO you fellows know that your station license provides that the apparatus described in the application shall not be changed without permission? And that a license granted a spark station is not good for the use of C.W. equipment? It sounds queer, considering that any complaintant ought to prefer a tube set to a spark, but if anybody wants to "get" you on it they can.

A broadcast listener recently filed a complaint with a radio inspector against a well known eastern spark amateur, alleging the use of an illegally broad and too-long wave. Called upon the carpet, there was no evidence that his spark, which was good as such animals go, was not entirely legal. But he volunteered the information that he was experimenting with C.W. anyway and the interference probably would be still further reduced. Whereupon, altho his spark set was O.K., he was informed that the use of C.W. was in violation of his license, and it was suspended for three months.

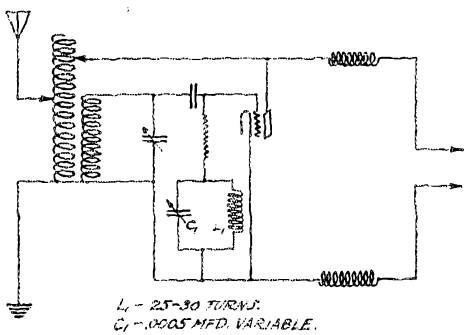
Moral: If the equipment you are using is greatly different from that for which your license was issued, take up the matter with your Inspector and "get right."

Tuned Grid Chokes for Tube Sending Sets

By R. C. Curtis

I WISH to present an idea for increasing the efficiency of a C.W. transmitter. It isn't new but seems to have been forgotten lately. When a grid leak is used across the grid and filament to keep the grid condenser discharged it also causes the loss of some of the high frequency energy in the grid circuit due to the fact that the resistance is shunted across the grid inductance and grid condenser. When the tubes are worked at their normal ratings this loss is not bad but most of the tubes used today are doing the work of a "mightier tube" (Hi) and in this condition the loss is usually quite large. By placing a radio frequency choke, or better still a tuned circuit consisting of an inductance with a capacity in shunt in the grid leak circuit, this loss can be greatly reduced. The circuit shown is the reversed feedback but will work in any circuit where the grid leak is across the grid and filament.

With reference to the diagram, the action is as follows: When the circuit L_1C_1 is tuned to the emitted wave the current thru the circuit is at a minimum and therefore the loss is at a minimum. In actual working conditions this state is indicated by an increase in antenna current and a decrease in plate current making it possible to use a higher plate voltage and consequently larger radiation without excessive plate current. The coil L_1 should be kept away from, or at right angles to, the main inductances of the set.



A test was made as follows. A set using two Western Electric VT-2 ("E") tubes was connected in the "1DH" or British Aircraft circuit to an antenna of the inverted L type. The antenna height was 40 feet on one end and 80 on the other, the top had six wires and the ground connection was of low resistance. The plate supply was from a 600 volt D.C. generator. The readings were as follows.

Antenna Current—2.3 Amperes

Plate Current—90 Milamperes.

The tuned choke arrangement was then added and another reading taken.

Antenna Current—2.5 Amperes

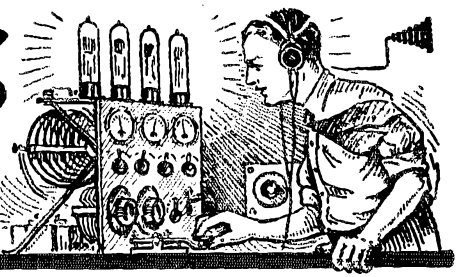
Plate Current—70 Milamperes.

This represents a very nice increase in efficiency—nearly 50%.

The same sort of affair can be inserted in the plate supply leads, and although these all require adjustment for wave length changes, they will probably prove r.f. power savers.

The Operating Department

F. H. SCHNELL, Traffic Manager
1045 Main St., Hartford, Conn.



This splendid report will speak for itself! There are just one or two things we have to say and after listing the 300 hitters and crowing about our biggest traffic month in the history of amateur radio we will let you pass on to the division reports. Three times in rapid succession this good old crew of the Operating Department came forth and smashed record after record until this total of over 80,000 messages was reached. Did we hear a whisper of 100,000 messages in one month? It took over 1,000 relayers of first order to ring up this figure, and if this pace keeps up it will be but a short time before we pass that mark of 100,000.

3ZO attempted to break 3XM's record of last month but fell short by a few messages.

H. A. Beale, Jr., (3ZO)
Parksburg, Pa.
Atlantic Division
1204 messages.

Our Hawaiian Division is being handled by K. A. Cantin since old 6ZAC left for the mainland. We look forward with an eager eye to the opening of 6ZY, who will endeavor to carry on where 6ZAC left off.

Of particular interest is our cover this month right in line with the great number of tubes blown by men of the O.D. How many tubes will "go west" when we go after 100,000 messages in a month?

Message Traffic Report By Divisions

JANUARY

Division	CW. Stns.	CW. Msgs.	CW. M.P.S.	SPARK Stns.	SPARK Msgs.	SPARK M.P.S.	TOTAL Stns.	TOTAL Msgs.	TOTAL M.P.S.
Atlantic	175	12706	73	39	2092	53	214	14798	69
Central	171	15798	92	48	3001	63	219	18799	86
Delta	7	414	60	3	40	13	10	454	45
Dakota	56	4547	81	4	215	54	60	4762	79
East Gulf	18	1263	78	6	599	100	24	1862	79
Midwest	107	10180	95	31	1974	63	138	12154	88
New England	90	9534	106	9	672	75	99	10206	103
Northwestern	43	2405	56	9	152	17	52	2557	49
Ontario	36	1574	43	2	123	62	38	1697	45
Pacific	26	2946	113	13	464	36	39	3410	87
Roanoke	43	2903	67	3	467	156	46	3370	73
Rocky Mountain	24	2654	111	2	55	27	26	2709	104
Vancouver	11	563	51	2	38	19	13	601	46
West Gulf	50	4549	91	10	231	23	60	4780	80
Winnipeg	5	219	44	—	—	—	5	219	44
Quebec	5	206	41	1	4	4	6	210	35
Total,	867	72461	84	182	10127	56	1049	82588	79

C.W. Messages, 72,461—88%
Spark Messages, 10,127—12%
Total, 82,588

With this heavy amount of traffic, it is high time that the *check* and *date* actually become part of each message. Delivery is considerably better and messages are moving faster, therefore it behooves us to use the *check* and filing *date* beginning right now.

For the benefit of newcomers who are not familiar with international amateur communication, there are certain intermediate signals which have been used with good success. An American amateur working

an American amateur uses the interval de (—. . .); Canadian-Canadian uses v (. . .—); American-Canadian uses aa (. —. —); Canadian-American uses fm (. . —. — .).

Brass pounder's League

Call	Msgs.	Call	Msgs.
8ZO	1204	5IX	386
6ZZ	673	4EL	375
1CPN	656	8CYT	360
9OX	650	9BRK	360
8BVR	650	3APR	352
*9AAW	585	9BGH	351
3BIT	568	9ASE	346
8IJ	547	3SU	342
9DQU	532	9AON	333
6CC	520	9DTA	330
1PM	515	1BYN	325
9AMB	509	9AIG	324
5SF	501	1BKQ	322
*8BDA	460	8AIM	322
8ALC	445	9AOG	317
*1CNI	428	2AWS	308
8ALF	417	3BNU	307
3XM	411	9BJI	305
1MY	408	3YO	305
9APS	404	9CCS	305
8FT	399	1II	301
1CMK	398		

(*) indicates spark stations.

TRAFFIC REPORTS FROM A.R.R.L. OFFICIAL RELAY STATIONS

MIDWEST DIVISION—C.W.: 9ACB, 13; 9CVO, 104; 9DMJ, 110; 9BIG, 212; 9CPY, 27; 9CGK, 104; 9CEE, 41; 9KO, 11; 9BED, 218; 9DZN, 65; 9NU, 8; 9AQZ, 222; 9ARG, 29; 9AAU, 7; 9AUK, 16; 9CTG, 142; 9EX, 42; 9ANO, 66; 9BWR, 11; 9AON, 333; 9FM, 130; 9RR, 174; 9DZY, 29; 9DWK, 72; 9CRR, 18; 9DPY, 12; 9BDS, 58; 9AQR, 88; 9AYL, 117; 9BJC, 41; 9BKK, 121; 9BKO, 40; 9BOZ, 12; 9DJB, 25; 9DPD, 26; 9DSD, 101; 9ABV, 256; 9CLW, 69; 9BZZ, 87; 9CAC, 73; 9CCS, 305; 9EFA, 179; 9PS, 195; 9CWC, 74; 9DTA, 330; 9CCV, 162; 9CFI, 148; 9BHN, 32; 9DEF, 25; 9AEY, 168; 9CKM, 52; 9CVT, 12; 9DPL, 25; 9AOG, 317; 9AOD, 76; 9BGH, 351; 9AOU, 273; 9BSZ, 244; 9DSL, 231; 9BSG, 210; 9DKY, 202; 9DAH, 200; 9BFG, 183; 9RZI, 180; 9ARZ, 172; 9AMI, 156; 9CXP, 141; 9AMU, 140; 9BIK, 94; 9UL, 79; 9ATN, 75; 9BVL, 56, 9AHH, 54; 9BAL, 46; 9CHN, 45; 9DOF, 43; 9BCF, 33; 9CLQ, 33; 9DBL, 30; 9BXJ, 27; 9BLT, 25; 9AXU, 20; 9BZE, 19; 9EBD, 17; 9BYC, 15, 9BDR, 24; 9FK, 132; 9YU, 251; 9BXT, 221; 9AIN, 110; AD-7, 205.
Spark: 9ACB, 16; 9AFL, 144; 9DMJ, 20; 9BMN, 190; 9EFB, 6; 9BCJ, 38; 9DCW, 35; 9DZY, 68; 9EFC, 125; 9CUF, 15; 9DWK, 13; 9DQQ, 12; 9AOJ, 226; 9DAE, 23; 9KA, 112; 9DRA, 234; 9BPV, 16; 9CWF, 10; 9DNC, 216.

ROANOKE DIVISION—C.W.: 8ZW, 220; 8AUE, 103; 8BPU, 74; 8SP, 51; 8AFD, 24; 8CAY, 3; 8AMD, 24; 8BDB, 63; 8AIP, 60; 8BDA, 18; 8BIC, 2; 4FT, 10; 4BX, 178; 4NT, 60; 4ID, 12; 4LJ, 101; 4FA, 6; 4NV, 6; 4DC, 56; 4EN, 20 4KT, 2; 4JE, 5; 4OI, 56; 3APR, 352; 3RLF, 248; 3BVL, 238; 3TJ, 152; 3CA, 145; 3BIJ, 100; 3BHL, 87; 3ZZ, 68; 3BMN, 55; 3IW, 55; 3BVC, 45; 3HL, 40; 3RF, 37; 3MO, 36; 3BZ, 17; 3ATB, 11; 3BNE, 8; 3BFE, 7; 3CEL, 5; 3BIY, 4. Spark: 8BDA, 460; 8IC, 5; 8TH, 2.

ROCKY MOUNTAIN DIVISION—C.W.: 9AMB, 509; 9BJI, 305; 9DTM, 287; 6ZT, 85; 9CAA, 149; 9DTE, 128; 9BXA, 112; 9XAQ, 108; 9CFY, 77; 9BUN, 84; 9DHI, 30; 9BXQ, 26; 9BVO, 11, 9BXM, 60; 9CJY, 15; 9BJK, 20; 7AFW, 72; 7ZV, 256; 7LU, 85; 7ZO, 18; 6BOE, 84; 6BGE, 2; 6ZM, 2; 6ZT, 85; 6RM, 179. Spark: 6BUH, 3; 6BKE, 52.

DAKOTA DIVISION—C.W.: 9AIG, 324; 9AVZ, 176; 9DKQ, 144; 9CXV, 114; 9BRI, 112; 9PI, 70; 9ASF, 67; 9YW, 25; 9DDP, 5; 9AWM, 268; 9BBF, 205; 9BKX, 102; 9BVY, 156; 9BXB, 33; 9CDR, 49; 9EGG, 19; 9QF, 38; 9DAW, 63; 9AUL, 17; 9IG, 73; 9DGE, 183; 9DGN, 21; 9DGV, 110; 9BLY, 33; 9BJV, 75; 9AQV, 32; 9BQQ, 28; 9BQW, 128; 9AWS, 207; 9EAX, 35; 9BOV, 5; 9CCV, 11; 9CRW, 7; 9ZT, 142; 9MO, 28; 9AUA, 67; 9BKJ, 76; 9APW, 283; 9CIP,14; 9BFQ, 16; 9GK, 112; 9UH, 173; 9AEJ, 2; 9ABU, 21; 9DLF, 9BAV 17; 9BAF, 154, 9ADF, 23; 9ABB, 23; 22; 9RZF, 6; 9EBT, 243; 9CDV, 49; 9AOR, 32; 9CMJ, 112; 9EA, 4; 9ZC, 3; 6TC 110; 6CC, 520. Spark: 9ANP, 15; 9DAG, 165; 9FX, 4; 9ZC, 31.

PACIFIC DIVISION—C.W.: 6ZE, 15; 6AOR, 38, 6LV, 121; 6EB, 23; 6BRU, 18; 6ASN, 12; 6HP, 15; 6ARF, 60; 6FH, 150; 6AMZ, 95; 6AOI, 36; 6ABX, 146; 6ZX, 256; 6GX, 14; 6FH, 42; 6AVM, 12; 6ZH, 261; 6ANH, 25; 6EC, 11; 6BJY, 5; 6BBH, 46; 6BJU, 27; 6ZZ, 763; 6AJR, 105. Spark 6TU, 183; 6ASN, 1; 6AOA, 124; 6HP, 5; 6GR, 16; 6GF 19; 6BJU, 32; 6AVR, 31; 6AAH, 14; 6CAR, 2; 6ZD, 22; 6ARX, 3; 6AJR, 7.

NORTHWESTERN DIVISION—C.W.: 7ZU, 261; 7ABB, 142; 7BJ, 186; 7WX, 129; 7AEM, 112; 7EX, 110; 7HM, 102; 7BA, 100; 7MF, 95; 7QE, 92; 7TQ, 83; 7OT, 82; 7GP, 49; 7NE, 78; 7LR, 74; 7TH, 67; 7NG, 67; 7SC, 51; 7AGF, 49; 7ZL, 43; 7ADP, 42; 7NA, 40; 7AIF, 38; 7GE, 38; 7MH, 38; 7DU, 35; 7WM, 29; 7AIC, 25; 7EY, 23; 7OM, 19; 7BK, 19; 7DC, 15; 7TT, 17; 7WS, 14; 7ACA, 11; 7TO, 10; 7OE, 10; 7FD, 8; 7ADR, 4; 7WC, 3; 7RI, 1; 7ADF, 1. Spark: 7KJ, 57; 7AFO, 26; 7OJ, 26; 7GH, 18; 7BG, 9; 7WG, 8; 7AGI, 5; 7PJ, 2; 7AW, 1.

CENTRAL DIVISION—C.W.: 9OX, 650; 9APS, 404; 9IO, 15; 9LH, 78; 9ARU, 25; 9EP, 57; 9ASE, 346; 9EI, 82; 9BOO, 50; 9ACE, 94; 9YB, 158; 8CYT, 360; 9BRK, 360; 8AIM, 322; 8AJX, 270; 8IJ, 547; 9DQU, 532; 8ALC, 445; 8FT, 399; 8BNH, 252; 8AER, 251; 8CWR, 239; 8BWA, 235; 8CGX, 225; 8BVR, 222; 9MC, 9BQW, 208; 9AJH, 195; 8BOZ, 192; 8BWK, 192; 8CMI, 176; 8UR, 172; 8BYN, 170; 8YN, 163; 8JJ, 150; 8BYW, 150; 9CZY, 149; 9CM, 148; 8CJZ, 145; 8ZF, 141; 8ANB, 139; 8BXX, 137; 9BJT, 137; 9DDY, 135; 8BZD, 132; 8CKV, 122; 8BOG, 120; 8ZZ, 115; 9BTA, 114; 9ZY, 114; 9II, 113; 8BEK, 112; 8BHO, 109; 8ZZ, 107; 8CXW, 102; 9AZA, 101; 9DCR, 97; 8BWB, 95; 9BGW, 92; 9WX, 91; 8BWB, 90; 8DAE, 90; 9DVN, 84; 8CBX, 80; 9CVI, 75; 9UU, 75; 8CMY, 74; 9AAP, 73; 9BYX, 73; 8CP, 72; 9CP72; 9DWM, 72; 9DXE, 70; 8BXH, 70; 8ZAF, 69; 9DJO, 68; 9DTJ, 67; 9DVL, 67; 9CZF, 67; 9UR, 63; 8CED, 63; 9ASD, 62; 9DYU, 61; 9AWZ, 60; 8JU, 60; 9AUS, 60; 9DIO, 60; 9DBV, 55; 8CAB, 52; 8PD, 52; 9BVZ, 50; 8RR, 50; 8ATX, 49; 8BFB, 49; 9AFN, 49; 9CLZ, 48; 9CWP, 48; 9EFW, 48; 9AQA, 47; 9DYN, 45; 8CWC, 45; 8BDO, 45; 8BBJ, 45; 9BJR, 44; 8BFM, 44; 9OS, 42; 9CHK, 43; 8AND, 43; 8CF, 43; 8OI, 43; 8HN, 42; 8AKD, 41; 8CXP, 40; 9BHQ, 38; 9DDZ, 37; 9AFK, 36; 9XM, 36; 9AIP, 35; 9BHX, 35; 9EBN, 35; 9AKY, 33; 9AZN, 32; 9BIZ, 31; 9QO, 31; 9ALP, 30; 9AMQ, 29; 8LT, 29; 8ZAG, 29; 9CFK, 29; 9DCT, 28; 9AKU, 23; 9DXL, 23; 9CHE, 23; 8FI, 22; 8QQ, 22; 9PF, 21; 9ALR, 21; 9CJI, 21; 9BCT, 20; 9BIL, 20; 9CE, 20; 8IQ, 20; 9BGC, 18; 8CWS, 17; 9CKW, 17; 9AMO, 17; 9ALW, 16; 9BHD, 16; 9BRA, 15; 9ATO, 15; 8AXT, 14; 9RCH, 14; 9BOH, 12; 8AIZ, 12; 9DWS, 12; 9CED, 12; 9DLR, 12; 8TD, 11; 9UK, 8; 9PN, 7 9BXD, 6; 9CPT, 6; 9DYG, 6; 8WY, 6; 8CVG, 6; 8UJ, 6; 9QS, 5; 9BDA, 5; 9AHO, 5; 9AZP, 14; 9ARN, 5; 9DMF, 10; 9DWQ, 16; 9AFT, 6; 9AVN, 39; 9EAR, 5; 8CWR, 5; 8AWN, 5; 8BYT 5; 8BPG, 5; 9FQ, 4; 8CBO, 4; 9DWR, 2;9DOG, 206; 9EGN, 1 ;8CAA, 113. Spark: 9AWF, 47; 9AMH,82; 9AAW, 585; 9BLU, 206; 8EB, 153; 8CNI, 138; 9DHG, 106; 8AIZ, 98; 9DHZ, 90; 9PD, 80; 9WX, 74; 9BJT, 73; 9CP, 63; 9DUY, 53; 8ABL, 49; 9APK, 11; 9DWX, 18 9AES, 13; 9BEF, 7; 9DIL, 8 9AZ, 50; 9BF, 5; 9BAM, 3; 9ASA, 36; 9IV,23.

9NQ, 48; 8AJX, 47; 9YJ, 40; 8CVD, 32; 8FI, 32; 8BCO, 30; 9ACL, 29; 9DMG, 28; 9APB, 28; 8AHY, 25; 8CYT, 20; 9BQG, 18; 8CNR, 17; 8BPG, 15; 9CIC, 15; 9MC, 14; 8CGX, 14; 9CIV, 10; 8CWR, 9; 9YAC, 8; 8BEJ, 7; 8CMI, 7; 8AXT, 6; 9DLN, 6; 9DLX, 6; 9FL, 5; 9CA, 5; 9VV, 5; 8CKV, 5; 9DLX, 4; 9CVL, 3; 8ATX, 3; 8DI, 3; 8BTR, 3; 8RR, 3; 9AZA, 2.

EAST GULF DIVISION—C.W.: 4YA, 220; 4HW, 103; 4CG, 76; 4KL, 73; 4CY, 63; 4EH, 45; 4BG, 25; 4ME, 15; 4GM, 12; 4HX, 10; 4EQ, 10; 4HS, 9; 4MT, 67; 4BW, 5; 4AS, 25; 4BY, 95; 4GE, 35; 4EL, 375. Spark: 4HS, 128; 4DF, 74; 4MY, 55; 4FB, 189; 4FD, 71; 4GN, 82.

NEW ENGLAND DIVISION—C.W.: 1VK, 20; 1BFE, 50; 1MY, 408; 1CKI, 2; 1BIY, 47; 1AW, 131; 1AJU, 53; 1CKP, 86; 1AWB, 150; 1EX, 5; 1AYU, 52; 1CR, 15; 1CPS, 12; 1BM, 26; 1CDP, 20; 1IV, 53; 1AYQ, 50; 1AGH, 69; 1QP, 220; 1CJR, 27; 1BVH, 31; 1CIT, 143; 1SK, 60; 1BSJ, 36; 1CBJ, 120; 1BBM, 32; 1BYN, 325; 1BQK, 28; 1AXB, 15; 1AAC, 67; 1BES, 271; 1IL, 182; 1CMP, 45; 1UN, 53; 1CJD, 125; 1BKQ, 322; 1BDU, 100; 1BWJ, 92; 1COT, 86; 1CSW, 91; 1ABC, 14; 1II, 301; 1BQD, 183; 1GV, 143; 1ALZ, 84; 1CBP, 123; 1BVB, 248; 1BYG, 108; 1CAJ, 58; 1AWW, 214; 1ISD, 153; 1BAN, 53; 1ARY, 46; 1CPO, 6; 1CJH, 17; 1PM, 515; 1CPN, 656; 1BLN, 32; 1AOJ, 30; 1BVR, 65; 1CHP, 32; 1AJP, 50; 1CDR, 64; 1CAK, 49; 1OR, 218; 1ATJ, 9; 1GL, 55; 1MC, 44; 1CQJ, 62; 1IX, 4; 1CM, 8; 1ASF, 235; 1BAS, 258; 1BNL, 132; 1BDI, 174; 1CRU, 112; 1BRQ, 200; 1II, 53; 1BJS, 32; 1AST, 21; 1BSJ, 36; 1CGR, 42; 1ID, 76; 1AOJ, 1BVR, 65; 1CHP, 32; 1BLN, 32; 1BSZ, 49; 1CMK, 398; 1ZE, 398. Spark: 1ARY, 37; 1AFT, 7; 1CM, 29; 1AKC, 56; 1LZ, 26; 1CNI, 428; 1CID, 42; 1BRQ, 33; 1ACO, 14.

ONTARIO DIVISION—C.W.: 9BS, 86; 3XN, 128; 3MN, 7; 2FA, 127; 3AD, 33; 3KO, 21; 3BV, 180; 3DH, 105; 3ABG, 6; 3LW, 22; 3TA, 40; 3JL, 15; 3KP, 48; 3BS, 6; 3TL, 4; 3JL, 35; 3HE, 35; 3HE, 16; 3BQ, 60; 3DS, 12; 2YH, 10; 3CO, 15; 3OH, 30; 3DE, 32; 3FC, 51; 3JE, 22; 3JI, 71; 3SX, 39; 3GK, 23; 3ZL, 7; 9BA, 81; 9BV, 7; 9BJ, 34; 9CD, 22, 3SR, 12; 9AL, 169; 9AJ, 48. Spark: 3GN, 51; 3EI, 72.

VANCOUVER DIVISION—C.W. 5CN, 203; 5GO, 87; 5CT, 72; 5DX, 73; 4DQ, 41; 5EJ, 30; 9BP, 25; 5AC, 20; 5BQ, 6; 5AK, 3; 4AB, 2. Spark: 3EC, 30; 5AK, 8.

WINNIPEG DIVISION—C.W.: 4CE, 6; 4CN, 10; 4DK, 25; 4BV, 89; 4HH, 89.

WEST GULF DIVISION—C.W.: 5IX, 386; 5KK, 60; 5VA, 55; 5SF, 501; 5DI, 261; 5SK, 200; 5BE, 55; 5PX, 55; 5TC, 190; 5QI, 140; 5EL, 7; 5UO, 66; 5ZADA, 13; 5UN, 5; 5CY, 7; 5OK, 37; 5HS, 236; 5XAJ, 58; 5XAJ, 50; 5QT, 20; 5UG, 2; 5ZH, 18; 5JM, 104; 5XB, 93; 5XV, 237; 5NK, 40; 5NN, 189; 5IM, 39; 5NK, 136; 5GR, 170; 5TM, 27; 5SS, 12; 5AEW, 7; 5ZAK, 143; 5NB, 12; 5ADD, 5UJ, 22; 5KP, 179; 5YK, 41; 5MT, 6; 5ZAE, 108; 8; 5FA, 3. Spark: 5ACQ, 74; 5TU, 41; 5AL, 7; 5FI, 16; 5QT, 53; 5UG, 16; 5ZH, 18; 5YK, 1; 5HC, 3; 5BO (Marathon) 3.

QUEBEC DIVISION—C.W.: 2AN, 48; 2AF, 65; 2CQ, 6; 2EI, 61; 2HG, 26. Spark: 2AG, 4.

ATLANTIC DIVISION—Eastern New York—C.W.: 2BRB, 28; 2KE, 129; 2CHY, 124; 2AWS, 208; 2CEV, 91; 2BQU, 40; 2NZ, 178; 2ADV, 2; 2TT, 1; 2AUY, 33; 2CPK, 120; 2AWF, 97; 2XQ, 168; 2BSH, 25; 2AIF, 5; 2BXW, 15; 2BSK, 6; 2KV, 119; 2BYS, 80; 2CUR, 4 2BNL, 33; 2CNK, 5; 2CPO, 103; 2CEI, 11; 2BUE, 150; 2FZ, 5; 2CIM, 18; 2VH, 21; 2AEQ, 20; 2CKN, 19; 2BQD, 27; 2HW, 33; 2ANM, 58; 8AVJ, 91; 8APU, 56; 2GK, 192; 8AOI, 21; 8BOA, 62. Northern New Jersey—C.W.: 2AOS, 23; 2AQI, 46; 2RZ, 36; 2EK, 17; 2AJF, 258; 2AFA, 29; 2CQZ, 209; 2CTC, 51; 2ALY, 127; 3CG, 42; 3XM, 411; 3BLZ, 14; 3AQX, 4; 3FP, 31; 2BMR, 24; 2BKR, 5; 2CHG, 4; 2CKL, 20; 2ANZ, 28; 2AJA, 38; 2BBB, 164; 2OF, 74; 2BTW, 50; 2BJP, 50; 2CMS, 100; 2CRF, 20; 2ARS, 40; 2BUY, 26; 2FC, 51; 2CEN, 5; 2AWL, 47; 2AFP, 81; 2CGS, 48; 2LE, 23; 2CQI, 14; 2AFC, 38; 2KF, 51; 2AXF, 20; 2WR, 66; 2JG, 4; 2AWH, 38. Southern New Jersey—C.W.: 3BEI, 55; 3ARM, 15; 3CM, 84. Penn. Del. Md. & Dist of Col.—C.W.: 2AWH, 79; 3BOB, 52; 3CC, 63; 3BLU, 18; 3BNU, 307; 3YO, 305; 3DLP, 21; 3BUV, 3; 3JG, 26; 3LK, 44; 3ALU, 30; 8AVL, 11; 3AVR, 3; 3EK, 16; 3HC, 3; 8AOL, 56; 3BYH, 33; 8ZQ, 33; 3ZO, 1204; 3OG, 30; 3AQR, 147; 3ACY, 57; 3CCU, 282; 3BIT, 568, 8ALF, 417; 8WR, 47; 8CEJ, 30; 8AAF, 92; 8BUT, 234; 9BDU, 13; 8BJV, 180; 8BRM, 48; 8CJY, 22; 8CFB, 25; 8CI, 11; 8DV, 62; 8CKM, 28; 8OW, 12; 8BRL, 95; 8ZD, 100; 8AGO, 48; 8AXD, 13; 8CON, 66; 8QC, 48; 8VH, 3; 3KD, 14; 3BUT, 9; 3HX, 3; 3GK, 37; 3FM, 10; 3TA, 11; 3UD, 42; 8ANJ, 36; 3BJY, 41; 3RB, 125; 3QV, 30; 3FS, 29; 3HD, 37; 3SM, 33; 3ADP, 21; 3ADQ, 27; 8BIQ, 34; 3BJ, 115; 3MB, 142; 3LP, 45; 3AAY, 62; 3ARP, 73; 3BGG, 39; 3CX, 54; 3CCX, 4; 8AGR, 28; 8RC, 3; 3AIS, 11; 3AFB, 11; 3APT, 85; 3WF, 67; 3SQ, 10; 3IK, 11; 3PH, 7; 3GZ, 14; 3FK, 8; 3BUC, 10; 3HG, 87; 3EM, 4; 3SU, 342; 3JJ, 229; 8PZ, 15; 3AB, 107; 3BHM, 129; 3ARO, 97; 3BSR, 58; 3ALN, 29; 3AJH, 22; NOF, 44. Spark: Eastern New York—2ND, 78; 2DI, 126; 2IF, 5; 2BY, 62. Northern New Jersey—2CJT, 68; 2BKJ, 37; 2BQZ, 19; 2CJA, 120; 2EX, 40; 2SQ, 98; 2CJX, 136; 2OM, 292; 2BK, 13; 3JL, 18; 2AER, 50; 3TJ, 50; 2AWZ, 10; 2QC, 10; 8BIZ, 8; 3CS, 55; 3FP, 18; 3BUK, 3; 2AAF, 50; 2CDR, 109; 2AFA, 128. Southern New Jersey—3BEI, 42. Penn. Del. Md. and Dist. of Col.—3AWF, 35; 3QN, 82; 3ACY, 72; 8BQ, 8; 8EW, 72; 8CEJ, 30; 8AGY, 1; 8BRL, 95; 8API, 53; 3GM, 4; 8AHE, 36; 3SF, 8; 3KM, 1.

DELTA DIVISION—C.W.:5NV, 150; 5EK, 76; 5IK, 26; 5ZB, 45; 5PV, 30; 5QM, 29. Spark: 5GD, 20; 5RZ, 10; 5BW, 10.

ATLANTIC DIVISION

Chas. H. Stewart, Mgr.

Western New York report is missing, which if it had been received may have been the means of bringing our traffic total in excess of the figure for last month. A summary of traffic is given by states.

State	C.W. Msgs.	Spk. Msgs.	Total Msgs.
Eastern Penn.	4474	254	4728
Western Penn.	1635	234	1869
Delaware	22	0	22
Maryland	303	8	311
D. of C.	1208	1	1209
Northern N. J.	2422	1287	3709
Southern N. J.	154	42	196
Eastern N. Y.	2426	266	2692

This, with the traffic summary of individual stations by states, comes as the result of a suggestion by Dr. E. A. Cyriax, 2DI, assistant division manager of Eastern New York. (Mani tnx, Doc, it is a gud one—FHS.)

EASTERN N. Y.: The most splendid cooperation is being received from all stations and the result is shown in the heavy traffic figures. 2TS continues to bat 'em out as before. It seems there is a little bit of jamming with the BCL on Long Island and unpleasant things are said of the amateurs. One must not overlook the fact that there are a good many commercial and Naval stations in that vicinity and not all QRM comes from the amateur. 2GK turned in a nice report from up state. Brooklyn still lingers and reports are missing.

NORTHERN N. J.: For the fourth time in succession this half of the state leads in traffic work. 2AWS must have a *pretty*

good method of getting reports in on time as Pennsylvania is his only leader. Of course the spark stations made it possible for the great total. (Bet a tadpole's pajamas that "Sink Spark Ostman" did this -FHS). 3XM bumped out 411 messages in ten days, which, by the way is going some 3XM threatens to smash all existing records for traffic handling, and a supply of over 1000 message blanks is on hand.

SOUTHERN N. J.: A change in the office of ADM is being made as Frye does not have time to handle the work. This half of the state will then be in a position to compete with the fellows up north.

EASTERN PENNSYLVANIA: Dist. No. 1. Reliable communication has been established by all the official stations in this district. Much credit is due to 3AWH, 3BNU, 3CC, 3BLU, 3AWF, and 3QN. Dist. No. 2. Traffic suffered a drop this month but a large number of stations reported which proves they are on the job. Effective short jumps have been established and the traffic moves fast. Dist. No. 3. At last we have a message report from this district, and it is hoped that all relay stations will cooperate with the district superintendent after his efforts in sending out a circular letter to promote better operating conditions. With the starting up of the Electric City Radio Club in Scranton, renewed activities from that city will be expected. 8BIQ was heard 2600 miles on 2 amplifying tubes, and worked many other DX stations. Dist. No. 4. 3ZO with 1204 messages, hung up a new record for the station. 3BJ, 3MB and 3LP are big boosters for Reading. Dist. No. 5: Traffic is increasing rapidly because of fine cooperation from relay stations. 3AQR, 3ACY, 3CCU and 3BIT are heavy traffic movers. 3AAY has a 4 A.M. schedule with 5DI and one in daylight with 4BY. 3ARP is coming forward with C.W. and promises to increase it to 20 watts. 3BGG handled a lot of local traffic. Dist. No. 6: 8BRE is finishing up his C.W. set. 8ANE has QRM from local power leak and suffered the loss of burning up a C.W. transformer. 3ABD is moving traffic on 5 watts C.W. 8BQ managed to erect his new cage while a severe snow storm raged and was forced to abandon the attempt to add the counterpoise.

PHILADELPHIA: Dist. 1: 3KD, 3BUT, 8HX, 3GK, and 3FM moved traffic in fine shape but most stations reported a lack of consistent range not being able to work the usual DX. Many stations have increased power. Dist. No. 2. 3TA and 3UD are continuing to reach out on C.W. The sparks are NIL. Dist. No. 3. Only two stations reported. 3ANJ and 3BJY. Dist. No. 4. 3RB has a daylight schedule with 3ZO, 3QV, 3FS, 3HD and 3SM. All reported good traffic totals.

WESTERN PENNSYLVANIA: City Manager, Dawson Bliley, Erie, Pa., has his hands full in securing much of a report due to a very heavy snow storm which wrecked every station but one, putting out of commission some of our best relay stations; 8AHE, 8CNB, and 8VH. 8AHE had been working only two weeks when aerial came to naught, but despite that fact, he reerected it and reports 36 messages handled, connecting regularly with 9AMK and 9PD. Such spirit is surely commendable and worthy of mention. 8AGR is getting out fine with a 10 watt set, doing DX work every morning at 6:00 A.M. He handled 28 messages during the past month, while 8RC labouring under a heavy handicap cleared but three. Dist. No. 9. More relay stations are being added daily and cooperation is increasing all over the district. This spirit of cooperation is very noticeable around Connellsville, Pa., where Mr. Thomas W. Scott, of 8BJV is spreading the spirit of amateur radio. Mr. Scott is to be highly commended for his work in promoting the work of the A.R.R.L. Relay message handling seems to be on the increase considering that the only active period possible for relay communication has been since the transatlantic listening period. Right at the present time most all of the stations have their equipment in A-1 order. Then on a few stations, however, that seem too busy handling traffic that they can never find time to send in a report. One of these stations is 8ACF. The record for handling traffic this month goes to 8ALF. This station handled 417 messages which is indeed remarkable as the operator attends the University of Pittsburgh during the week and only has his week-ends for operating. During the week while in Pittsburgh, he operates 8ZD. 8EW has sent in his last report for the spark column as we have good information to the effect that a C.W. set is being installed. In the last report we predicted the downfall of 8EW as a spark station would be soon, and now it is a reality. The amateurs of Pitsburgh will certainly rejoice over this change. 8CEJ did not come up to the mark he made during the last period, but considering the time taken up by the transatlantic tests, his report is very good. This station has been using both C.W. and spark although the C.W. seems to be the best means of handling DX relay. 8CEJ recently reported that his station was to be closed by the Radio Inspector on account of interference with broadcasting. The claims filed against 8CEJ were not sufficiently proven to cause cancellation of the license, however. The Radio Inspector is giving the amateurs a square deal. 8CEJ has resolved to use only C.W. hereafter. 8CJY is one of the new stations reporting and is doing very well considering the fact

that there are so many other relay stations in Pittsburgh. This station will be operated two mornings a week from 4 to 7, and three evenings from 10:30 until 12:30. 8CJY's signals have been reported consistently within a radius of 1000 miles. 8BJV is doing good work handling traffic in all directions. Mr. Scott has an assistant operator and between the two of them, traffic is cleared rapidly. One of the rules at this station is that no message shall remain on the hook over 24 hours. This kind of work is what makes the A.R.R.L. famous. Connellsville is not only represented by 8BJV but we also have 8WR, 8BGG and 8ALT who also have the facilities for handling message traffic rapidly. 8ALT has been operating a 100 watt C.W. set and is now installing two 250 watt tubes. Uniontown, Pa., is represented by 8BDU and 8BRM who both use C.W. These two stations work on schedules cooperative with the stations at Connellsville. All of this work for cooperating having been arranged by 8BJV. 8AAF and 8BUT are handling all traffic at South Brownsville, Pa. Both stations use C.W. and are having very little interference in their locality and handle considerable traffic. 8DV is back with us again after a long absence. This station has always been considered one of the best A.R.R.L. relay stations in the valley. 8CKM is still building that 100 watt A.C. set that he reported two months ago. This station, however, does good work on the small set and we doubt whether he needs the 100 watts. 8AGY did not do much this last period on account of vacation. This station uses spark and does almost all of its work in the daytime with 8XE at State College and 3ZO at Parkesburg, Pa. 8OW, who has been operating two 250 watters in a self-rectifying circuit, has a bushel basket full of cards and has now started in on a small set to see if he can duplicate his collection. This station does considerable experimental work and during the transatlantic listening period worked faithfully with superheterodynes, radio frequency and all styles of Reimartz tuners, in an attempt to get the British and French stations. The transmitter at 8OW is at present one 5 watt master oscillator with four 5 watt power amplifiers. 8BRL is again handling traffic in his old style and doing it with a variety of transmitters. We have heard this station on lately with spark and C.W. and from the report we find that 8BRL uses one K.W. 60 cycle quenched, or ½ K.W. 500 cycle spark. 8BRL also uses phone for local work. 8AGO did not hand in a very big report this month for several reasons; first of all the transatlantic listening period took up a great amount of the time and then it is rumored that Mr. Arthurs took a trip to Philadelphia to pick out an OW for 8AGO. 8AIO failed us for the first time and we are trying to believe that his report must have been lost in the mail. 8ZD is still handling its share of the traffic for Pittsburg. During the transatlantic sending period this station had four 50 watters go west and is now using one 50-watt tube.

Dist. No. 11. 8CON has shown the real spirit in clearing 66 messages and handling all his school work at the same time and rounding up his stations. The reports received from him are fine in every respect and only show no report from 8BLT. 8CON does all traffic work with but 5 watts. 8AXD shows a total of 13 messages and is a very promising station. Assistant division manager 8LF reports no messages handled, but can report many communications and much more compiling of reports during the past month, leaving that amount of time for the other fellow to clear some traffic. 8LF is now constructing a new ¼ K.W. tube transmitter excited by motor-generator.

DELAWARE: At this time last year nothing at all could be obtained from Delaware. 3AFB is heard handling traffic almost every night.

DIST. OF COLUMBIA: The District of Columbia as reported by Herbert A. Wadsworth, A.D.M., shows a good increase for the month. The good work is undoubtedly due to more stations opening up and considerable more interest shown in DX work. Hastings has opened up old 3ALN again after being several months in Colorado and 3ARO has at last succumbed C.W., leaving no "HE" sparks in Washington. 3SU continues to be the Star station of the District and deserves much credit. NOF is back with the amateurs again and his help with 4 operators to help move traffic is appreciated.

MARYLAND: The transatlantic tests made quite a gap in traffic handling. The stations in and about Baltimore have made a creditable showing during the past month. Many new stations are lining up for A.R.R.L. traffic. 3UC has abandoned spark and is installing a 50 watter. This will be welcome news as Bill Small had one of the "noises" sparks in Baltimore. 3GZ installed C.W. with 15 watts and is now doing good DX work. 3OU is back with C.W. doing good DX work. 3BUC installed 100 watts of C.W. and has reached the coast, having been logged by 6ZH. 3FQ another addition to Baltimore's 100 watters is reaching out. 3SQ has been reported from the sixth district which is certainly F.B. 3BMO, 3FK and 3IK are reaching out nicely with C.W. 3SF and 3AHK are the only rock crushers left in Baltimore. 3AHK may install C.W. and threatens us with 500 watts when he does it. 3WF, 3APT and 3HG seem to be the prime movers of DX traffic for Baltimore. 3APT

maintains a schedule nightly with Washington through 3JJ. 3HG maintains several schedules and manages to hold the star for handling traffic. (His 100 watt C.W. holds all previous Baltimore records now as having reached across 3 or more times and he is receiving cards reporting signals up and down the west coast.) 3EM with 100 watts has already made a break into the traffic and will undoubtedly resume his old schedule with 3ZO and Washington through 3SU or 4ARO.

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

All the assistant division managers have been helping in the drive for bigger message totals and the fact that their efforts have been successful is borne out by the biggest total we have ever had for this division. Every state is becoming better organized and despite the general feeling that amateur radio is not what it once was, it apparently is more flourishing than ever before in its history.

Illinois and Ohio are running a close race for the Star state honors of the Central Divison with Wisconsin coming up at a high rate of speed. Note the very much increased activity in northern and southern Indiana as well. Michigan is also standing up well in a hard battle with the B.C.L.s. Kentucky unfortunately is not represented this month.

WISCONSIN: Dist. No. 1. Things are going fairly well in Milwaukee at the present time. 9DIO is making himself heard all over the country. Dist. No. 2. This district is certainly coming along nicely. There is a noticeable increase in traffic to and from Madison. Other good stations recently located are 9AER, 9EEY, 9BDB, 9CVZ and 9ARO. 9CWP is coming on in good shape. 9CVZ is rebuilding his antenna and going to get down on 200 and join the gang. This district now has a station at Platteville (9CHK) which certainly was badly needed. 9XM has not been able to maintain a regular schedule as yet for relay work and the messages handled in the last month took place during his test periods. 9AZA is doing remarkable work with 100 watts C.W. It took a long time to relegate the old spark to the dump heap.

Official Relay Stations in Wisconsin will be glad to learn that a silver loving cup is being awarded by Ben A. Ott, assistant division manager for this state. The station handling the most traffic each month will have its call letters engraved on the cup. The first station to win the cup three times, not necessarily in succession, will become the permanent owner of it. The first award will be made for the month ending March 15th.

Dist. No. 3. 9CZY is sure there with that 5 watt bottle. 9BHQ is now using 20 watts. 9DCT handles his share of Appleton traffic. 9DVY is on the job regularly and has been doing good work lately. 9BQG is the nucleus of a network of smaller stations in this district. 9FQ and 9DLN are on the air occasionally. Oshkosh is represented by five stations now, 9BCH, 9DHG, 9AMQ, 9BGB and 9BYE all doing excellent work. Dist. No. 4. All the traffic in this district is still being handled by four stations, 9AKY, 9AZN, 9ZY of La Crosse and 9CM of Trempeleau. Dist. No. 5. Superior fans are dead but not buried. 9DGY burned out a tube, got disgusted, sold his stuff and is now planning a bigger and better station. The Rock Crusher at 9YAC is being heard again and handling some traffic as is also 9QS.

NORTHERN INDIANA: Traffic is being handled regularly and smoothly in both districts. No difficulty is experienced in handling either inter-state or local traffic.

Dist. No. 1: The only activity reported in this district was in Fort Wayne. The active stations are 9DFB, 9DAX, 9CUI, 9DWW, 9UC, 9CNV, 9ME, 9II and 9BFW. 9DFB is doing very good work and has been heard by twenty-seven stations on the Pacific Coast and also in France. 9DAX is back on the air and doing good work. 9CUI is doing fair DX work on 5 watts, as is 9DWW, with the same power as 9CUI. 9UC is doing very good work on 5 watts, having worked 7SC. 9CNV is doing very good work but is not on consistently. 9BWF has a 10 watt set and is doing fair DX. The fellows in Fort Wayne have agreed to QRX until 10:30 P.M. for broadcast listeners. Dist. No. 2. The active stations here are 9CP, 9AWZ, 9DTJ, and 9EFZ. Although 9EFZ has only been on the job a short time he will soon be a good one to help out things. He experiences a little trouble in getting east, especially to Fort Wayne.

SOUTHERN INDIANA: Several daylight routes are being worked. Nearly every station reported this month, except 9ARR and a few Indianapolis stations. 9ARR is a very valuable station as he is the only sure QSR west we have. 9BRK is doing splendid work with the four 5 watters.

OHIO: Very good work is done in all the districts, the state being so well dotted over with good stations that routes can be picked in practically any direction throughout Ohio. Columbus handled a large percent of traffic in all directions. Its a C.W. city now, all spark stations having been closed by the Radio Inspector—for Why? 8AWU opened up with a 10 watts C.W. 8ALC is using 50 watts but is not yet working up to the old 5 watt set with which 6XAD was worked. 8IB and 8BXH with

100 watts each are doing wonders. 8UR with 10 watts is doing good work and is now handling his share of traffic. 8ZAF has been making some noise with his 500 watts. 8GQ, 8BNQ, 8BBU, 8TJ, and 8SG will be C.W. soon. 8BKO has a 5 watt set with which he has succeeded in working 8ALC, at least 200 feet distant. 8BYN is capable of handling quite a bit of traffic. 8BEK has a bad case of the "CQ" they say, and a little code practice would not be amiss, but OM, you're not the only one. Come boys, let's give the other fellow a chance to answer between the CQs—now and then. 8AER, 8CWP and 8BHO of Lancaster, Ohio, are coming along fine. Our friend Mr. R. H. Howe, of Granville, Ohio, has opened a station. 8AJX of Delaware is also with us again. 8CJZ is a new station and is coming on fine.

Dist. No. 4. It would take the whole *QST* to tell of all the good work being done by these stations. 8ANB is reaching Hawaii on 20 watts and 8CWS has worked 7ZU using 20 watts. 8AIX is changing over from spark to C.W. 8BYN handled his 170 in three days. Dist. No. 2. The star of the state for this month is 8IJ. 8LT of Norwalk can QSR direct to 6XAD or 6KA any time. Give him your California messages boys.

MICHIGAN: All the Michigan stations are occupied with plans for the big Flint Convention, February 9th which is expected to be the biggest thing yet pulled off in Michigan.

The Detroit fellows pulled off a novel stunt during the Christmas holidays in the distribution to all the retail radio stores of message blanks for various customers to file Christmas radio greetings. These blanks were plainly marked to the effect that the message was being transmitted by the courtesy of the Detroit Radio Association. This idea is helping a lot in acquainting the general public with the activities of the League and its local representatives in Detroit as well as with the work of the radio relay amateur in general.

ILLINOIS: Dist. No. 1. Besides the ten active official stations in this district we will line up 9DUH, 9CHF and 9BWO. 9CFK is doing himself proud with one 5 watt tube to the tune of 1.5 thermo amps. and all districts but 6 and 7 to the present writing. Dist. No. 2. Very comprehensive as well as voluminous report from D. S. Bergman this month showing increasing activity. 9BJT of Streator is star station this month with sigs. from 6XAD to 1CMP. 9DXL qualifies for ORS. 9AJH of Western Springs pushes close second. He is just beginning to step out with the C.W. (Continent Wrecker) 9ACL is back from the University on a vacation. 9APB with the OW back from school shared the total with 9CXL the other op. 9DCR continues to be high man in Champaign, Urgana. Sez T.A.T. knocked his total for a mock turtle, same seconds 9DHZ the x 8 amp. thermo spark.. (Lo! the poor B.C.L.s in his home town.) 9ASD pleads school QRM but turns in 62. 9DBV sends two 5 watters west and T.A.T. gave him handicap. (9DBV. N.B. D.S.) 9BTA warms a couple of 50s this month. Works 1s and 2s like local but no sixes. Listen for him sixes he is QRK on you. 9WX has a casualty list of two 5 watters this month. No message as spark knocked condenser twice. 9DVL contemplates a 20 watt and 50 watt set. (In the tube business OM?—D.S.) 9UU falls from grace this month with only 75. 9DDY has a hard time to get any one to relieve him of messages. Some of you fellows hearing him take 10 or 20 and help him get the hook clean. 9DDY squeak box C.W. artist can't make the dynamotor perk like the 4D coil. 9EBN lost a 5 watt bottle so no messages. 9BXD has a tel. co. ringer sitting practically in his back yard. 9ARM slipping up on reports, none received for two months now. One more chance or off comes the head OM. Same applies to 9AP. 9CCM handles tfc. with 1CMK, 9CCM, 6XAD, but he does not report how many per month with the rest of the boys. 9DYN got 3.2 with a 50. Replaced with a 5 and got same with no heating. Some fellows have all the luck. 9OS, C.M. of Elgin reports activity increasing and a new special 9ZG in town. 9EBH, 9VM and 9OS expect to make Elgin boom for the A.R.R.L. 9DWS has a 2.75 amp on 15 watts and expects to wreck a few continents now. 9AQA, the C.M. of Champaign-Urbana, reports nine official relay stations all busy. 9DOG, 9BGC and those previously mentioned all helped.

137 C.W.—73 Spark
Harry M. McCormick
Total 210 Msgs.
Streator, Ill.

Dist. No. 3. All this district except E. St. Louis is becoming active again. Jacksonville is better represented than ever and the B.C.L.s are learning the cuss words in in code and 9BY and 9CLZ are working like horses to get the town really on the map. 9ASL should be ashamed not turning in a report since his appointment. There is activity in Springfield. Let the A.R.R.L. know there is such a town. Len Small did. 9BLU promises a C.W. that will spill the detectors from Maine to California.

Dist. No. 4. There are now 12 widely separated active stations in Dist. 4. Recommendations at hand for two more, 9BIL and 9BHX. 9DQU is again star station with 532. That OM is sure batting high. Has been heard by four west coast stations, Porto Rico, and 2000 miles N.E. of

New York City. Dist. No. 5. From 4 stations we have a total of 89 messages. What's the matter fellows? Are all you loyal A.R.R.L. men dead above the shoulders down there or is there a loyal A.R.R.L. man down there? Speak up.

Dist. No. 6. District No. 6 had a Convention, and a real hamfest it was. D. S. Ridgway writes, "every district No. 6 station you hear every night was there on the memorable days of December 30 and 31st". The boys from Rockford drove over in 9BQW's tractors and the bunch was assembled in time for supper at 9AKU. Broadcasting was cussed and discussed over the teacups. The gang split up to go to the different stations. 9EGN and 9DQR went to 9EGN. 9DVW and 9BQW went to 9AFN after 9DQW had made a fizzle of his pet RCA ckt at 9AKU. Traffic was handled hot and heavy until 6 A.M. by all, but 9DVW and 9BQU would make better mattress testers. At 6 the gang went down town where they battled royally with 4 rounds of hot dogs, after which they went over to 9AFN's where they blew 10 K.W. or KVA of onions in AFN's microphone. After a real breakfast later in the morning, traffic routes and schedules were planned. A REAL chicken DINNER was served by 9AKU's Mother and all the OMs demonstrated anti-capacity especially 9AKU.

DAKOTA DIVISION

N. H. Jensen, Mgr.

Probably in no other division is there as fine cooperation among amateurs as in this division. Practically every station is reporting traffic and nearly all stations are observing the quiet hours from 7 to 10:30 P.M. 9AIG is high for January with 324 messages.

Recent appointments made in the Dakota Division are as follows: Don C. Wallace, 9ZT, of Minneapolis, A.D.M. for Minnesota; Bert Wick, 9AEJ, of Fargo, A.D.M. for North Dakota; Leonard Weeks, 9UH, City Manager of Fargo; and Edward J. Caveny, 9CDR, City Manager of Luverne.

MINNESOTA: Dist. No. 1. 9CDV was home from the U of Minnesota during the hollidays and did fine work in helping out with holiday traffic rush. City Manager Hayes of Duluth reports that practically all traffic through Duluth has been handled by 9DAF. He now has his 100 watt set going and is in daylight communication with Twin City stations. City Manager McQuillin reports that Brainerd stations clear traffic in all directions daily. Much credit must be given to 9BAF for the large number of messages he handled. 9BAV says he will double his traffic report next month. 9AOR is doing well with his 10 watts. 9CMJ is clearing traffic daily with 9BAF. He is our best western outlet at the present time. 9ABB has been on the sick list. 9EAU is trying for a daylight schedule with 9CM, 9BIV and 9ADF. 9EGU will be on the air with 10 watts.

Dist. No. 2. District superintendent H. R. Skifter reports the loss of one of the best stations in the whole Dakota Division. Lloyde V. Berkner, 9AWM, of Sleepy Eye has left the state and is now attending a Radio Institute in New York City, to enter the commercial game. City Manager Wallanc, 9ZT, has maintained a schedule with 1QP for some time with 100 watts. He is now installing a UV204. City Manager Goldberg, 9APW, has come across with a near record by working 4OI in Porto Rico regularly. A schedule has been arranged between these stations. 9APW also leads the district in amount of traffic handled. 9BBF has been reported by the operator on 9IRX at Colon, Panama. Luverne is coming to the front as a real radio town. Already six stations have licenses and all have transmitters. 9BVY and 9CDR are the leaders in traffic handled.

NORTH DAKOTA: Most of the activities in North Dakota are centered in and around Fargo. City manager Wick reports stations 9GK, 9UH and 9EBT all active and handling considerable traffic, which moves on through Canadian 4BV to Montana and Washington. 9ABU and 9BFQ are doing good work. 9AMX and 9ADZ will soon be going with C.W. transmitters. 9AUU is also doing good work. 9DOC will be going again soon.

SOUTH DAKOTA: 9AIG is doing the best work in the district. With 15 watts, he is handling considerable traffic. Other stations in Sioux Falls doing good work are 9DKQ and 9DDP. At Yankton, 9CXV appears to be the only station on the air at this time, and in the northern part of the state 9PI, 9ASF and 9TI are on quite regularly. 9YW at Rapid City is stepping out good. 9AVZ and 9CLS at Pierre are both going and in a few weeks will both install UV204's.

DELTA DIVISION

J. M. Clayton, Mgr.

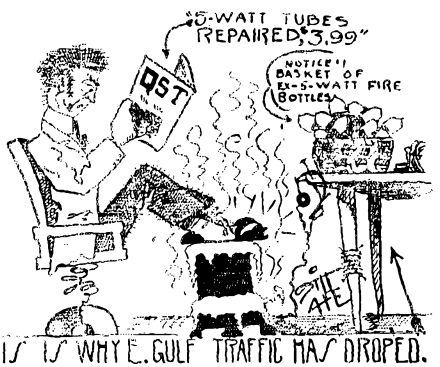
TENNESSEE: Dist. No. 1. This district is rapidly coming to the front, while district No. 2 is practically doing nothing, or at least failed to send in a report, as evidence.

Traffic was held up somewhat during December on account of the transatlantic tests, however, the relayers in district No. 1 made a very good record. 5QM is getting in the game and handled 29 messages. We are glad to get a report from this station and to know that he is handling everything coming his way. 5DA was on every possible chance. However, he only handled 27 messages. 5NV takes the cookie this month

for traffic handled, having pushed across 150 of 'em. 5EK comes next with 76 to his credit, using 100 watts C.W. 5NV uses 50 watts now and gets very good DX on it. 5IK is using 1 k.w. quenched, 100 watt C.W. and is buying a Government sparker. (F.B., OM, more power to you.) He works the west coast frequently on the C.W. and got away with 26 messages last month 5ZB, 5MO and 5NV complete the Memphis list of active C.W. stations. All of them are doing good work, especially 5MO, who steps out to both coasts constantly. We are proud to transmit the news that 5EK was one of those stations that got away down to the South Seas, being heard 3400 knots S.W. Panama. Spark radio is hampered here by the awful QRM from several C.W.s here. The smothering blanket spread out by those C.W.s completely wipes out all spark sigs, local or DX. 5RZ has been going some time and gets good distance on the ½ k.w. sink, while 5BW and 5GD are also QSA at long distance stations. Each of these three spark fiends handled a few messages as the report shows.

EAST GULF DIVISION
B. W. Benning, Mgr.

The report for the East Gulf Division this month will be short. Only one superintendent sent in a report. There were no reports from South Carolina or Alabama, and only one from Florida. Stations in this division are doing good work but they keep it to themselves.



FLORIDA: 4MT is the only station to report. He is ready for heavy duty and reports traffic going through regularly.

GEORGIA: 4FD has moved back to Midville to help 4GN out. Both stations are doing fine work. 4GE of Savannah is open for traffic. Atlanta stations are moving a lot of southern traffic and expect to double their total next month. 4AG is back with a 10 watt C.W. set. 4MY has been reported twice on the west coast on spark. Reports have been confirmed.

MIDWEST DIVISION
G. S. Turner, Mgr.

HURRAY! Another record of ours broken. The gang handled more messages last month than any other time since the Midwest Division was formed. Just think men, 12,154!

MISSOURI: 9AON first with 333 messages! 9AUK reports that Joplin has organized a radio club with F. Morton as the head. 9CHJ and 9AUK have put in new 10 watters. 9CUA is on with ½ K.W. spark. 9DOR uses a 20 watt set. St. Joseph is certainly going great and J. D. Cox, 9ANO, the city manager, claims that the fellows in his town are sure chesty these days. They handled over 250 messages and practically all in daylight. 9CTG is the banner station this month and is reaching out F.B. with 15 watts. 9ANO frequently works stations in Colorado and North Dakota in broad daylight. Occasionally works Milwaukee in the afternoon. A new station, 9DLT, is on the job. 9DRW has a 1 K.W. spark working again. 9BDS reports all routes working in great style. 9BED, reports the St. Louis gang going great. QRM? Yes, knew him once upon a time but don't just remember how he looks now, haven't seen him for some time. Even the broadcast listener says so. The broadcast stations in St. Louis are cooperating splendidly with the amateurs and due to this, very few complaints from the listeners are being received. 9CEE has increased his power to 15 watts. 9AOJ of Columbia handled a raft of traffic this month. 9EQ of spark fame is back on the job with 50 watts. 9CPY is using 100 watts. 9BLG has doubled his number of messages and threatens to dethrone 9AON. 9DMJ has been converted to C.W. 9AAU is on with a 15 watt set and also a 200 watter. 9CGK is one of the more recent DX fellows. Laizure of western Missouri says that he is busy getting the gang lined up and promises to have some good news next month. 9CKS reports much doing in his town. He has a new 100 watt set and is now working regularly on route "B" during the daytime.

The routes as shown in December *QST* are all in perfect working order. Besides these old routes we now have one other in operation, i.e.; route "E" which is as follows: Cape Girardeau, Mo., 9BDS via Lawrence, Kan., 9AOG to Denver, Colo., 9AMB. That is surely great work, 'eh men? Watch out for our Midwest Special. 9BOZ is a new station 9BJB has put in a 50 watter and is working every one he hears. 9BKK and 9BIW are now partners to a 150 watt set. 9EFC ex-9DZI of Columbia is doing good work again. 9CUF another radioist gone wrong. Just getting lined up in traffic work and thought

we had him setting pretty when along comes an incipient OW and runs off with him. 9DQQ is a new comer so far as traffic is concerned. The D.S. of western Missouri has discovered two fellows who are doing good work, 9CRR and 9DPY.

The following appointments have been made to our official relay stations: 9BKK, 9AYL, 9RR, 9DAE, and 9BLG.

KANSAS: **9DTA first with 330 messages!** Our new R.M. showed himself off this month and handled the largest number of messages in the state. Then the OM excuses himself by adding that he would have made it more but he burnt out three tubes. The others with "empty sockets" are 9AOG, 9AOD and 9CKM. 9CVT is now on with 50 watts. The Wichita bunch is pepping up considerably lately with 9KA, 9PS, 9CWC and 9BJN doing good work. 9ABV and 9CCS are both handling messages. 9DSD and 9DPD of Hutchinson are steadily heard from. 9EFA, ex-9DUN, is using both spark and C.W. Daylight routes are working smoothly to all parts of the state, thanks to 9DTA, 9CFI, 9BHN, 9AEY, 9CKM, 9CVT, 9AOG, 9CLW, 9BZZ, 9CCS, and 9CWC. 9AOG is working 9AMB on schedule at 7:30 P.M. C.S.T. This eliminates some of the QSR trouble experienced in getting west. A daylight schedule has been arranged with 9BDS to the east. 9CKM is appointed city manager of Kansas City, Kansas, to replace Wells who has not the time to devote to the job. There is a new station to help 9AOG, with the call 9EHT. Special mention goes to 9CCV for consistent good work in League affairs.

IOWA: **9BGH takes first honors with 351 messages.** According to a wire received from Stover at a late date no report will be received from him for publication in this issue due to the fact that a fire at his place destroyed all his monthly records. Watts sends in the largest traffic report ever received from Iowa. Over 3500 messages being handled by Iowa alone. 9BZI, 9AXU, 9BCF, 9BIK, 9AMI, 9DKY, 9ARZ and 9CXP has established records over 4000 miles and 9CXP even over 8000 miles. The bulk of the traffic for the month was handled by 9BGH, 9AOU, 9BSZ, 9DRA, 9BSG, 9DKY, 9DAH, 9BFG, 9BZT and 9ARZ. Others did very well, averaging over one hundred, and as a whole, Iowa ranks first for traffic handled in this division. 9BSG handled 210 messages during the first ten days he was home from school. 9AMU is now doing good work. 9AHN, 9CHN, 9BLT and one or two more are wearing pennants of black ribbon emblematic of "the empty socket." 9DSL is leaving for school. 9BIK informs us that he will have to quit radio on account of eye trouble. 9FK is still keeping the connections open for across the state traffic.

NEBRASKA: **9YU wins first honors with 251 messages.** The A.D.M. asks that you Lincoln boys speed up a bit on your report. 9CNS at Rushville is the only dependable western station. We have what appears to be a real daylight traffic route clear across the state. It starts at Omaha and goes via 9AIN at Hooper to 9CNS at Rushville. We have one starting at Lincoln, continuing over the same route. Although it is a long jump from 9AIN to 9CNS a large number of messages have been cleared. The south Nebraska district handled by far the greatest number of messages. Over 1000! You Northerners ought to be ashamed of yourselves handling only 710. What would you do without AD7? The star stations for this month are: 9YU, 9BXT, 9DNC and AD7. Mr. Sanders of Hooper is back after a long illness and deserves special mention for his good work. He handled 110 messages. 9CKI has been doing good work. Omaha surely has a fine C.M. He reports 9ASO and 9ALK, sparks knocking 'em cold. 9EW and 9DXY have put in new C.W. sets. 9DSM is doing good work on 100 watts. 9CIY and 9CMK are getting started. The D.S. of North Nebraska reports that with the exception of 9AIN and 9CNS, the north district has no dependable stations. 9BDU and 9DTU have increased their sets to 20 watts. 9AYS is building a 100 watter. In the southern district we will commend 9BWE for good work with a flivver C.W. set.

NEW ENGLAND DIVISION

I. Vermilya, Mgr.

The following appointments were made during the month as relay stations: 1CKP, 1MY, 1OV, 1BIY, 1VK, 1CR, 1EX, 1ALZ, 1CPI, 1MC, 1ATJ, 1CJZ, 1CJA, 1CSW, 1GL, 1CSS. Mr. Neal Dow has been appointed District Superintendent of Rockingham and Strafford counties in the state of New Hampshire. Mr. Philip F. Robinson has been appointed Assistant Division Manager for Eastern Massachusetts. Business has been rather brisk this past month and from the look of things it is getting better and better in every way, every day. If it keeps up we will need a few more secretaries.

MAINE: The old Pine Tree state came through in fine shape this last month, and Mr. McShane, who is helping out Mr. Pierce, sends in a very good report The Star station of Maine is 1BAS with a total of 238. Reports of the other Maine stations will be found in the station list of messages handled. 1BRQ deserves special mention for his 200 which shows mighty good work.

NEW HAMPSHIRE: This state is doing very well indeed under the blow it had

when it was allowed to sink below the usual A.R.R.L. standard. This state has some very promising material, and we hope to have some large message reports in the near future. We must be on the job, fellers, so let's get up and after them. I am not entirely satisfied with things as they are. The total messages are not enough as compared with the rest of New England.

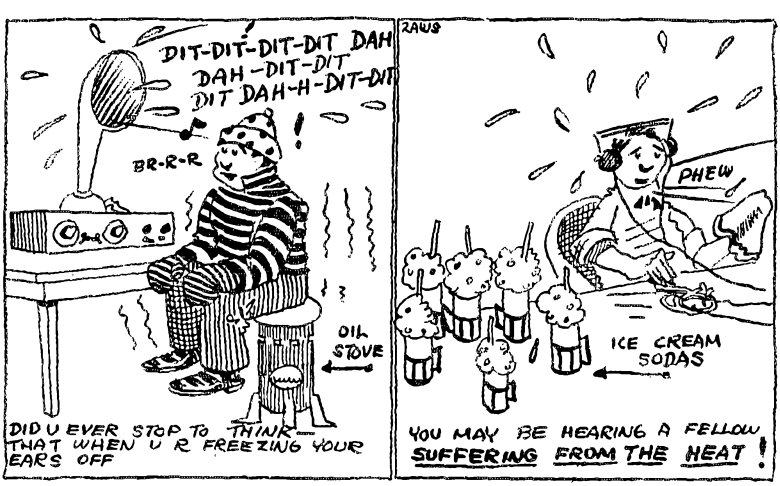
VERMONT: Vermont also has a state full of enthusiasm, but we must have more than enthusiasm to swell the message reports. You fellows in Vermont and Hampshire must admit that a total of one hundred and six is a very poor showing for a whole state.

MASSACHUSETTS: This state, the old Bay State, has certainly come forward and held the lead of the rest of New England.

1CNI handled 428 messages. This is quite a burst of speed and this is the kind of work that counts. 1CPN with 656 messages is another of these "stay up all nights" and we surely welcome their reports. 1PM is another with 515 messages. 1CNI is planning on a tube set. A little bluebird saw him buy two 50 watt bottles—'atta boy—now watch the ammeters and the distance. 1AWW kicks because it takes too long to get these reports into *QST*. He is another 200 man—214. 1CMK deserves special mention—398. These are the men that count, fellers, and when you meet them, show that you appreciate their work. 1BSZ will shortly show the stuff he is made of. He shows real A.R.R.L. spirit, and we expect to see the traffic report jump another thousand down his way each month. 1CMK has received a report that his signals were taken on a dictaphone record in London. 1BYN handled 325 messages and deserves to be put on the honor roll along with the rest of the big fellows. 1BKQ has, month after month, consistently handled hundreds of messages. This time he rings the bell with 322. Taking in no consideration the time for the transatlantic tests, this is very good. He says 1,000 or bust next month. 1CJD handled 125 messages.

RHODE ISLAND: 1II has handled 301 and likewise his name belongs in the honor roll. He has certainly come forward with some good reports since his appointment and above all, he gets them in on time. 1BVB handled 248 and we put a gold star opposite his name. This man has made wonderful strides in Rhode Island. 1GV handled 148, but we want more, from this good station, and this star operator. 1BVB is going to have a Y. L. operator on the job to help him out. 1BES handled 271, and this entitles him to a seat on the Honor Roll.

CONNECTICUT: Reinartz is doing great. His report was three days ahead of time and that's going some for him. Ye Division Manager wishes to publicly thank him for antenna dope and trick C.W. circuits. They sure are great.



Reinartz wants every certified station in Connecticut to communicate with him so that he can bring his list up to date.

New London is full of pep, and messages moving nicely. Bridgeport is likewise moving the traffic in bunches of hundreds.

1AW has at last fallen for one of the big bottles, using one 250 watter. He makes lotsa noise. 1BGZ is in danger of losing his job, if he don't get busy. 1QP on his new antenna dope, has been heard in St. Louis in daylight and Denver and Arizona at night. He uses one 50 watter and puts out five amps. 1MY goes down on the Honor Roll with 408, while QP copped off 220.

NORTHWESTERN DIVISION
H. F. Mason, Mgr.

We are glad to be able to present more complete reports this month than for some time. This signifies general good times in amateur radio, with everything going smoothly.

MONTANA: The star station of the division this month is 7ZU. Using one 50 watter with 1400 V.D.C. on the plate, he is receiving so many cards that he will soon have to start lining the outside of his station with them. They include all districts. All messages were handled over distances of from 900 to 1350 miles.

7HM is handling the bulk of the traffic in Great Falls vicinity. He will have to watch his step when 7NV goes into commission. 7EX is on the job every night from 10 to 1. He has trouble in working west, but a large part of traffic of Canadian origin moves through his station. 7AGF is getting along nicely. Montana stations have an exceptionally hard time in working one another; it being easier to reach out 500 miles or so than do work in the state. 7ZL has lately been assigned 7HS, the second op, and Cutting have been doing more experimenting during the past month than anything else, but are now about all fixed up.

IDAHO: Dist. No. 1: Not much doing as 7JF, the only reliable station in the district has succeeded in burning out four 5 watters. Dist. No. 2: 7WG is keeping the hook cleared with the old spark and is installing C.W. Dist. No. 3: 7CG is on with a new 10 watt set. 7LN is having considerable trouble getting his set to oscillate without burning the shack down from the heat of the tubes. Dist. No. 4: Seems to be a hoodoo hanging over Boise. 7YA, 7AEM, 7OT and 7HJ have all blown several tubes each. (See cover on this *QST*). Traffic is traveling through in fine shape. The above stations have handled the major part, with 7PJ, 7LO and 7WC assisting. 7AEM, 7HJ and 7OT have been doing some remarkable DX work during the past month.

OREGON: All district superintendent appointments in Oregon are hereby cancelled. Districts will be re-appointed, and those few good amateurs who have worked for the best interests of the rest of the gang will be given due recognition in the new order of things. The state will be reorganized.

In Portland 7TO, 7TT, and 7EY are handling traffic and reaching out. In Eugene and vicinity, 7NA, 7TQ, 7MF, and 7SY are handling the bulk of the traffic south. 7MF and 7NA can now QSR east, as they have no trouble working into the ninth district consistently. 7NA, on 10 watts has worked 4EB of Palmetto, Florida.

WASHINGTON: Traffic in this section is moving with a regularity never seen before. Stations are awakening to the need of reporting traffic handled, and the district superintendents are co-operating in good shape. The adoption of the Revised Pacific Plan has helped to smooth out a number of difficulties, and the amateurs in the larger cities are living up to it to the letter.

Dist. No. 1: 7OJ has been off the air and has not handled the usual amount of traffic. Dist. No. 2: We are glad to have this district back in *QST* again. Stations handling traffic in Aberdeen and Hoquiam are 7ADR, 7KJ, 7NN and 7SC. 7RI and 7ADF, please note. 7SC will soon have 500 watts of C.W. Dist. No. 4: 7GP is a good QSR for Seattle and Tacoma stations who have trouble in working east. Dist. No. 5: Traffic has been slightly less this month owing to the T/A tests, and to the antenna insulation at 7BJ going up in smoke. 7BJ's synk rectifier is also acting up. Traffic is not moving through any special line of stations in any direction but there are always enough stations on the air to keep traffic from being stalled. 7AIC is getting to be a regular traffic hound, and has installed a special waste basket in his station to receive the burned out UV-202's. 7BJ is switching over to chemical rectifiers, and putting in new antenna insulation.

Dist. No 6: The honors go to the two members of the "boiled owl club"—7BA and 7WX. 7BA is on the job from 1:00 A.M. on while 7WX comes on at 2:30 A.M. and stays till 5:30. Give them a call, you ninth district stations, and they will QSR. 7QE is doing some good work. 7WM has cut down on the traffic, but as he is getting to be an old married stiff, that accounts for it. 7AW and 7BG are both having their first experiences in trying to make a five watt tube oscillate. Dist. No. 7: The star station is 7ABB Seattle stations are off the air rebuilding their stations, but traffic is moving easier here than before. 7ADP, 7DU, and 7MH have been doing good work. 7BK has been too busy pounding the typewriter this month to handle any traffic to speak of. 7AFH has been doing good work, and clears Northern and Eastern traffic OK.

Dist. No. 8: 7UD has dismantled and is attending the U. of W. 7AIO is installing C.W., although traffic honors for the district this month go to him on the old spark. 7JS, had the same misfortune as the ham on *QST* cover last month—Blew a tube. Dist. No. 9: 7NE has been getting south fine, but cannot QSR north Dist. No. 10: 7OM brought this district out of its heretofore peaceful slumber by

reporting traffic this month (F.B. let's hear from 7EV too.) Dist. No. 11: 7GE has his hands full as President of the 7th District Executive Council, so has not had time to make up a complete report this month. 7GE and 7TH both report traffic handled, though. 7GE is now on C.W.

Dist. No. 13: The amateurs of this district are going to make it a model for the rest of the division, and have nearly doubled last month's business. Six stations are on the job consistently, and work the sixth district with ease. All stations are putting forth every effort to lessen the QRM by pre-rectifying their plate supply, and are supporting the Revised Pacific Plan. 7NC takes the traffic honors. 7DC and 7AIF are working east OK. 7OE has been working in the interests of the Seventh District Executive Council and forgets about the traffic end of the game this month. Much credit is due him, however, for the success in the forming of the Council.

ONTARIO DIVISION
A. H. K. Russell, Mgr.

Oh, yes, the amateur is doomed—*we don't think.* Every district reports the old traffic rolling right along piling up the totals and if the other divisions this month are like the Ontario one we are going to knock all former records for a row of California bungalows. Boys, its sure a grand and glorious feeling when every station in the whole blame division is handling traffic.

Old 3BV is the top dog in Western Ontario with all sorts of traffic handling, and covering all kinds of ground. The little note in last *QST* asking for dope on his stuff, brought forth results and the D.M. has received a fine newsy letter from him giving all the dope from the border. 9BS reports the passing of spark set at that station much to the sorrow of the BCLs (? hi.) 3XN is proving beyond doubt that London is not the dead spot formerly supposed and is reported QSA 1100 miles west of 'Frisco. 9BS says he is QRK in Ingersoll. He is also QRK to Can. 4DK so should be an invaluable westbound link in Trans-Canada Chain. In fact it is understood that he has already cleared one Trans-Canada message unofficially started. 3MN on 1 five watter clearing traffic regularly with 120 volts B battery. 3FA has all kinds of luck, mostly bad. 3KO hasn't been much on the air lately. 3IR in Leamington is back on the job. There is great competition between 3DH and 3BV for Windsor traffic honors. 3BV put it over this month. Both are spitting fire and blood from their aerials nightly and if the giddy pace keeps up 3ZO will have to watch himself. 3ABG is a new 5 watter opened up in St. Thomas. London has a rival for 3XN in 3LW who is coming fast. He only has 5 watts so far, but he is a go-getter. 3ADT has opened up in Ingersoll with 5 watts to give old H. LeRoy B— a little competition. Go after him, 3ADT, and see if you can't drive 9BS into the 3BV-3DH class.

In the Central Ontario District, the air looks like the aurora borealis with the juice the boys are shoving into it. Come on any time you like after ten thirty and you hear a dozen little canaries chirping—and isn't it sweet music to the ear? 3DE says the QRM, etc., is too much for him so he arises every A.M. at 4:30 and is on till 7. 3TA in Tillsonburg says he can work 1000 miles west but can never raise a Toronto station. Keep after 'em O.M., we are all a little deaf up this way, anyway. In Kitchener we have the livest town for its size in Ontario. 3BQ is high man there this month, and great credit is due him for his fine biz when he has only been on about 3 months.

3DS reports great difficulty in working other Canadian stations, but plenty of Yanks. Toronto is full of C.W. sets doing fine DX work. 3FO has opened up a C.W. transmitter apparently having kissed his spark a lingering goo'bye. Thank Allah! The combined set of 3JI-JK has been very busy the past month. 9BJ is another 50 watter who is tickling the cans in California, and 9AJ has kept up his good work in relaying. 9BA is also a very busy station, and is reaching out very consistently.

The Eastern Division is still the weak sister. Those two old timers 3IL and 3HE in Kingston seem to be the only workers in that neck of the woods. The peculiar feature of Kingston bound traffic is that apparently it has to be routed across the lake to Rochester or Watertown, to arrive at its destination, as there seems to be an absolute blanket over sigs between Kingston and Western Ontario. The great news from the East however, is that Montreal is coming through at last. Many stations have been in communication during the past month between the two cities and that part of the Trans-Canada chain seems easy. 2HG, 2BE, 2EI are particularly good in Toronto, and 2CQ is often copied in Kingston.

PACIFIC DIVISION
J. Vance Wise, Mgr.

There is a lack of material this month from which a concise report may be made. No reason is given for this, but it is believed that the Trans-Atlantic Tests was the cause of a good many tubes burning out when the gang kept pounding hard to get over.

ARIZONA: Traffic is moving in good shape in spite of the fact that it is un-

usually heavy. 6BBH is getting out better. 6ZZ has schedules with 5ZAE, 9BJI, 6OD, 6ADA, and 9AEY. A great deal of traffic comes thru dozens of other stations. The lid is on from 8 to 10 P.M. every night.

NEVADA: 6QR has relocated at 812 N. Virginia St., Reno. 6ZO is back on the air with 100 watts and has schedules with 6AK and 6ZX in addition to several east. 6AJR is still pounding the brass and will add another 50 watter soon.

CALIFORNIA: Dist. No. 1: 6ANH is reaching out and is doing good DX work as is 6ZAH who has been reported 450 miles east of N.Y. and has been heard in 34 states and Canada. 6AVR is using the old spark until a new 50 watter can be purchased. 6ZB and 6EC will be back very soon with new layouts. Dist. No. 8: 6TC and 6CC did practically all the traffic handling during the month, both stations handing in large totals. 6CC has hooks of messages for the Islands where 6ZAC used to take them. We hope 6ZY will be in working condition soon. 6LU is back again. 6BBA and 6QM are not going regularly.

QUEBEC DIVISION
A. J. Lorimer, Mgr.

Reports show all around improvement throughout the vicinity of Montreal with traffic moving steadily. Regular schedules have been drawn up by the majority of stations and real traffic has been handled.

Spark transmission is practically discarded, although 2AG has been doing some good spark DX when on the air. 2CQ has increased his power to 20 watts and has no trouble getting through to the nines. 2HG, using two French 40 watters, has been getting out in great shape. 2EI is another reliable relay station and has been making good use of his low power. 2CG has joined the C.W. ranks. 2AF clears traffic with Toronto. 2BE, Mr. A. Reid, an old A.R.R.L. man is our Government Radio Inspector here and when not too busy takes a hand at the key. 2AN keeps schedule from 10 P.M. until 3 A.M. Traffic is handled with 3DS at Kitchener, in spite of bad QSS over this territory. 2AM has been quiet since a couple of 5 watters went west .

NORTHERN QUEBEC: 2EO has a C.W. set going but is unable to do any relay work on account of heavy QRM from a nearby power mill. 2EK has not been heard from for sometime leaving a blank route north.

ROANOKE DIVISION
W. T. Gravely, Mgr.

The division manager wishes to thank each one of the assistant managers for his splendid cooperation and to commend each one for his diligence, his unswerving loyalty to the A.R.R.L. and for his fine performances.

Your manager wishes to draw attention to the fact that in many instances detailed reports are missing. Unless the individuals will furnish his district superintendent or city manager with a detailed report in addition to his traffic report, he cannot possibly furnish the needed information to his A.D.M., and in turn, your A.D.M. cannot give it to your manager. Therefore, the situation sifts down to this—if you, the individual station, do not receive due recognition in the Manager's reports, it is because you are not on your job, or because your district superintendent is not on his. Now fellows, let's look up the word cooperation in our Websters', and let's apply the principles more diligently than ever before in the history of the A.R.R.L.

VIRGINIA: Traffic seems to have fallen off on account of T/A tests, and QRXing for B.C.L.s and other causes, but some of the old gang seem to hang on and handle considerable traffic. With good efficient receiving apparatus it is unnecessary to QRX for the B.C.L., but since the single circuit tuners are cheaper, the transmitting gang have to suffer for the defects.

Dist. No. 1: 3ZZ "got over" all right in the tests, but is still bothered with the QSS at his station caused by fogs from Dismal Swamp. 3AAG is now in Government service. 3BVC, assisted by his 14 year old brother, is beating out the traffic. 3BNE lost his mast in a storm and is out temporarily. 3BSP and 3JN are back with C.W. and handling traffic. Dist. No. 2: 3BMN is the live wire in Petersburg. A new station is 3BCH. 3ATB, a new station, is working like an old timer and reports his traffic. 3TJ worked mostly in daylight and handled considerable traffic. Dist. No. 3: 3CEL, a new station on 10 watts of C.W., and is working in daylight into Pennsylvania. 3BIJ handled some traffic and was heard in California. 3MO is still short of antenna on account of red tape gang holding out on him. Dist. No. 4: 3BLF is using 15 watts now and worked the west coast. Dist. No. 5: 3IW had the misfortune to lose his father in December. (We extend our sympathy—A.D.M.—D.M.—T.M.) Dist. No. 6: 3BHL is still hammering at them. 3BFE, also handled a few. Dist. No. 7: 3ASP is operating spark now as he had trouble with his C.W. set. 3ZX allowed the B.C.L.s to bluff him off, and he is out of the game. 3ZAA works several daylight schedules and he is handling traffic. Dist. No. 8: 3APR, working most on daylight schedules, is handling traffic but blows tubes rapidly. 3BZ is not on the air much on account of illness in his family. He expects to move the junk

into a new shack shortly, and may resume the old "Boiled Owl" stunt. Dist. No. 9: 3HL is getting the "thing" going now and handling traffic. 3RF worked 4OI once and has been logged on the Pacific Coast. 3BIY is still hanging on with a little work. 3BDZ is a new station using 10 watts C.W. 3CU is out of commission as is 3AIR, on account of tube trouble and sickness. Dist. No. 10: 3AOV, the old rock crusher boy, has sold out all the junk and gone to Florida to let the crocodiles take a look at him. A.D.M. Wohlford has the following to say: "If you have any grouches, forget them and get in the game with the gang and fight right along, shoulder to shoulder, for your right to the air. Don't be bamboozled by a lot of guys that would not know a code station of the spark type on 600 meters, that jam them, from one of the C.W. on higher wave lengths."

WEST VIRGINIA: The news seems to be rather brief this month, no one making any particular remarks. As explained in a recent letter, our "super" spark station which was reported as closed by the R.I. last month, was able to secure permission to re-open after they had returned and re-adjusted their set. The evidence shows that our Inspector has a very lenient attitude towards real amateurs in this district, and it surely is up to us in turn to carefully observe the law, and not abuse privileges. 8ZW is working on 500 watts. He evidently, did not make any effort to figure in the game. Mr. Gantt (GX), whose expert work at 8BDA contributed much to their large showing, is leaving for Washington, D. C. 8AMD says he is getting back on the job and improving transmitter. 8AUE keeps plugging away with his 10 watts and reports a nice bunch handled. As usual, 8CHO, is out of it—sickness in the family and set being moved.

NORTH CAROLINA: Smith is wide awake at Wilmington and we should expect big things from the eastern section when 4FT comes on with that 200 watt C.W. A.D.M. Simpson states that he has not received detailed reports from the fellows, which means, of course, that he cannot report activities. (More cooperation here, fellows,—D.M.)

PORTO RICO: That "Pearl of the Antilles" is here with the report and right on time. Traffic with the U.S. resumed this month. 4OI is back on the air and has handled a few messages, acting as relay between the New England States and the Gulf States. A queer route you will say, but effective just the same. 4JE has succeeded in establishing communication with the mainland, handling a few messages with 4EL. 4KT at Carolina has been inactive the larger part of the month "THAT EMPTY SOCKET, NO DOUBT." The A.D.M. is trying hard to open a relay route to Central and South America. 4OI works stations in Iowa, Oklahoma, Minnesota, and Illinois most any night. (F.B. OM—D.M.)

This winds up the report with the exception of the box. High honors go to a spark station again.

8BDA-460—Spark
8APR-352—C.W.

ROCKY MOUNTAIN DIVISION

N. R. Hood, Mgr.

Well, well gang, did you make the 1800 for January, I guess so and then some! Colorado still leads with an average of 124 messages per station; Wyoming second with 107 messages and Utah with 58 messages per station.

9AMB's pole seems to be the only one that stood the hurricane which swept through Denver recently and he takes the "box seat" for individual traffic honors. Of late some complaints have come to this office that coast stations refuse to take traffic. (How cum?)

A new plan for distributing information through the division was originated by F. N. Mitchell, A.D.M. Wyoming. Each week there is issued from the D.M.'s office a weekly letter chuck full of the latest A.R. R.L. happenings, local and national, and the last few weeks, international. This letter is mailed weekly to each A.D.M. He reads this matter to various clubs and then has a chain of stations in the outlying sections of the state and he starts the letters on their way. As each station received the letters, he reads them and then forwards them to the next and in this way complete the circuit through the entire state. The one requisite is that you mail the letters out to the next station the same day you receive them, so they will not be too stale by the time they reach the last man. The last man forwards the letters back to the A.D.M. for filing in the A.D.M's office.

Within the next month, inter-division relay routes will be organized. The best stations we have will be the ones who will qualify for these appointments. We want a record smashing inter-division relay route so that our international machinery can function fast. This will in the end speed up delivery and the relaying of messages through the division and in the bordering divisions.

It looks like bad weather is in store for us men, so remember the "ASA" when your town gets smashed up or other emergencies present themselves. Let's make that "ASA" history for the division if the chance ever presents itself.

COLORADO:

9AMB-509 Msgs.
D. & L.Hathaway
Denver, Colo.

The following official relay stations have been appointed in Colorado since the first of the year: 9DTE, 9CAA, 9BXM, 9FV, 9CDE, 9XAQ, 9CFY, 9BUN, 9BVO.

Our traffic report would have been larger had not the stations closed down during the transatlantics. We also would have had greater traffic totals if the wind storm would have sought other regions.

9CFY reports traffic is moving through QRM for the west and northwest. 6ZZ is handling most of his traffic for southern California. Eastern traffic is moving thru many stations. 9DHI just completed his new cage antenna and is sure getting results. 9BJI has been heard in the first district seven times during a period of ten days. He uses 50 wats and has the flute like note, with liquid clarity. 9DTM reports his tower down but at that got over 200 messages through. 9CAA is a new station in DX circles. He is a 5 watter and is getting out very good. 9DTE has worked all districts, also Mexico and Canada. Due to Xmas vacations at the college the total of 9XAQ was lower than their average. 9BUN burned out his generator twice the last month. This kept him somewhat out of the game but "he came up smiling." 9BVO reports that he will handle 100 messages or bust. 9BXQ dropped a line that his aerial went the way of many during the storm but will be back soon with a 75 footer as a memorial to the one lost in the smash. 9CJY put through 15 messages with more promised in the future. 9BXM is a new station with 10 watts rectified A.C.C.W. and put through 60 messages for a starter.

WYOMING: 7ZV and his "side kick" 7ZG as second trick man once again put his station in the lime light like that wicked old spark of his to used to be. 100 watts is doing overtime work at 7ZV and he is looking for new lands to conquer. 7LU is back again after considerable rectifier trouble and he also reports bad QSO west. His 15 watt now puts 4½ T.C. amps in his aerial and his DX is to be envied. Traffic moves through in bunches. 7AFW has reached the 2nd district on 10 watts, and slipped 72 messages through to show that 10 watts can do it. Ex 7JQ is now 7AIZ with 1K.W. spark. 7DH is putting the finishing touches on his new C.W. set 7GK reports little activity in the southern part of the state. 7ZO was off greater part of January due to power wire leakage QRM and had to completely rebuild receiver to combat the noise and now has a new tuner going overtime.

UTAH: The best showing in months, maybe years, was made in the northern district for January. Traffic seems to be moving freely in all directions through Salt Lake City. 6AWH, formerly a ¼ K.W. spark set is replacing it with 10 watts of C.W. 6ZV is changing equipment also. Four 5 watters along side of each other will be doing duty. 6ZA was silent for a few days pending changes in location and license, but we expect this old timer to be up and at 'em soon. 6OT, 6ATE and 6SJ are all silent and it is not known when they may be expcted on the air again. 6RM wins the laurels for Utah this month with 179 messages to his credit. A schedule with 9CFY is in the making. Sigs from 6RM are QSA on the Atlantic Coast. 6ZT continues to push through. 6BOE and he are working in shifts. 6ZT is on to midnight and 6BOE after midnight until all is cleared. 6BGE is changing equipment. 6RE, Ogden, is on nightly with 20 watts. The big set at 6ZM is doing duty now on 375 meters. Trouble is experienced raising anyone on this wave but a new aerial will enable them to get down to 200 meters. A railroad storm route between 6ZM and 6BKE, Richfield, is established to a degree and will be perfected soon. 6BKE has the kinks out of his spark set and is moving traffic. 6APL blew the Dubilier for good and they are going to use 5 watts until signs of new equipment for a larger set show up.

VANCOUVER DIVISION
J. T. North, Mgr.

Traffic is still on the increase, and as yet there is no indication of its returning to the low totals of a few months ago. Far be it from us to boast, but we are making no secret of the glad news that we have an OW in the Division now. Mrs. 4DQ has "come out" and we welcome her most heartily.

VANCOUVER: 5CN again gets the honors in this division. 5GO is doing very good work on 10 watts, and being on regularly he handles considerable traffic. 5AC was also doing well on 10 watts until one of the "globes" blew up. 5EJ has put in a rectifier and has no trouble working any station who comes back at him. 5AK has had 5 watts going a couple of days and has junked the spark. 5EC is the only spark left and he is cussed most heartily by all hands.

VANCOUVER ISLAND: 5CT is the only station showing a decrease in traffic this month. He has been heard by 4HH in Sask. and is QSO 9BP in Prince Rupert. Reeves reports communication with Seattle very irregular as 7BK and the rest are not on the job. 5DX in Victoria is putting in C.W. as he is too close VAK for spark.

(Continued on page 49)

U. S. Sigs Heard in Iceland

Another country has been added to the list to which American amateur signals are reaching in the reception of two stations at Reykjavik, Iceland, by Mr. Snorri P. B. Arnar, who has been mentioned several times heretofore in our columns as one of our far-distant A.R.R.L. members.

On Jan. 20th at 0407 G.M.T. and again at 0414, 9DPF was heard calling CQ. As 9DPF is in Lincoln, Neb., this is quite a reach. At 0409 9BBF in New Ulm, Minn., was heard answering 9DPF. A Grebe CR-5 and one Radiotron tube were used.

Altho Mr. Arnar is a commercial operator and has long been interested in our amateur radio work, this is the first recorded reception of such signals in Iceland. We hope he will continue to listen in.

B. W. R. L.

The move for a British Wireless Relay League has now got under way. Approval of the P.M.G. has been secured, and at a meeting on Jan. 11th it was decided to circularize the British societies to obtain their co-operation in the management and control of the League. The success of the A.R.R.L. Transatlantic Tests and the enthusiasm shown in Britain, France, Switzerland, Holland, and America has given new impetus to the project. Mr. Hugh S. Pocock, Editor of the *Wireless World & Radio Review*, has been elected Hon. Secretary and the *Wireless World* adopted as the league's official organ.

This movement, as our readers will remember, is being promoted by the Manchester Wireless Society, and the question of its more elaborate organization and co-operation with other British radio activities was placed on the Agenda for discussion at the Annual Conference of Wireless Societies held in London on Jan. 24th under the auspices of the Radio Society of Great Britain. At time of going to press we have heard no particulars as to the decisions arrived at.

The objects of the society are intercommunication between members with a view to improving existing transmitting circuits; relaying of messages thru member-stations, to perfect a service of utility; strict observance of radio laws and regulations; co-operation with wireless leagues of other countries; and the advancement of the science generally. Apparently to meet the restrictions of the P.M.G., all messages relayed are to be confined to the business of the League.

Mr. Harold Green is president; Mr. Y. W. P. Evans the traffic manager; Mr. W. H. Lamb the hon. treasurer; and Mr. Pocock the hon. secretary.

British Notes

A well-posted English amateur waxes expressive in a recent issue to the editor, part of which we reprint because of its graphic portrayal of British conditions:

"Business over here is very brisk altho the broadcasting itself is rotten and of very inferior quality. Most English amateurs have gone down to 200 meters and on this wave length they are obtaining surprising results; the telephony is good and sharp. With regard to DX work, most stations appear to be able to cover this entire country with 10 watts transmission (sometimes these 10 watts are more like 50 watts) so that we are sighing for more worlds to conquer. It is quite an easy matter to transmit to and receive the French amateurs and one of our best transmitters (2AW) is regularly working with Geneva, Switzerland. Everybody is hoping that before long we shall be working with eastern American stations. We are afraid, however, that if we obtain any satisfactory results our good old Post Office will step in and forbid intercontinental communication. We wish we could get somebody like your Secretary Hoover at the head of the radio department over here.

"I do not know whether your people are going to bring in any law to forbid regenerative receivers but I will give you a tip right here: do not encourage them to do it, as altho it is all right to use a non-regenerative receiver nearby a broadcasting station, in distant localities where they are dependent on broadcasting for their sole joy they are very disgusted with the results. People over here are beginning to find out how to make a non-regenerative set regenerate by putting in illicit coils. A man, when he starts wireless, may be a fool but if he is at all interested he does not remain a fool very long. He soon finds out how it works and sets about improving matters.

Our Post Office in their simplicity think that the average Englishman is a fool. They have every reason to believe it, as they have sufficient proof for their assumption in the fact that the English people tolerate the Post Office to exist as such at all. You may be surprised to hear that the Post Office monopoly is such that it is an offense against the law for intercommunication between two houses which are next door to each other, and I believe if the whole matter were carefully gone into that it would be an offense against the Post Office to have an electric bell connected up between the dining room and the kitchen, this being means of communication between "A" and "B," which the monopoly covers!"

Australian Letter

We take great pleasure in publishing some interesting news furnished by Mr. W. Bell Taylor, of WQUA, who has been spending two months visiting amateur stations along the Australian coast.

"The situation in Australia at the present time is not unlike that of the English amateurs, that is, the requiring of a license for all receiving apparatus at a cost of two pounds a year and a transmitting license practically impossible for the average amateur to obtain. However, this country has a lot of men and women very devoted to the game and of course if the restrictions were taken off and regulations made that would encourage amateur radio, there would be many more, who cannot afford the necessary license cost at the present time.

"Mr. Hughes, the Prime Minister, has promised new regulations for the amateurs. The writer has interviewed many amateurs in every state in the country and it is their opinion that these new regulations will be in effect in the near future.

"There is much organization work going on here and the amateurs have learned that if they present their views in a united body they will accomplish a great deal more. The Wireless Institute of Australia, following the principle of the A.R.R.L. with the states as divisions, is the most noteworthy organization and has brought the amateurs into unity throughout the country. These clubs are certainly doing their bit to bring about the long desired regulations.

"As to the practical work that is being done, Mr. Charles Maclurcan of Sydney, New South Wales who is considered as Australia's foremost experimenter, must surely be congratulated for his excellent work. He maintains a regular Sunday schedule at 7:30 P.M. on 1465 meters and with 18 watts input his concerts are heard in many distant parts of Australia and with modulation all that could be desired. He has worked many times on as low as 3 watts and has covered remarkable distances. His transmitter is continually being improved upon until it has reached a high state of efficiency.

"The Australian-American Trans-Pacific tests are being arranged now with Californian amateurs and if these tests are as successful as were the Trans-Atlantics, it will be one of the greatest things in the annals of amateur radio as the distance from San Francisco to Sydney is around 6,500 miles. Many amateurs are hearing NSS consistently here and many other foreign long wave arcs in the Pacific and Europe, which speaks well of their long wave receivers.

"If conditions continue as they are now, it will not be long before the Australian amateurs will be on a par with the Yanks."

The British Radio Trade

Mr. Milton B. Sleeper, well known in this country, has recently returned from a trip to England and tells us many things of the conditions he met, from which the following is excerpted.

The radio business, broadcasting, and public interest, so popular last fall, has taken quite a slump. After holding up progress to prepare themselves to take full advantage of the "boom," they tied themselves into such knots that, even tho the revival is now taking place, radio is not getting the send-off that it had in the States. Everyone attributes the delay to the desire of the British Broadcasting Company, the organization which has arranged with the Post Office to handle all broadcasting, to avoid the "chaos" experienced in America. The idea has been drilled into the public, dealers, manufacturers, and engineers by thorough propaganda to the extent that nearly everyone discounts by 90% the reports of conditions in America as they actually are. Moreover they think that Wanamaker advertises bargain sales and cut-price goods by radio, and that the Detroit News has ruined its circulation by giving away all its news. The conception in England of affairs in our free air country is impossible to imagine, according to Mr. Sleeper.

To make things more difficult, the trust, or B.B.C., has arranged with the Post Office to limit the number of licenses for experimental receiving sets. Such a license is necessary for any set not bearing the B.B.C. mark. Consequently the small manufacturer of parts has had his market taken away, except among the 6,000 experimental license holders. A small concern must buy B.B.C. stock and deposit $225 as a guarantee of good behavior. Since most of them are running hand to mouth, they cannot raise the money. In addition to the surplus of war material still on hand, quantities of sets not conforming to the new regulations and all kinds of separate instruments are being

dumped by despairing manufacturers. Conditions are worse than existed in the States last fall.

From our point of view, the retail and distributing situation is in very bad shape. Most of those trying to operate stores have no conception of merchandising, service, or methods of popularizing radio with the public. They have tried to organize against the trust but against heavy odds and in additions are torn by dissention and lack of mutual confidence. The only thing really low in price is vacuum tubes which have been selling for $3.94, in the case of detector and amplifiers, until Mullard won the suit brought against them by Marconi and now they sell at $3.38, while Dutch and German types can be bought for $2.25 or less.

Receiving sets are made very expensive by the high tax. A license fee of $3.38 per socket must be paid to Marconi. Almost everything has a tax on it. The total royalties on a non-regenerative receiving set with a detector and two-step amplifier are $22.38, an amount nearly equal to the manufacturing cost. The attitude seems to be, "Yes, I suppose things do seem bad, but you know the English always muddle thru somehow."

The most striking thing about English equipment is the elaborate array of lacquered brass. It is fairly dazzling. Efficiency has not been made a paramount consideration, nor have they achieved adaptability, mechanical strength, or permanence of construction. The finish generally stops at the surface. English apparatus is distinguished by the free use of hard rubber, the mounting of the tubes outside the cabinets horizontal or sloping panels, and the absence of stamped or moulded parts. The interior of the sets is not open to inspection without removing the screws that hold the panel, and in the opinion of Mr. Sleeper the appearance inside is in no way equal to American equipment. The use of straight lines, real bus bar wiring and square corners is, at least for the present distinctly ours.

OPERATING DEPARTMENT

(Continued from page 46)

ALBERTA: 4DQ reports regular work with 5CT and has worked 6LV and 6BIP. 4AB is doing a little work. 4CW is using C.W. and is QRK at 4DQ on 5 watts. There isn't much life in Alberta and its not the fault of the D.S.

PRINCE RUPERT: 9BP has his C.W. going now. He handles considerable traffic with 5GO in Vancouver and has worked 6FH, 6AJF, and Canadian 4BV. This station has opened the route to the North. 5CS will be on deck with 10 watts, and with a little luck we'll have an A.R.R.L. division out here yet. We also got a little boost when 9BP sent greetings via 5GO from the Mayor of Prince Rupert to Sir Henry Thornton, President of the Canadian National Railways, who was out here for the first time.

WEST GULF DIVISION
F. M. Corlett, Mgr.

If it wasn't for the excellent cooperation and support of the assistants this division managers job sure would go to and stay put, but I couldn't quit if I wanted to with you fellows, most of you, backing me up like you do. Once in a while some of you fall down and I know you hate to have me tell the world about it through *QST*, but every member reads *QST* and that is the most logical method of letting the membership know just what their traffic department is doing, where the weak links are in the chain so that they may help strengthen them. Now this months report from our busy relay friend Louis Falconi, assistant division manager in charge of New Mexico, is missing and I'll just bet he moved a thousand or more messages himself over 5ZA. Then how many messages other stations in New Mexico moved of course we don't know, they were beyond the break in the chain. Then too, I have noticed that district 2 of Northern Texas has not been represented in our reports for some time, there is evidently a broken link in our chain down that way. Roy L. Layton, 5AEJ, of Corsicana, Texas, is the district superintendent of district No. 2. This district includes such towns as Corsicana, Waco, Temple, Cleburne, Frost, Waxahachie, Ennis, Kerens, Teague, Jacksonville, Marxhall and Nacogdoches, all having A.R.R.L. relay stations in them, surely you fellows are handling messages every day and night. Is it that you are not reporting them to your district superintendent, or are you reporting them and he is not doing his duty in representing you? Let's find these weak or broken links in our organization and strengthen them. Call a SPADE A SPADE and let's have the facts.

The star station of the division was 5SF of Fort Worth with 5OI. This of course makes him likewise the star of northern Texas too. 5IX of Dallas was next with 326. Southern Texas star station for the month is 5XV of Port Arthur with a total of 237 and 5KP of Elgin comes next with 179 to his credit. Oklahoma star station is 5XT of Oklahoma City with a total of 216 and 5AEC of Oklahoma City next with 101.

NORTHERN TEXAS: Cow Town again ran away with the first place with a grand total of 1402 messages handled by the stations in Fort Worth. 5TC has only worked two weeks and handled 190 on 5

(Continued on page 57)

Who's Who in AMATEUR WIRELESS

A. H. K. RUSSELL

A. H. Keith Russell, the genial manager of the A.R.R.L. Ontario Division and one of Canada's best-known amateurs, was born in Hamilton, Ont., in 1893. He first became interested in radio in 1908 and operated a pre-war station rejoicing in the call XRE with one of the old "Hytone" sets.

Graduating from the University of Toronto in 1915 as a Bachelor of Arts, Russell immediately joined the radio division of the Royal Naval Canadian Volunteer Reserve and served until the fall of 1917 with this unit at the transatlantic station at Newcastle, N. B., on interception work. He then joined the Royal Naval Air Service as probationary flight officer, and after flight training in France and England he got his wings and went on seaplane service flying from Taranto, Italy.

Opening up after the war it was not long before Russell had a C.W. set with the special license 9AL. He is known as one of

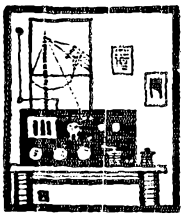
(Concluded on page 69)

JOHN L. REINARTZ

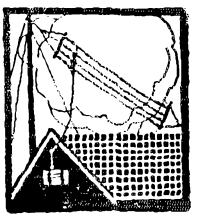
John L. Reinartz, more commonly called "Kewpie," is the noise behind the key at 1QP and known to our readers as the perpetrator of a carload of tuners and myriad variations thereof. Hardly does a reader out in the wilderness order and pay for the parts of one tuner before this man Reinartz comes out with one guaranteed to do even more wonderful work. Some have said, "Aw shucks, he designs good tuners faster than I can make them. I give up. Me for the tuning coil a while longer." Such is about the case.

Tho much of his early life is dim and obscure, we know his literary talent started early for at the age of two he ran out of his tub and was found sitting on the curbstone reading a newspaper upside down. Things happened rapidly from then on. In 1911 an aerial consisting of a piece of tin about a foot square was nailed to the chimney with the lead-in tacked to the

(Concluded on page 69)

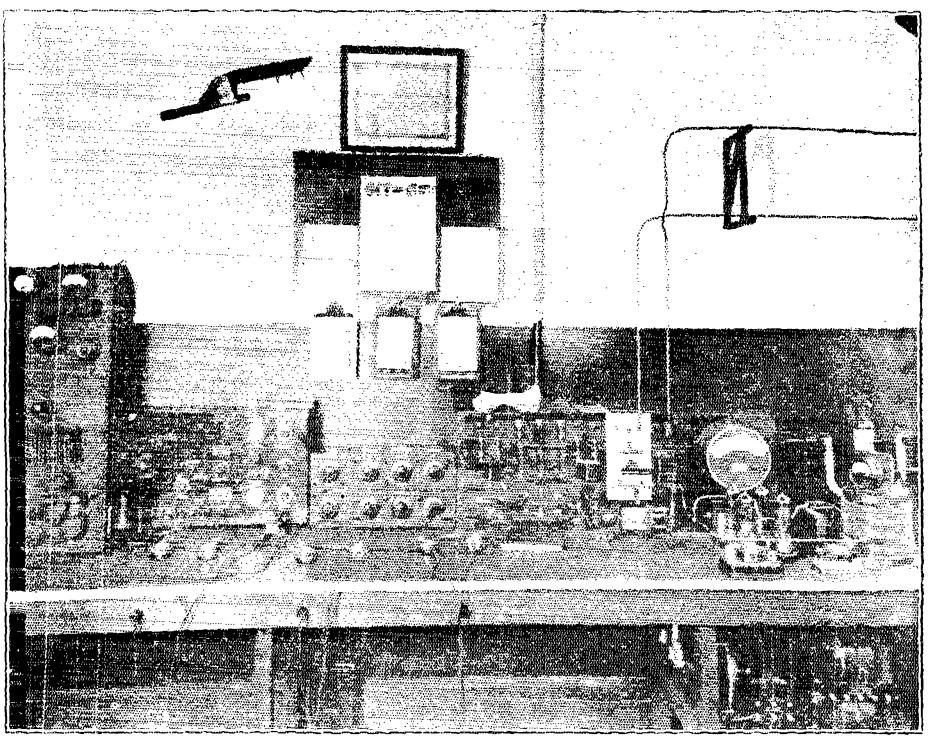


Amateur Radio Stations



1XM, Cambridge, Mass.

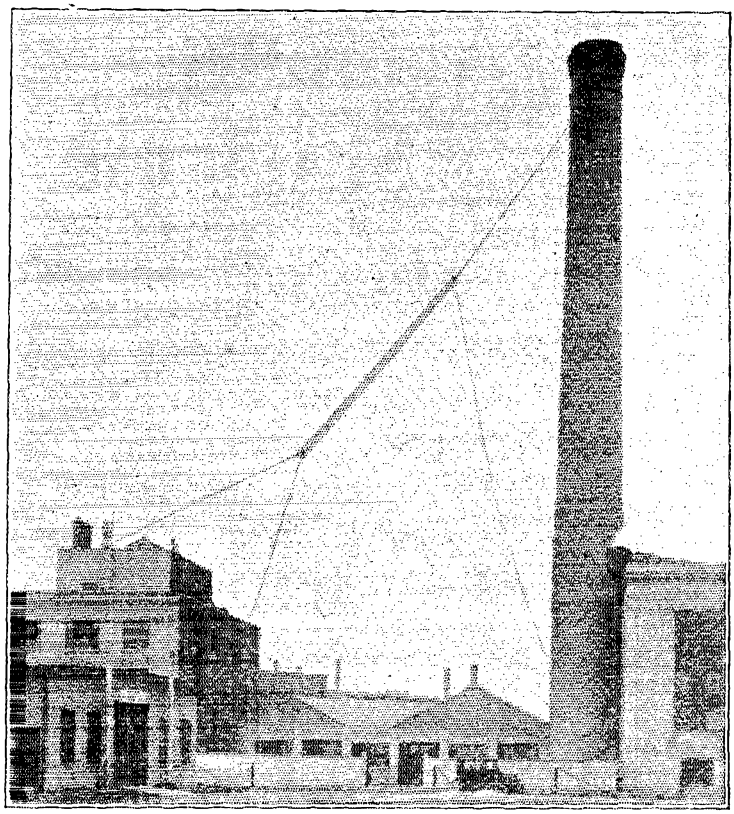
1XM, the station of the Massachusetts Institute of Technology Radio Society, Cambridge, Mass., was one of our consistent calls to get across the Atlantic, the code word being verified several times in England, France, and Switzerland. 1XM was the first eastern station to be heard in Honolulu and has been reported many times on the west coast down to Panama. As 1XM is primarily an experimental station, the new layout was arranged expressly to provide facilities for such work, and at the same time permit a set to be operated for traffic purposes.

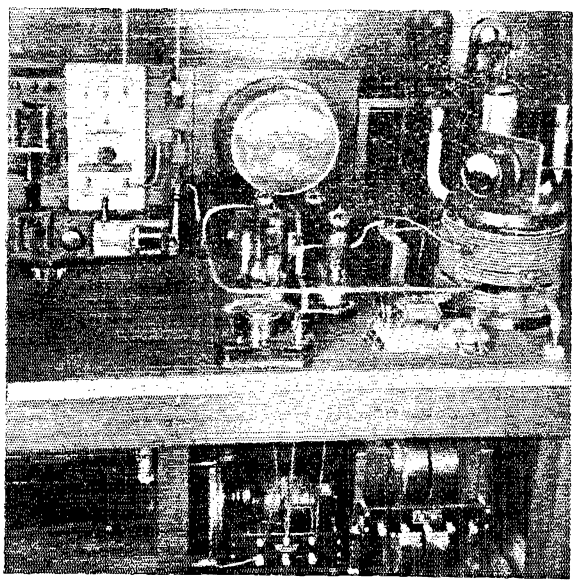


Turning to the antenna system, a good idea of its arrangement can be gained from the photo. Although the down lead looks like a single cable in the photo, it is in reality a cage of the same size as the top section. One section rises nearly vertical for 50 feet and the other extends 50 feet more at a slope of about 45 degrees. The top end is supported by the powerhouse brick stack and the other is guyed back upon the building. The counterpoise system consists of a network of wires suspended over a cement court under the aerial. The antenna system has been designed so that the ends will electrically ballance each other in order to bring the antinode of current directly in the transmitting inductance, which is in accord with best theory. The antenna current on 218 meters is 6 amperes with 100 watts.

On the left side of the operating table appears the old half K. W. quenched spark set, the type supplied to the U. S. Navy by the Wireless Specialty Apparatus Co. Next is a Signal Corps five watt radio phone which also includes a three tube receiver. The spark set graces the table for old time's sake and is not used at present. The small telephone set is used as a low power C.W. transmitter for local work, especially during such hours as interference with phone broadcasts is taboo. The plate supply from the dynamotor is filtered and is sufficiently smooth as to cause very little interference. A wouff-hong is kept handy for emergencies.

The regular receiving equipment and control switches appear in the center of the photo. The receiver is continually being changed, depending upon the type loaned or tested at the time. The control panel is so designed as to furnish the operator with direct control of all parts of the equipment. Controls are provided for tipping the mercury arc rectifier for starting the arc, for starting the 500 cycle generator located in the adjacent room, as well as controlling the power input to the tube set. The mercury arc rectifier is automatically cut out when 500 cycles is used for plate supply.





Cuts of aerial, interior, and circuit diagram loaned by *The Tech Engineering News.*

This brings us to the C.W. transmitter which is shown on the right of the station, or in more detail in another photo. The thing that is impressive is the fact that everything is where it can be plainly seen and easily gotten at, as well as the heavy wiring for high frequency circuits. The filament and plate transformers, rheostat, filter condenser and chokes are directly beneath where leads are brought up thru the table to the tubes,

(Concluded on page 69)

With the Affiliated Clubs

Radio Club of Hartford

Members of the R. C. H. were given a treat on January 24th, when the club put on a "mock trial" in which a broadcast listener prosecuted a radio amateur. The picture speaks for itself. "Judge" Freeman fined the amateur $10,000.00 and sentenced him to 20 years at hard labor for causing such interference as static, squealing, whistling, clatter, Naval stations, commercial station, arc lights, and what not. The bro. BCL was forced to pay the judge and jury for letting him off so easy and was further penalized by being forced to buy all equipment from the Rattling Radio Co. in the future.

From left to right in the photo are C. D. Tuska, O. Bates, R. S. Miner, L. W. Ripley, F. H. Schnell, Harrison B. Freeman, C. A. Service, E. C. Adams, J. Furey, Boyd Phelps (Beep), Hiram Percy Maxim, and K. B. Warner. The group on the left excepting FHS represents the BCL, his witnesses and attorney; H. B. Freeman, judge; C. A. Service, clerk of court; E. C. Adams, sheriff; J. Furey, dago foreman of the jury; the remaining three and FHS being the amateur crew. The implements (?) on the table were used as evidence in connection with the trial. A true setting of the court room was arranged in the Bond Hotel. A very large crowd attended the hearing and during the course of examinations and cross examinations many ridiculous things were said which brought roars of laughter from the audience. One may see from the expressions on the faces that no love existed between the two factions. Space does not permit a detailed account of what went on, but detailed information is available at A.R.R.L. Headquarters for clubs wishing to put on the "mock trial."

Radio Club of Hudson County

New officers for the year are: P. V. Zeyn, pres.; G. U. Smith, vice pres.; W. Arp, treas.; P. Rank, secy. A 1 K.W. spark set will be installed with a good receiver. Splendid programs have been arranged for coming meetings to which all are invited. All correspondence should be sent to I. M. Argush, asst. secy., 59 Eldorado Place, Weehauken, N. J.

Atlanta Radio Club

A special reorganization meeting was held January 3rd and the following officers were elected: W. E. Dobbins, pres.; H. L. Reid, vice pres.; F. F. Merriam, secy.; H. A. Cole, treas. Because of the friction between BCL's and the A.R.R.L., a committee was appointed to redraft the constitution so that the club, in the future, will be made up of members interested in experimental and relay work. The club meets twice a month at the Chamber of Commerce Building.

The Columbus Radio Club

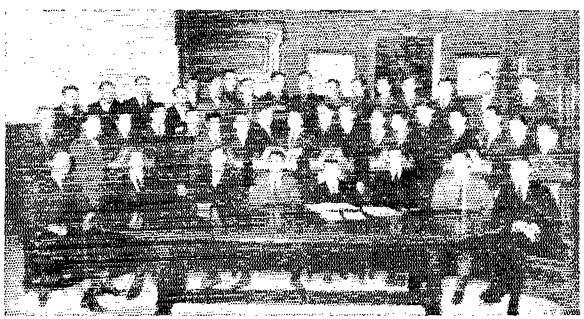
The C. R. C. has now established permanent quarters in the Columbia Hotel. The club has one room on the ground floor which is open at all times, and has the use of a large parlor on the second floor.

With Fred W. Redding as President and Fred S. Harmer as Secretary the club is progressing splendidly and very active is shown by the members.

The club members are being treated with talks by such men as Paul F. Godley, Major Armstrong, Captain H. W. Webb, of Ohio State University, F. O. Everty of the Ohio Inspection Bureau, Col. R. L. Krumm of Erner & Hopkins Co., Prof. R. A. Brown, Ohio State University, and O. E. Marvel of the Dayton Fan & Motor Co.

Milwaukee Amateurs' Radio Club

The M. A. R. C's. first meeting of the new year was devoted to reports of the results of the 1922 trans-Atlantic tests of the A.R.R.L. The signals of one member, Marian Szukalski, Jr., 9AAP, were reported heard in Manchester, England. Attorney L. J. Topolinski, the club's recently appointed general counsel, reported the progress of the case of "McWilliams vs. Bergman" in which an Illinois radio amateur is being sued on grounds of interference by a broadcast listener.



R. E. Lathrop, 9ATX, of the technical committee read a paper entitled, "Elimination of Distortion in Receptors," at a recent meeting, and at a later one gave an informal talk on the topic of electric wave traps. Under the leadership of E. T. Howell, Sc.M., technical committee chairman, several discussions have been had in which much light was thrown on the subject of filters for C.W. transmitters. Axel G. Berg, Chicago sales representative of the Radio Corporation, addressed the society on the attitude of large radio corporations towards amateurs.

At the suggestion of the committee on relays and interference, the club will again enforce the ruling of no testing after 7:00 P.M.

The Fourth Annual N.E. Convention

The Fourth Annual New England A.R.R.L. Banquet will be held at Walker Memorial Building, Massachusetts Institute of Technology, Saturday, March, 31st. It is planned to call the traffic men's meeting and a meeting of club representatives and A.R.R.L. officials in the afternoon at three o'clock. At that time the election of officers for the New England Council will take place, as well as a discussion of all matters regarding amateur radio in New England.

In the evening, in the same building the Fourth Annual Banquet will be held, followed by the usual program of comic movies, specialties, stunts and speakers. The following speakers will be present: E. H. Armstrong, H. P. Maxim, Charles C. Kolster, F. H. Schnell, and K. B. Warner. This is run under the auspices of the M.I.T. Radio Society and they want every New England amateur at this convention.

Third Radio District Convention

The coming Third Radio District Convention to be held in Baltimore April 13-14 means lots to the fans who are nightly punching the air with their friendly communications. The "G.E.O.M." and the "C U L" "With best 73's," only express lightly the bond of friendship, the very heartbest of Brotherly feelings, that has always been a most important fact of this wonderful game. The American Radio Relay League has made many things possible and through and by this wonderful organization we are now known, and recognized the world over, and looked upon by our own Governments as a very useful servant in time of need. We have been most successful in our tests and relay work, and have domonstrated to all that we are not only capable of handling traffic, but that we can also construct and maintain complete radio equipment.

Now fellow fans you have all worked and worked hard, now the time is coming for a little play. A time when you can ease up a little and talk in person to the ones you work so often on the air. This convention is your convention. It is your recreation, your holiday; come and enjoy it—be one of the merry crowd, and let the fellows know *you* are here.

You are promised a wonderful time, namely; good exhibits, excellent program, banquet, and a chance to see and hear your own A.R.R.L. officers. Now is the time to talk convention and keep it up and by your efforts we will all greatly benefit.

The Junior Operator

(A department formerly known as "With Our Radio Phone Listeners.")

Tube Sets with Spark-Coil Plate Supply

THE spark coil I.C.W. set or spark-tube set is nothing but a low power tube sending set with plate power supplied by an ordinary spark coil. Such sets, first described in our pages by Herbert Wadsworth of 3JJ (October 1921, p. 32), are rapidly crowding out the ordinary spark coil sets. The beautifully sharp wave of the spark-tube combination makes almost no local interference and has a much greater range than the spark coil alone.

One of our best spark-tube stations, 9DDY, has worked 160 miles in broad daylight and has repeatedly worked 400 and 500 miles at night. This is with a one inch coil, a 5-watt tube, and an antenna current of half an ampere. 3BGS, at Bristow, Va., works a daily schedule across 45 miles of mountainous country with another station which receives him strongly enough to use a loud speaker. He also has worked over 500 miles. The best distance reported so far is that of 8AER who has worked 5XAC in daylight and has been heard at 1100 miles at night. These distances were once considered good for one kilowatt sparks.

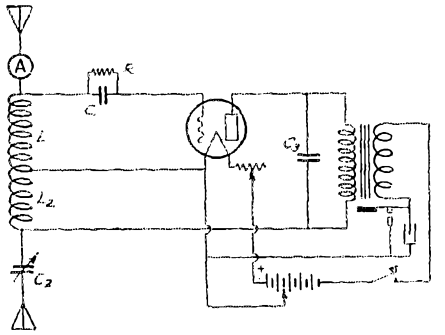


Figure 1.—The Circuits at 3JJ and 3BGS

L1 & L2—Quaker Oats box with 25 turns of bell wire, 9 above the filament tap and 16 below.
C1—Faradon U.C.1014 mica condenser, capacity .002 microfarads.
C2—Variable condenser, capacity .0005 microfarads.
C3—Any sending condenser.
R—Radio Corporation 5000-ohm grid-leak.
A—Hot wire or thermo-couple ammeter—0 to 1.5 amperes.

For a set using a receiving tube, a half inch spark coil or an automobile coil will answer. For a 5-watt tube a one inch coil is better and for a 50-watt tube the proper thing is something like the Amrad spark

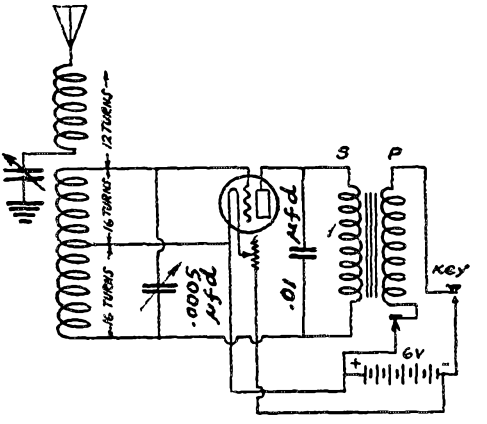


Figure 2.—The circuit at 2BCF

All coils wound with annunciator (bell) wire on a 4 inch pasteboard tube. Leave from ½ inch to two inches between antenna coil and the plate-grid coil.

coil or the old Duck "half kilowatt" spark coil. Spark coil secondaries are wound with a great many turns of very fine wire which give a high voltage but do not deliver enough current to operate a power tube properly. This may be partly corrected by connecting a condenser across the secondary. This is the condenser marked C_3 in Figs. 1, 3 and 4. It must be large enough to keep sparks from jumping inside the tube and not so large that the voltage gets too low to operate the tube. At 3JJ, a .01 microfarad condenser is used, at 2CEI there is a glass condenser with 38 plates of glass 5 x 7 inches with tinfoil 4½ x 6½ inches, and at 3ABI a pair of Murdock moulded sections serve the purpose.

A better way of lowering the plate voltage is to dig out the wax around the coil secondaries (a lukewarm soldering copper helps) and re-connect the secondaries in parallel instead of series. This is possible only if the secondaries are alike.

The best plan of all is to remove the secondary entirely and re-wind the coil with wire 6 or 8 sizes larger. Robert Kraus of 2CEI finds that for a Ford spark coil the best secondary is one having 5000 turns of number 32 A.W.G. (B&S) double-cotton-covered wire. When the secondary is re-wound in this fashion no shunt condenser is needed in Fig. 4 and even for the other circuits it can be reduced to .001 microfarad. Three sheets of 4 x 5 tinfoil between 5 x 7-inch glass sheets ⅛ inch thick is more than enough.

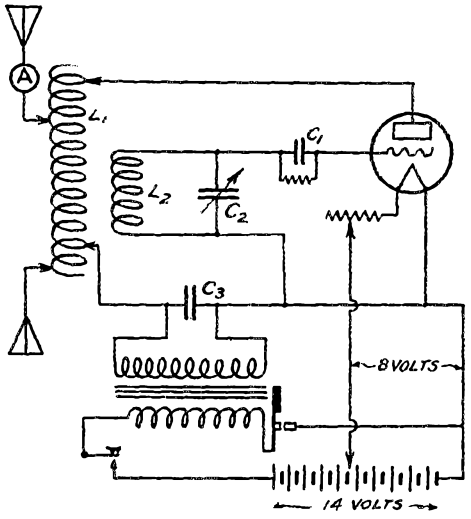


Figure 3.—The Circuit at 8AER

L1—25 turns bare No. 10 wire on a 5-½ inch tube.
L2—20 turns No. 18 S.C.C. copper wire on a 3 inch tube.
C1—Mica condenser of .00025 to .0005 microfarads capacity.
C2—Variable condenser, .0005 microfarads.
C3—Glass or other sending condenser.

With a half inch spark coil a hard receiving tube may be used; either the Cunningham C.301 or the Radiocorp U.V.201 is suitable. For larger coils the 5-watt C.302 or U.V.202 may be used but less filament power is consumed by the Western Electric "E" or VT-1 tube. No 50-watt tube with proper plate insulation for spark-tube work is available just now but the C.303 or U.V.203 can be made to do.

Various circuits have been described in our pages in a paper called "A Spark Coil C.W. set," by Samuel Kopelson of 2BCF (May 1922—p. 66), and in "A Spark Coil C.W. Transmitter," by F. J. L. Duffy (March 1922—p. 28). In *The Modulator* for January 1923 there appeared on page 17 a concise paper by M. Joffe describing his spark-tube set at 2BYO. These various circuits are given herewith; for details the reader is referred to the original papers or to the station owners, whose addresses are in the call book. The simplest and cheapest circuit of all is that of Figure 1, originally described by Wadsworth of 3JJ whose paper in our October 1921 issue was referred to at the first of this article. The beginner is advised to start with it

It is much easier to adjust the set if one has a small antenna ammeter with a one ampere scale; a larger one is not much good. A small tungsten filament flashlight bulb in the antenna lead can be used but is not a very good substitute.

Because the circuit shown in Fig. 1 is the simplest we will start with it. Begin by putting the grid and plate clips at the very ends of the helix and setting the variable condenser C_2 at its largest value. Then light the filament, hold down the key, and adjust the vibrator of the coil. A smooth tone is the best, no matter what the pitch is. One may as well stop right here and work with the coil till such a tone is gotten. At 3JJ the vibrator was loaded with solder until the tone was exactly that of a "sink" spark gap at its best. This had much more "punch" than the high mushy tones. There is no objection to a good high tone but few coils will give it and still fewer will put any "pep" into such a tone.

If no antenna current appears, try moving the plate clip up six or eight turns, jumping two turns at a time. After that put the plate clip back and try moving the grid clip down two turns at a time. Finally try adjusting the condenser C_2. If none of these things start the tube to oscillating try reversing the secondary leads of the spark coil and go thru all the adjustments again. Finally try shorting the grid condenser and leak and repeat the entire performance once more. If the tube still does not go to work the filament is too dim, the coil not powerful enough, a connection is wrong or the antenna is no good. Go over all of these things and pay especial attention to the notes on antennas.

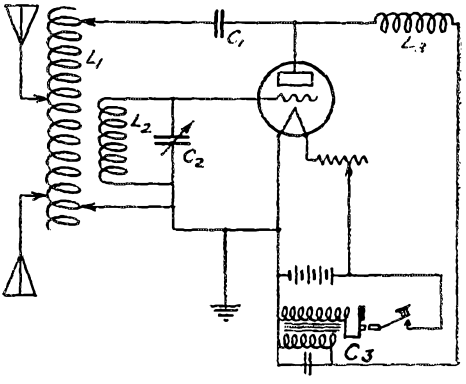


Figure 4.—The Circuit at 2CEI

L1—25 turns edgewise strip 7 inch diameter.
L2—15 turns No. 18 D.C.C. wire.
L3—250 turn honeycomb coil.
Note—Do not use bell wire, as the wax prevents it from working properly.

When an antenna current is finally obtained it will very likely be on some "off" wave—270 or 109 meters. If no wave meter is handy the receiving set may be used to check the wave.

Light the tubes of the receiving set and move the plate variometer or the tickler over until the receiving tube oscillates. Now with the antenna switched to the sending set light the sending tube and hold down the key. Then tune in the signal on the receiving set. One should be able to tell from the position of the dials whether the wave is about the same as that of other stations. This does not work with a single-circuit tuner. The wave can be reduced by reducing the setting of the condenser C_2, at the same time moving the plate and grid clips to get the best antenna current. During this performance the antenna current will probably fall off, but this does not matter as the lower wave will "get out" better.

The adjustments of the circuit shown in Figures 3 and 4, the wavelength is fixed by the position of the antenna and counterpoise clips and the condenser C_2 must be very carefully adjusted to get good antenna current. To change wave move the clip and swing the condenser.

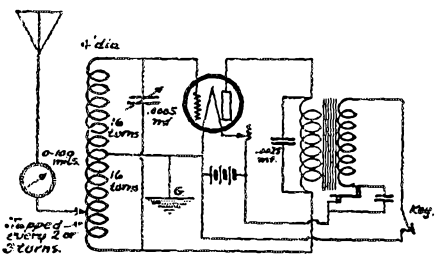


Fig. 5
The Circuit at 2BYO

Because the power is low the antenna must be as good as it can possibly be made. The insulation should be the best, the lead-ins made in the form of a four or six inch cage, the top either of cage or flat top form and the greatest care taken with the joints, of which there should be as few as possible—there is no call for *any* joints in an L-type antenna run all wires clear down to the switch. If a counterpoise is used it must be made as carefully as the antenna; if a ground connection is used make it with the greatest care. With a properly made antenna system and a 5-watt spark-tube set the antenna current will be between .3 of an ampere and 1.5 amperes.

For very short distances, a half mile at the outside, the spark-tube set can be used as a radiofone by screwing down the vibrator tight and putting a microphone transmitter in the series with the coil primary. Not very much power can be used as the microphone will "fry" on half an ampere. This limits the stunt to sets using receiving tubes or Western Electric 5-watt tubes.

Spark tube set can work down to 50 meters without any trouble. Attention is especially invited to the work of 3RP described in the article "Exploring 100 Meters," which appears in this issue.

OPERATING DEPARTMENT

(Continued from page 46)

watts. The general radio situation in Fort Worth is fine, there being very few complaints from broadcast listeners and usually these few are remedied by the Fort Worth Radio Club. 5EL is doing good work and is getting out fine. 5UN is back on the job and is doing good on his 300 watts. 5ZADA has changed to 15 watts and is doing some fine work. 5CY has just installed a 20 watt C.W. set. 5OK comes in this month with a report. (Thanks OM.) 5UO was reported QSA 2700 miles southwest of Panama, also on the Hawaiian Islands on 15 watt (F.B.) 5IX handles 386 messages this month. He has junked his transformer and is using a generator on the plates. He has received 11 reports from stations over 1500 miles. 5KK has started up on 5 watts A.C. C.W. and has done very good work during the 15 days that he has been working. His best DX so far is slightly over 500 miles. 5JL has turned in no message report but has been working steadily and has been receiving reports from both coasts and Canada. (F.B.) 5VA, City Manager for Dallas, has burned out his fifth antenna ammeter. He has managed to handle 55 messages and is getting his forces organized to beat Fort Worth stations in handling message traffic. 5ZH has had his 50 watt bottle going several times and as many times has had troubles with defective insulation on transformers, but says he will make a 50 watt tube harness with another and percolate or bust, that Sherman might have known something about war but if he had tried to make two 50 watters work, his opinion of War would no doubt be changed.

The transmitters of Dublin, Texas, have had trouble with the broadcast listeners the past month. They want them to QRK from 6 to 12 P.M. even on C.W., when their 25c sets won't even tune a C.W. using motor generator with a good filter system, whatenell next.

SOUTHERN TEXAS: No cold weather has yet reached us in these parts, and although C.W. is cutting through in fine style, one would really enjoy sitting-in some few nites this season when static is entirely absent as it has been for many weeks at a time during past winter seasons. The El Paso district fails to come up to expectation this month, and District

Strays

Transatlantic Flash!

In collecting dope on transatlantic stations, while pawing thru the government call book we find that 8ML and 8SP are listed as using over a million watts and that 8XE uses a wave of 200,375 meters. No wonder!

In the transatlantics probably fewer tubes got over east than the much larger number that "went west." Due to the strain many power tubes have gone dead since the tests (See Operating Dept.) It has been suggested that when your transmitting tubes blow, you should send the signal "QGD" so as not to keep the other fellow waiting.

1QP has had a couple 50-watt Radiotrons go bad in operation by the puncturing of the glass seal by the plate voltage. The rupture takes place under the band which surrounds the seal-stem for the purpose of supporting the plate. The potential punctures the glass and jumps to the grid wire. Now 1QP safeguards his 50's by the following process: A knife-blade is run around the bottom of the base until the porcelain is loosened; the terminals are unsoldered from the contacts, and the base removed. Heavy glass tubing (1QP uses gauge-glass, ⅛" center hole, ⅛" wall) is then slipped over each of the four electrode leads, and the base restored. Try this if your tubes have punctured in the seal.

Concerning the Englebretson S/R article, there seems to be an awful lot of worry about some of the details. Let's explain. The condenser C_1 in the diagram at the bottom of page 36 is supposed to be a variable. It is connected to the switch half way up the left side of the panel shown on page 37 and that switch throws the condenser in series or parallel with L_1. In the same diagram C_3 is shown as a variable condenser. That too is a mistake and as shown in the table on the opposite page, C_3 is a series of small fixed condensers.

2KG comes along with the bright suggestion on a high antenna having minimum insulator leakage, absorption, hysteresis losses, etc. His method is to use a hollow wire filled with hydrogen gas and the bottom end merely tied to the radio shack.

The daylight transcon reports continue to straggle in but are still so fragmentary that there will be no further report. Next time we will have to make everyone swear to report.

The January 2d issue of the *Radio Service Bulletin* contains a warning to broadcasting operators that operators indulging in point-to-point communication may have their license suspended or revoked and that the station licenses of such stations are liable to the same penalty. Broadcasting licenses do not permit point-to-point operation and operators are cautioned not to comunicate with other stations. The transmission of acknowledgments to individuals relating to the receipt of letters, telegrams, etc., is direct communication and not authorized. This means the exit of broadcast station "clubs" which have held nightly "initiations" on the air to the accompaniment of much jangling hardware. Even the B.C.L.'s will be relieved to hear of this.

The mayor of San Francisco recently dedicated a broadcasting station in his city and in his talk invited everybody who heard him to send him collect telegrams telling how far his voice was carrying. By midnight of that evening at least one telegram had come from every state and by daylight it was estimated that the mayor had incurred a toll bill of $3,000, with the possibility that the figure might be doubled.

This sounds funny to you, gentle reader, but just imagine how funny it must have seemed to the mayor.

Even President Harding gets radio QRM. The New York Tribune reports that the President recently sought melody over his receiving set but all he could get was two concerts on the same wave, so he finally gave up in disgust.

Last Call for the Antenna Number

In spite of the delay there is going to be an antenna number of *QST*. It has taken time to get the material together but we think we are going to have something worth while now. Therefore, if anyone amongst us has any thoughts that belong in the antenna number, send them in now or at least make a reservation for them.

Read 'Em and Weep

From the large volume of reports received for this department each month it appears that a station is one of the very best when on 5 watts it can work 1500 miles and be heard at times across the continent (Examples: 8CK, 4JK, 1BOE, 6ACB. 9AHC has heard the following five watters: 2AFP, 4LP 5PF, 5XV, 6AQW, 6BJC, 6BQD, 6BQZ, 6GD, 6GX, 6SG, 6VM, 7HS, 7MF, 8BMK, 8CBX, 6ZTQ, 7AFW, and probably more. On ten watts the following have been heard by 9AHC: 1AOK, 1AXD, 1BWJ, 3BNU, 3BDA, 3SM, 4DC, 4EB, 5SF, 6ABX, 6AUU, 6BF, 6BQC, 6EB, 6KU, 6NX, 8AGO, 8ALF, 8BUC, 8KH.

A 50 or 100 watt station should be heard across the continent often to be classed as one of our best, or if nearer the central part of the country should work all districts and be heard in Europe or Hawaii occasionally, depending on how much the station is on the air. Stations with 250 watt tubes should handle transcontinental traffic on very good nights and freak distances of several thousand miles in excess over water should happen now and then. About a tenth of one per cent of the licensed amateur stations in this country would be included in any of the above classifications.

1MY on three 5 watters heard 1160 miles west of San Francisco.

4EH used the same power when he was heard 3,675 miles west of S.F.

Probably the greatest distance a Canadian has heard a Canadian was when 9BP heard 3GK. Their logs check.

4EB has been several times logged by 6ZY in Honolulu. 4EB uses two 5 watters and puts 2.1 amperes into the antenna.

6KA, 6EN, 6JD, 6BES, 6AVD, 6XAD, 6ZZ, 6AWT, 6CF, 6BKE, 6EA, 6AOU, 6BRB, 6BCR, 6ABX, 6AAT, 6CU, 6BQG, 6KU, 6AMT, 7ZO, 7ZU, 7SC, 7ZV, 7ZK, 7ABB, 7AFW, 7BJ, 7LU, and others, are heard quite regularly in states bordering the Atlantic.

SOS to Meter Makers

We urgently need a voltmeter that will work on either A.C. or D.C. voltages between 1,000 and 10,000. It need not have laboratory accuracy but it must be economical of current. A meter to measure the voltage on a fifty watt tube now days consumes as much power as the tube and perhaps drags down the voltage. Some time ago we saw a tiny electrostatic meter made by Everett Edgecumb of London made for an aircraft radio set. It fitted the requirements exactly and in addition was very small, dead simple, and very rugged. The moving part was a single aluminum leaf shaped like the moving plate of a decremeter-type variable condenser and stiffened by pressed-in ribs. The area of this leaf was not over 1½ square centimeters. Such a meter takes no current at all and ought to be inexpensive. Could it be produced in America for $7.00 or so?

"If you see the prefix *micro-* tacked on to any electrical term you know at once that it means 'millionth of.'" So says an American text book, but our microphone simply won't believe it.—*Thermion* in the British *Amateur Wireless*.

7ZU and 6ZO made a good amateur speed record in handling 29 messages in 33 minutes.

If 9ZN goes much lower in his short wave tests he will begin to run into negative or minus wave lengths.

No Known R medy

A doctor asked the *Chicago Tribune* something like the following: "I have a terrible new malady which is bothering me. The name of this new affiliction to mankind is Radiocitis. Caused from wearing radio head receivers for several weeks. Symptoms: Ears flattened against head with upper tips turned out. Patient very grouchy and sour. Talks very loudly and says, 'Static, static,' whenever anyone speaks to him. Pays no attention to wife, family, or friends, and even refuses to eat at times. Sits up at all hours of the night muttering to himself and feverishly turns numerous dials and dodads. Is far worse than a golf nut when he meets a fellow sufferer—talks loudly and waves his arms—paying no attention to the other bug who does likewise. Would appreciate suggestions for treatment—even if relief is only temporary.

(Signed) Doc. W."

What causes the wave of a C.W. set to swing? Why do some never swing? No one seems to know. Please list the steady stations you hear and let us have them. Please note we are not talking about *fading*. Never mind the fellows that do not fade—that is due to plenty of power and a good location—what we want is the dope on stations whose wave never shifts.

Some days we have gotten as many as five punk poems in one mail. *QST's* absorption factor for this wasted energy has been less than one-half of one per cent. Here is a typical one, selected merely because it portrays "how they get that way."

The Boiled Owl's Lament

Sleepless, heatless, eatless am I,
Shooting my traffic all over the sky,
Ring-eyed, weary, witless as well,
Slowly, slowly going to ******,
Calling and signing and working them all,
Till I'm exhausted and ready to fall,
Chills, colds and fever all rack my poor dome,
The college infirmary now is my home.

—*3XM"J"*

Calls Heard

HEARD DURING JANUARY
Unless Otherwise Specified

F. H. Stephens, Chichagoff, Alaska (60 mi. N. Sitka)

C.W.: Can. 4HH, 5AD, 5BQ 5CN, 5CT, 5EJ, Can., 5QY, 5ZAK, 5ZAV, 6ABX, 6AGP, 6ALU, 6ALV, 6AMK, 6AVN, 6BIC, 6BJQ, 6BJY, 6BNH, 6BQC, 6BSJ, 6BUN, 6BVW, 6CC, 6EB, 6FH, 6KA, 6NY, 6OH, 6TI, 6XAD, 6XAF, 6XAX, 6XK, 6XWI, 6ZAC, 6ZH, 6ZT, 6ZN, 6ZO, 6ZW, 6ZX, 6ZZ, 7ABB, 7ADM, 7BA, 7CE, 7EY, 7GE, 7JF, 7MF, 7NA, 7NF, 7NG, 7NN, 7NY, 7OM, 7PF, 7QT, 7SC, 7TQ, 7VF, 7ZU, 9AFD, 9AMT, 9ANQ, 9ANS, 9AOU, 9APW, 9AWM, 9BAK, 9BAP, 9BJI, 9BJV, 9BP, 9BP, Canadian, 9BX, 9BX, Can., 9CLS, 9CNS, 9CXN, 9DGV, 9DKY, 9DKQ, 9DPF, 9DRV, 9DTM, 9EBT, 9GK, 9OX, 9UH, 9VE, 9YU, 9YW.

Spark: Can. 3EC, 6AMK, 6ARK, 7NN, 7YA, 7YG, 9YAK. Above heard on 12 nights, one hour per night.

Carl G. Brown, P.O. Box 133, Ancon, Canal Zone.

8CJH, 8CVE, 9EJ, 9EP, 9AMT, 9AZH, 9CCM. 300 C.W.: 1AJP, 1AYZ, 1BEJ, 1BER. 1BES, 1CKP, 1FD, 2CCD, 2CIM, 2HK, 2NZ, 2KF, 2RM, 2ZL, 3ADT, 3AFD, 3AJJ, 3ARO, 2BEC, 3BEF, 3BFU, 3BGT, 3BIJ, 3BJ, 3BSS, 3BUC, 3BVA, 3BVC, 3BY, 3CQZ, 3HT, 3MO, 3MT, 3RF, 3TJ, 3XM, 4BX, 4BY, 4EL, 4JZ, 4ZC, 5AA, 5ADE, 5AEC, 5CY, 5EK, 5GR, 5IX, 5JT, 5MB, 5ML, 5NN, 5NZ, 5PV, 5PX, 5QI, 5SF, 5SS, 5UJ, 5UK, 5VO, 5XV, 5XAD, 5ZA, 5ZAF, 5ZB, 8AAF,8ADZ, 8AFD, 8AJK, 8ALT, 8BEO, 8BFQ, 8BK, 8BKE, 8BPL, 8BRG, 8BYO, 8CRB, 8CVE, 8DV, 8ER, 8FY, 8KG, 8SM, 8YD, 8YV, 8ZW, 9AFK, 9AFN, 9AJS, 9APS, 9BAK, 9BDD 9BKK, 9BRK, 9BZI, 9CBA, 9CCM, 9CCV, 9CTV, 9CWR, 9DCR, 9DJ, 9DWK, 9ECE, 9LZ, 9VM, 9XAC, 9YB.

Heard at Sea from N.Y. to Holland and Return (One tube)

100 milees east of New York:(All C.W.) 4HZ 5HK, 5ZAV, 8ACF, 8ADZ, 8ANB, 8AWZ, 8BWZ, 8CHJ, 8CVE, 9EJ, 9EP, 9AMT, 9AZH, 9CCM. 300 miles east of New York: (All C.W.) 8ZW, 8ZZ, 8ADN, 8AQO, 8BKZ. 500 miles east of New Yrk:All 8VQ, 8ADG, 8ANB, 8ASK, 8CKO, 8DAK, 9BAK, C.W.) 1JT, 1SD, 1BOP, 1BXH. 1CNK, 3BLF, 4LJ, 8VQ, 8ADG, 8ANB, 8ASK, 8CKO, 8DAK, 9BAK, 700 miles East of N. Y.:(All C.W.) 8IQ, 8QK, 8VQ, 8AZF, 8BDV, 9QK, 9ZN, 9APS, 9ASF, 9BNA, 9CXP, 9DPL. 900 miles East of N. Y.: C.W.: 1CY, 1EE, 1LL, 1TS, 1AWW, 1BHR, 1BKQ, 1BSZ, 1CAC, 1CDO, 2HJ, 2OF, 2BIR, 2CDG, 2CFB, 2CKR, 2CNK, 3WZ, 8CKO, 8CMI, 9HK, 9IY, 9KP, 9AAD, 9AAP, 9AAV, 1CDO, 2HJ, 2OF, 2BIR, 2CDG, 2CKR, 2CNK, 3WZ, 3AFB, 3BEC, 3BIJ, 3BIT, 3CDG, 3CDM, 4BY 4IZ, British 5WS, 5ABY, 5ZAG, 6ZZ, 7ZU 8FQ, 8SB, 8UK, 8ABM, 8AMZ, 8ARD, 8AWP, 8AXT, 8BEF, 8BGT, 8CDD, 8CGU, 8CGX, 8CUR, 9FM, 9PS, 9VK, 9ZN, 9ZT, 9AIX, 9AJH, 9AWS, 9DXM. Spark: 1FM, 1CNI, 2AIM, 9AAW. Canadian 2BG. 1100 miles East of N. Y.: C.W.1AW. 1IT, 1OR, 1RD, 1SN, 1SN, 1AFZ, 1AJP, 1ALZ, 1AOL, 1BCF, 1BFE, 1BSZ, 1BVD. 1CDR, 1CKP, 1CRU, 1CTR, 2GK, 2SQ, 2ARS, 2AWS, 2AXK, 2BZQ, 2CDK, 3OT, 8ABW, 3BEC, 3BNU, 5BE, French 8AB, 8NB, 8PD, 8ZZ, 8AAF, 8AIW, 8ALF, 8AQF, 8ATA, 8ATU, 8BCH, 8BEF, 8BLC, 8BTU, 8BXH, 8CDZ, 8CFP, 8AIX, 9AJH, 9AJH, 9AOT, 9APW, 9AXU, 9BZI, 9DSG, 9YAJ. Spark: 1FM, 1RV, 1AKG, 1BCF, 1CNI, 8AEO, 9VZ, 9AAW, 9AHQ. Canadian 2BG. Phone 8AWP. British station sending msg.: "Great Britain sends Xmas Greeting, etc., British 2SH? 1400 miles East of N. Y.: (All C.W.) 1EE, 1RD, 1ZE, 1AJH, 1AJP, 1AOK, 1ASF, 1BAS, 1BRQ, 1ZE, 1AIH, 1AJP, 1ACK, 1ASF, 1BAS, 1BRQ, 8PJ, 8SB, 8AQF, 8CGU, 8CJJ, 8COO, 9CR, 9RC, 9ZY 9AAF, 9AAP, 9APS, 9AXU, 9BIK, 9BSG, 9BZI, 9CBA, 9DCB, 9DKY, 9DXM, 9DXU, "FZ". Canadian 9BA. British station using test code word "MUPZN". 1600 miles East f N.Y., QRN had. (All C.W.) 1EE, 1OR, 1BAS, 1BDT, 1BES, 8CML British 2SH, 5WS. 1800 miles East of N.Y. (All C.W.) 1EE, 1FB, 1II, 1OR, 1RD, 1SN, 1AJP, 1BAS, 1BJN, 1BKA, 1CDO, 1CGO, 1CMP, 2KF, 2AWH, 2AWL, 2AYV, 3BJ, 3IW, 3PZ, 3VW, 3YO, 8ARO, 3BFU, 8BNU, 4EA 5KC, 5NK, 5UJ, British 5WS, 5ABY, 5ZAG, 8PD, 8VQ, 8ZW, 8ALF, 8AQF, 8ASV, 8BCH, 8BXH, 8CEI, 8CKN, 8CMI, 8COO, 9II, 9CBA, Canadian 3GK. 2000 miles East of N. Y.: (All C.W.) 1AJP, 1BWJ, 1CMP, 2CM, 2HJ, 3AS, 3CM, 3SM, 3BFU, 5EK, 5KC, 5ZAG, 8IB, 8ZW, 8AWP, 9KP, 9RC, 9ANQ, 9DFB, 9DYN, 9XAC. Phone 8AWP. Canadian 3GK. 2200 miles East of N. Y.:(All C.W.) 1FB, 1LL, 1SN, 1AJP, 1BYG, 1CKR, British 2AW, 2OM, 2SH, 5MS, 5WS. French 8AB, and station signing 8RRX, using code word "ULMON". 3AS, 3APB, 4EA, 8AIM, 8ALT, 9AZA, 9BCD, 9BSG.

Return trip. 2550 miles east of N. Y. (All C.W.) 3AQR, 3BFU, 8MZ, Canadian: 2HG. 2300 east. (All C.W.) 1SN, 1ADL, 1AOK 1BAN, 1BAS, 1BES, 1BHR, 1BKQ, 1CNF, 2CQZ, 3CM, 3ALN, 3ARO, 3BFU, 3BUP, 4YA, 5EK, 5FV, 5IK, 5UJ, 5XB, 5XAJ, 8XE, 8ZX, 8AAF, 8ALT, 8ANN, 8AWZ, 9EP, 9KP, 9AMI, 9AOD, 9AWF, 9BBF, 9DWK, 9DXE, NOF. Canadians: 2AF, 2HG, 3BP, 9AL. 1900 east. 1GV, 1BES, 1BET, 1BKQ, 1BRQ, 1CIV, 1CNF, 1CVE, 2XZ, 2ZS, 2ATS, 2AWF, 2AYV, 2BYW, 2BZV, 2CQZ, 3HK, 3OT, 3ARO, 3BFU, 3BSS, 3BVC, 3CCC.4EB, 4EH, 4FT, 5XK, 5ZA, 5ZAK, 6ZZ, 8BK, 8FU, 8II, 8PJ, 8YV, 8ZW, 8ADG, 8ALT, 8AWP, 8BEO, 8BXX, 8BYO, 9BX, 9OX, 9PS, 9ASF, 9BZI, 9DKY, NOF. 1650 east. C.W.: 1AW, 1FD, 1GV, 1AGH, 1ASF, 1AYZ, 1BAN, 1BKA, 1BQL, 1BRQ, 1BWZ, 1BYG, 1BZD, 1CJH, 1CRW, 2RY, 2XZ, 2ZS, 2AYV, 2BQU, 2BRB, 2BUM, 2BZV, 2CIM, 3JT, 3OE, 3OT, 3PZ, 3SU, 3VW, 3WF, 3XM, 3ANS, 3API, 3ASI, 3BEC, 3BIJ, 3BUN, 3BSS, 3BUG, 3BVA, 4FT, 5XB, 8AB, 8BO, 8II, 8MZ, 8NB, 8UF, 8WA, 8XE, 8YD, 8ZW, 8ABS, 8ABX, 8AFD, 8AVT, 8AWP, 8BRC, 8BZC, 8CLK, 8CMI, 8CPB, 8CQH, 8CRB, 8CUU, 8DAA, 9UC, 9WC, 9APS, 9CBA, 9CJO 9CTV, 9DXE, 9ECE, Spark: 2OM, 8BDA, Can. 2HG, 3DH. 1400 east. Moderate QRN. C.W.: 1II, 1XM, 1AIH, 1ALZ, 1ARY, 1ASJ, 1AYZ, 1BAS, 1BDI, 1BES, 1BET, 1BQE, 1BRS, 1BSZ, 1BWJ, 1CWK, 1CMP, 1CNF, 2HJ, 2ZL, 2AWF, 2CIM, 2CQZ, 3HK, 3JJ, 3OT, 3XM, 3ZZ, 3AFB, 3AQR, 3BFU, 3BIJ, 3BLZ, 3BVA, 3BVC, 4BI, 4BY, 4EA, 4YA, 5MO, 5MS, 5XK, 6ZZ, 8FU, 8MZ, 8RV, 8UC, 8UE, 8AAF, 8BCH, 8BEO, 8BRY, 8BSY, 8BVR, 8COO, 9BP, 9AON, 9BZI, 9CBA, 9DXE, 9XAC. Spk: 8COA. Canadian: 2HG, 3DH. 1150 east. C.W.: 1CN, 1FD, 1GV, 1HX, 1II 1IT, 1JP, 1QP, 1RD, 1UN, 1ADL, 1AJP, 1ALZ, 1AYZ, 1BAS, 1BDI, 1BES, 1BKA, 1BKR, 1BQD, 1BQF, 1BQK, 1BQI, 1BRQ, 1BWJ, 1BYG, 1CDR, 1CIT, 1CNF, 1CZK, 2ZS, 2ARS 2CIM, 3BG, 3BJ, 3OT, 3XM, 3AJJ, 3ALN, 3AQR, 3BIJ, 3BJY, 3BSS 8BVA, 4FT, 8HN, 8KG, 8MZ, 8OI, 8UF, 8ZW, 8AAV, 8ADZ, 8AFD, 8AHR, 8AIM, 8AJX, 8AWP, 8AZQ, 8BCH, 8BKR, 8BNJ, 8BPL, 8BRC, 8BRD, 8BWA, 8CFS, 8CJZ, 8CLD, 8CRB, 8CRN, 8CUR, 8CUU, 9KP, 9OX, 9UC, 9UH, 9UU, 9ZL, 9AAV, 9APS, 9BCB, 9BCF, 9BZI, 9CPY, 9CTE, 9DGV, 9ECR. Spk: 1RR, 1CNI, 2BM, 8BDA, 9ZN, 9DWP. Phone: 1BKA. Canadian: 2HG, 3DH, 3BP. 975 East of N Y.: 1AW, 1EE, 1GV, 1II, 1OW, 1QP, 1XM, 1AGH, 1AJX, 1AOK. 1ASJ, 1BAN, 1BDI, 1BET, 1BFE, 1BMS, 1BQD, 1BRQ, 1BSZ, 1BWJ,

1CDR, 1CNF 1CPJ, 2CM, 2DD, 2EP, 2HJ, 2HW, 2NZ, 2WR, 2AVC, 2AWF, 2AYV, 2RNZ, 2BQU, 2BTW, 2BUM, 2BXW, 2BYW, 2BZV, 2CBG, 2CFB, 2COL, 2CQI, 3CC, 3HK, 3MO, 3PZ, 3TJ, 3XM 8AAO, 8AFB, 8ALN, 3BFU, 3BGT, 3BIJ, 3BQX, 3BVA, 8BVC, 4EA, 6ZZ, 8CF, 8CJ, 8MZ, 8RV, 8UE, 8XA, 8ZW, 8AWP, 8BEO, 8BFQ, 8BVR, 8CKN, 8CXW, 8XAN, 9PC, 9DWK, Spark: 2BK, 2FP, 3BEI. Canadian: 2AF, 2HG, 3BP. 800 East N. Y.: 1AW, 1RD, 1TL, 1XM, 1AGH, 1ALZ, 1AWB, 1BDI, 1BDU, 1BET, 1BMS, 1BQL, 1CDR, 1CJH, 1CMK, 2KF, 2RY, 2AWS, 2BVH, 2BXW, 2CCD, 2CLU, 2CNK, 2CQZ, 3AS, 3BJ, 3CC, 3FP, 3HD, 3LK, 3PZ, 3TJ, 3VW, 8XM, 3ZO, 8ADT, 3ALJ, 3BJI, 8BLF, 3BSS, 4EA, 5XV, 8NB, 8UF, 8EJS, 8CEI, 8CGU, 8COO, 9AZA, Spk: 1BCF, 2BK.

S/S Liberty, D. L. Cawman, opr.

New Year's Eve: (2400 miles east of N. Y. C.) 9BZI, 2XAO, 1OR, 2FP, 8IB, 8AIM, 3AFB, 9BZI, 9BSG, 8BJS, 5FV, 8DAT, 1RD, 3ZO, 8AA, 2SQ. 8ZW, 9CYW, 9YU. 1BES, 8BJS. (In order logged). (Jan. 7th (975 mi. E. N.Y.C.): 1GR, 1LL 1MC, 1RD, 1XZ, 1ADL, 1AGH, 1AJP. 1ALI, 1ALZ, 1AWW, 1BAS, 1BRQ, 1BQE, 1BYG, 1BQD, 1CRU, 2BG, 2GK, 2HJ, 2TS, 2VH, 2WR, 2ZS 2AFA, 2AWF, 2AWS 2BII, 2BLP, 2BRC, 2BMR, 2CBG, 2CGT, 2CIM, 2CUI, 2CGJ, 3AS, 8BG, 3CC, 3CM, 3JJ 3MO, 3OE, 3TJ, 3AAO, 8AAY, 8APR 3ARM, 3BER, 3BNU, 3BVC, 4EA, 4EB, 4KM 4YA, 5HL, 5KC, 5NN, 5XV, 5ZB, 6ZH ex-6AJH (QSA and heard several times), 8JJ, 8PJ, 8UE, 8VV, 8ZD, 8ZY, 8ZZ, 8ABS, 8AIH, 8AJX, 8AWP, 8AZQ, 8BNH, 8BOZ, 8BXH, 8CJZ, 8CNW, 8CPD, 8CRB 8CR, 8KP, 8RC, 9AAP, 9AAV, 9ANF, 9APW, 9AVP, 9BBF, 9BCF, 9BLY, 9BTT, 9BXK, 9BZI, 9DGE, 9DKY 9DPF, 9DQU, 9CCV, 9CYW, NOF. Canadians 3BV, 3XN. All in this list are C.W. except 9AAW, who was heard on spark.

Canadian, 2AN.

C.W.: 1CN, (1FB), 1GV. 1II, 1MC, 1MY, 1VC, 1XU, 1AAW, 1AOK, 1AZW, (1BAN). (1BAS) 1BES, 1BKQ, 1BQL, 1BRQ, 1BSZ, 1BYG, (1CBJ), 1CDR, (1CPI), (1CSW), 2HW, 2KF, 2KV, 2NZ, 2RM, 2XQ, 2ANM, 2AQI, 2AVC, 2AWL, 2AYV, (2BBB). (2BKK, 2CBG, 2CCB, 2CCD, 2CKK, 2CQI, 3BJ, 3BQ, 3CM, 3FP, 3RF, 3SU, (3XM), (8YO), (8ZO), (3AAO), (3ACQ), 3AFB, (3AJJ), 3ALC, 3ALN, 3AMW, 3ANR, (3ATG), (3BEI), 8BGT, 4EA, 4GL, 5ZA, 5XD, 6XAD, 8CF, 8DV, (8HN), (8IQ), 8KG, 8NN, 8OE, 8RV, 8RJ, 8UE, 8VL, 8WA, 8XE, 8YD (fone), 8ZZ, 8ADG, 8AFD, (8AIM), (8ALF), 8ALT, (8ANB), 8AQD, 8AXT, 8BDV, 8BEF, 8BFG, 8BNH, (8BOZ), 8BRD, 8BRY, (8BXX), 8CLC, (8CPB), 8CPX, 8CTN, (8CUR), 8CYW, 9LZ, 9XU, (fone) 9ACW, 9ADF, 9AQG, 9AMT, 9AWS, 9BEC, 9BHD, 9BIK, 9BLG, 9BRK, 9BRS, 9BTA, 9CBA, 9CUL, 9DXM, 9ECE.

Spark: 1RV, 1CNI, 2CJA, 8COA.

Canadian: (3FC), 3TA, (3DS), (3JI), (3JL), (8SX), 9AL, (9BS), 3DE, (3BQ).

1SW, Andover, Mass.

Spark: 9AAW, 9AVP, (9OF) daylite, (9VG.)

C.W.: 4BY, 4CO, 4EA, 4EB, 4EH, 4EL, 4FT, 4GL, 4NT, 4NR, 4YA, 4XD, 5FV, 5SA, 5TT, 5ZA, 6KA, 6XAD, 7ZO, 8AEA, 8AEB, 8ALT, 8AG, 8AGO, (8AXQ,)8BDU, 8BEF, 8BOA, 8BOZ, 8BUB, 8BUN, 8BX, 8CGP, 8CJH, 8CK, 8CKO, 8CYH, 8JG, 8ML, 8VG, 8VY, 9AEA, 9AHH, 9AW, 9AWS, 9CD, 9ZN, Canadian: 9AJ, 9ZN, (both C.W.)

1BAN-1AZL, Wellesley 81, Mass.

C.W.: 4BG, 4BI, 4BK, 4BY, 4CO, 4EA, 4EB, 4FT, 4GN, 4JZ, 4KL, 4NT, 4YA, 5EK, 5PX, 5SF, 5XC, 5XT, 5ZA, 5ZAK, 5ZAS, 5ZB, 6EA, 6JD, 6ZZ, 9AAB, 9AAP, 9ACE, 9ACP, 9AEP, 9AFK, 9AFN, 9AIG, 9AJH, 9AMB, 9AOG, 9AOL, 9AON, 9AOU, 9APE, 9APO, 9APS, 9APW, 9ARG, 9ARZ, 9ASC, 9ATO, 9AWS, 9BBF, 9BBP, 9BDS, 9BHD, 9BHE, 9BIE, 9BIK, 9BKK, 9BKJ, 9BKR, 9BLG, 9BLY, 9BOZ, 9BP. dalite 2 P.M. hr., 9BRD, 9BRE, 9BRK, 9BRL, 9BRS, 9BRT. 9BTA, 9BTT 9RV, 9BZI, 9CBA, 9CGD, 9CGK, 9CHR, 9CKM, 9CNV, 9CP, 9CTG, 9CVO, 9CZF, 9DAH, 9DDY, 9DGN, 9DIO, 9DJB, 9DKK, 9DKQ, 9DKY, 9DL, 9DQU, 9DSD, 9DTJ, 9DTS, 9DWN, 9DYN, 9ECI, 9EEY, 9GC, 9GF, 9HK, 9II, 9KP, 9LH, 9LJ, 9LQ, 9LX, (9LZ), 9OX, 9PI, 9RR, 9SR, 9UR, 9US, 9UU, 9VK, 9YB, 9ZN, (AD7), NOF, Canadians: (2AF), (2AN), 2BE, (2EI), 2EQ, (2HG), (3BQ), 3BV, 3DE, 3DH, 3FC, 3GK, (3JI), (3OH), 9BJ.

Sparks: (never listen fr them, thes broke thru the Cws) 9AAW, 9AHQ, 9BPJ, 9OX. Anlone listed above wl rec a crd upon request by mail.

1SN, Beverly, Mass.

C.W.: 4AG, (4BX), 4BY, 4CG, 4DX, 4EL, 4FA, 4GN, 4HZ, 4IW, 4KL, 4KM, 4OD, 4OK, 5AAJ, 5AGJ, 5EK, 5JB, 5MO, 5NK, 5NN, 5PX, 5XB, 5ZA, 5ZAK, 6KA, 6XAD, 6ZZ, 9ACQ, 9ADF, 9BCF, 9BCH, 9BDB, 9BDS, 9BGH, 9BJI, (9BKP),9BLY, 9BMV, 9BOC, 9BOP, 9BPR, 9BRK, 9BZI, 9CCM, 9CCV, 9CFK, (9CGK) ,9CJI, 9CPY, 9CR, 9CTE, 9CWR, 9CXC, 9CZF, 9DDY, 9DFB, 9DGQ, 9DIO, 9DKY, (9DQU), 9DRI, 9DS, 9DSD, 9DVL, (9DVN), 9EL, 9EP, 9GK, 9HK, 9IO, 9LQ, 9PF, 9PN, 9PS, 9QR, 9RC, 9UC, 9UR, 9VK, 9VM, 9WA, 9WC, 9XAC, 9YB, 9ZN, 9ZT, 9ZY.

Sparks: 9AL, (9BA), 9BJ, 9CD, 4KO, 9AAW, 9CP. Canadian C.W.: (2CQ), (2EL).

2BID, Paterson, N.J.

C.W.: 4CA, 4FA, 4OI, 4YA, 5ALN, 5EK, 5EN, 5FT, 5KC, 5MO, 5ZA, 6BM, 6RO, 6ZZ, 7ZU, 9AAP, 9AFN, 9AFW, 9AKN, 9AMI, 9ANY, 9APS, 9ATZ, 9AXT, 9BIK, 9BJ, 9BOP, 9BRS, 9BSK, 9BTH, 9BTT, 9BX, 9CHC, 9CBA, 9CJI, 9CKW. 9CXP, 9CZF, 9DIO, 9DIQ, 9DJB, 9DKX, 9DLF, 9DNH, 9DRN, 9DRV, 9DXM, 9ES, 9QR, 9UU, 9YI, (C.W. & fone) 9ZQ, 9ZT, 9ZY, NOF.; Can. 2CQ, 3CO, 3FC, 3GK, 3ZL.

2AQP, New York City. (All over 700 mi.)

..C.W.: 4AG, 4AJ, 4BB, 4BI, 4BK, 4BX, 4BY, 4CA, 4CC, 4CG, 4CK, 4CN, 4CT, 4DK, 4DO, 4EA, 4EB, 4EH, 4EL, 4EU, 4FA, 4GD, 4GH, 4GV, 4GZ, 4HW, 4HZ, 4IW, 4JH, 4JK, 4JZ, 4KC, 4KE, 4KL, 4LJ, 4MT, 4NV, 4OI, 4YA, 4ZC, 5AAG, 5AAM, 5AGY, 5ATB, 5DA, 5EK, 5GR, 5HL, 5KC, 5MB, 5MO, 5ND, 5PX, 5SO, 5TA, 5ZAK, 5ZAS, 5ZB, 6TF, 6ZZ, 7MX, 7OT, 7ZO, 7ZZ, 9AP, 9BJ, 9CP, 9CR, 9EI, 9EP, 9FP, 9HB, 9IO, 9JS, 9KP, (C.W. & Phone), 9LH, 9LZ, 9OB, 9OF, 9OR, 9OX, 9PE, 9PF, 9PI, 9PS, 9QR, 9RC, 9UR, 9UU, 9VM, 9XAC, 9XN, 9ZV, 9ZY, 9AAP, 9ACE, 9ADU, 9AFK, 9AIB, 9AJH, 9AMH, 9AMU, 9ANC, 9ANE, 9AON, 9APS, 9ARK, 9ARZ, 9ASD, 9ASE, 9ASF, 9ATO, 9AVH, 9AWF, 9AXU, 9AZA, 9AZE, 9BDB, 9BDF, 9BED, 9BER, 9BGH, 9BHD, 9BIL, 9BKK, 9BNH, 9BPI, 9BQW, 9BRB, 9BRK, 9BRL, 9BRS, 9BVV, 9BVW, 9BWF, 9BZI, 9CBA, 9CDU, 9CEV, 9CFC, 9CFI, 9CGK, 9CJC, 9CMV, 9COK, 9CTE, 9CTG, 9CTV, 9CUC, 9CUR, 9CVC, 9CYW, 9DAH, 9DBV, 9DMJ, 99DMR, 9DPF,9DQ,9DQV,9DRL,9DSD,9DTA, 9DDR, 9DES, 9DFB, 9DGQ, 9DHD, 9DIO, 9DKF, 9DVK, 9DWK, 9DXC, 9DXE, 9DYN, 9ECE, 9ECI, 9ECR.

Canadian C.W.: 2AN, 2BG, 2BW, 2CQ, 2HG, 3BP, 3CO, 3DF, 3DV, 3JI, 3MB, 3XN, 9BA, 9BJ, 9BV.

France C.W.: 8AB.

American Spark: 4BC, 4BI, 4DF, 4FD, 4GN, 4HS, 5XA, 9CP, 9JX, 9LI, 9VZ, 9XK, 9ZN, 9AAW, 9ABM, 9ACN, 9AFL, 9AGG, 9AHQ, 9ARL, 9ASG, 9BEC, 9BOO, 9BPD, 9BRL, 9DAG, 9DHZ, 9DWP.

Dalite C.W.: 1BM, 1FD, 1HO, 1PM, 1XM, 1ADB, 1AGH, 1AWB, 1AXI, 1BES, 1BOE, 1BVY, 1CAC, 1CMA, 1CMK, 1CPK, 1CRH, 3AS, 3GC, 3GO, 8OT, 3PZ, 3ADT, 3BFU, 3BHM, 8BKI, 3CDY, 8CF, 8HJ, 8IB, 3RR, 8SF, 8VN, 8AFD, 8APN, 8AVD, 8BHO, 8BJC, 8BNH, 8BNY, 8BQB, 8BRL, 8BRM, 8BUT, 8CKV, 8CWP, 9ASE, 9BER, 9CGK, 9CUC. Dalite Spark: 8AIT, 8AKQ, 8BDA.

3QT, Parkesburg, Pa.

4BI, 4BK, 4BX, 4CY, 4DB, 4EA, 4EB, 4EH, 4EL, 4FA, 4FM, 4FT, 4GN, 4IR, 4JK, 4JM, 4JY, 4KM, 4KU, 4LC, 4LJ, 4LP, 4NB, 4OD, 4YA, 4ZC, 5AJ, 5EK, 5DA, 5GX, 5KC, 5IX, 5JK, 5MA, 5MB, 5NV, 5QM, 5AAG, 5AEC, 5AMS, 5COI, 5XA, 5XT, 5ZA, 5ZB, 5ZAS, 6AWT, 6ZZ, 7ZU, 8AB, 8AY, 8BK, 8BU, 8CP, 8CR, 8EO, 8EW, 8FQ, 8FU, 8H, 8IJ, 8JQ, 8LS, 8OI, 8ON, 8QK, 8RJ, 8TE, 8TX, 8UF, 8VN, 8NQ, 8ADA, 8ADC, 8ADK, 8AIZ, 8ALF, 8ALP, 8ALT, 8ALV, 8ANB, 8ANP, 8APW, 8ASC, 8ASV, 8AZQ, 8BBF, 8BDO, 8BEK, 8BFQ, 8BFT, 8BFX, 8BIS, 8BJX, 8BLC, 8BMF, 8BNH, 8BOA, 8BPX, 8BQK, 8BRC, 8BRY, 8BSY, 8BUT, 8BXX,

8CDD, 8CJY, 8CLK, 8CMN, 8CNW, 8COD, 8CPX, 8CQI 8CVE, 8CWE, 8CYU, 8XE, 8YU, 8ZK, 8ZQ, 8ZW, 8ZZ, 8ZAE, 8XAN, 9CJ, 9CM, 9EI, 9EP, 9EQ, 9FM, 9FP, 9GK, 9IP, 9NC, 9OX, 9PS, 9QR, 9UC, 9UR, 9UU, 9VM, 9VZ, 9AAD, 9ACE, 9ADF, 9AEN, 9AEY, 9AFK, 9AMH, 9AMI, 9AMQ, 9AMU, 9AON, 9APH, 9APS, 9ATN, 9ATZ, 9AUS, 9AWF, 9AWM, 9AXU, 9AZA, 9BAH, 9BAK, 9BCB, 9BCH, 9BDB, 9BDG, 9BDR, 9BED, 9BGI, 9BHI, 9BIK, 9BIO, 9BIS, 9BJR, 9BJY, 9BKJ, 9BKK, 9BLG, 9BRE, 9BRI, 9BRK, 9BRL, 9BRT, 9BTA, 9BYA, 9BZI, 9CBA, 9CCM, 9CDU, 9CGU, 9CHE, 9CJC, 9CJI, 9CJY, 9CMV, 9CPY, 9CTE, 9CTV, 9CUI, 9CWR, 9CXC, 9CYM, 9CZY, 9DBS, 9DCR, 9DDY, 9DKY, 9DLR, 9DQU, 9DRT, 9DVI, 9DWF, 9DWK, 9DFB 9DFX, 9DGQ, 9DGX, 9DHQ, 9DIS, 9DJB, 9EIY, 9IJH, 9LHA, 9YB, 9XAC.
9DWM, 9DXE, 9DYL, 9ECE, 9ECI, 9ECR, 9EIV,

3BVA, York, Pa.

C.W.: 1AP, 1AW, (1CN.), 1FB, (1GL), 1GV, 1II, 1IL, 1JT, 1LL, (1MC.), 1MJ, 1MY, 1QR, 1OW, 1PL, 1PM, 1QP, 1QW, 1RD, 1UJ, 1XM, 1XU, 1XZ, 1ADJ, 1ADL, 1AEG, 1AGH, 1AHZ, 1AJP, 1AJU, 1AJX, 1ALZ, 1ANB, 1AOL, 1ARY, 1ASF, 1AUB, 1AUW, 1AWB, 1AWH, 1AWW, 1AXI, 1AYQ, (1AZW), 1BAN, (1BAS), 1BDI, (BET), 1BES, 1BFE, 1BGF, 1BHK, 1BIY, 1BKA, 1BKR, 1BKQ, 1BMS, 1BNT, 1BOA, 1BOE, 1BOQ, (1BQD), 1BQL, (1BRQ), (1BSD), 1BSZ, (1BWJ), 1BYG, 1CDL (1CGR), 1CJA, 1CJH, (1CMK), 1CMP, (1CNF), 1CPJ, 1CPO, 1CQP, 1CSW, 1CUX, 1CVE, 1CWM, 2CM, 2DA, 2EL, 2FZ, 2GK, 2HG, 2KE, 2KF, 2OM, 2NJ, 2RM, 2RY, 2VH, (2XZ), (2AFC), (2AFP), 2AJF, 2ANM, 2AUV, 2AWF, 2AZY, 2BBB, 2BFE, 2BFZ, 2BIR, 2BJP, 2BLP, 2BMR, 2BOI, 2BQD, 2BRB, 2BRC, 2BSE, 2BTW, 2BUA, 2BUE, (2BUY), 2BVD, 2BYW, 2CBG, 2CFB, 2CGJ, 2CGS, 2CGT, 2CKK, (2CPD), 2CQI, (2CQZ) (2CSL), 2CUS, 2CVJ, 2CVU, 2XAO, 4AG, 4AS, 4BB, 4BI, 4BW,(4BX), 4BY, 4CG, 4CL, 4CN, 4CY, 4DB, 4DC, 4DL, 4DX, (4EA), 4EB, 4EH, (4EL), 4ET, 4FA, 4FG, 4FS, (4FT.), 4GH, 4GX, 4GZ, 4HW, 4HZ), 4ID, 4IR, 4JK, 4KC, 4KI, 4KL, (4KM), 4KU, 4LE, 4LJ, 4ME, 4NV, 4OI, (4XK), (4YA), 5BQ, 5EK, 5ER, 5FV, 5HL, 5JS, 5KC, 5LJ, 5LO, 5MB, 5ML, 5MO, 5ND, 5NV, 5NZ, 5OR, 5PB, 5PV, 5QM, 5TJ, 5UJ, 5UK, 5XA, 5XB, 5XD, 5XK, 5XT, 5XV, 5ZA, 5ZB, 5ZS, 5AAG, 5AAM, 5AAT, 5ADE, 5AGJ, 5AGY, 5AMS, 5XAJ, 5ZAG, 5ZAK, (5ZAS), 5ZAV, 5ZAW, 6ZZ, (6XAD), 7ZO, 7ZU, 7ZV, 8AB, (8BF), 8BK, 8BO, 8BU, 8CF, 8CH, 8DV, 8EO, 8FM, 8FW, 8GX, 8HN, 8IB, (8II), 8MZ, (8NB.), 8OE, 8OM, 8ON, 8OW, 8QK, 8RV, (8IJ), 8JJ, 8JQ, 8JY, 8KG, (8KQ), 8LT, (8LS), 8SB, 8SM, 8SS, 8TC, 8TT, 8UD, (8UK), 8UP, 8UT, 8VL, (8VP), 8WA, 8XE, 8YD, 8YG, 8YN, (8YU), 8YY, 8ZD, 8ZO, 8ZW, 8ZY, (8ZZ), 8AAV, 8ABE, 8ABS 8ADH, 8ADU, 8ADZ, 8AEA, 8AEG, (8AFD), (8AFL), 8AGO, 8AIG, 8AIH, 8AIL, 8AIM, 8AIO, 8AIW, 8AIZ, 8AJD, (8AJT), 8AJX, 8ALC, 8ALF, 8ALT, AMQ, 8ANB, 8ANV, 8AOI, 8AOL, 8APN, (8APV), 8ARD, 8ASC, 8ASV, 8ATU, 8AVD, 8AVT, 8AWR, 8AWZ, 8AXB, 8AXC, 8AXD, 8AXN, 8AZE, 8AZC, 8BAL, (8BBF), 8BBO, 8BCH, 8BDB, 8BDE, 8BDP, 8BEF, (8BEK), 8BEN, 8BFB, 8BFG, (8BGT), 8BIS, 8BJC, 8BKE, (8BKH), 8BLC, 8BMK, (8BNH), 8BNY, 8BOE, 8BOG, 8BOM, 8BOQ, 8BOZ, 8BPU, 8BQA, 8BRC, 8BRD, 8BRL, 8BRT, (8BSF), 8BUB, 8BUR, 8BUT, (8BVR), 8BWY, 8BWZ, 8BXH, 8BXT, 8BXX, 8BYO, 8CAZ, 8CCU, 8CCS, 8CDD, 8CDK, 8CDZ, 8CEI, 8CEJ, 8CFS, 8CGB, 8CGJ, 8CGM, 8CGQ, 8CGX, 8CIH, (8CJZ), 8CKA, 8CKN, 8CKV, 8CLD, 8CLK, 8CMI, 8CNW, (8COO), 8CPD, 8CQH, 8CRB, (8CRC), 8CRN, 8CUR, 8CVE, 8CVK, 8CVT, 8CXT, (8CXW), 8CXX, 8CZO, 8CZZ, 8DAA, 8DAE, 8DAT, 8DAK, 8XAN, 8ZAE, 9AP, 9BP, 9CM, 9CP, 9CR, 9CX, 9EI, 9EP, 9FM, 9FP, 9GK, 9HK, (9IG), 9II, 9IO, 9IV, 9KP, 9KR, (8LH), 9MC, 9OF, 9OR, 9OX, 9PE, 9PF, 9PI, 9PS, 9QP, 9QR, 9RC, 9UC, 9UK, 9UH, 9UR, 9US, 9UU,9VE, (9VM), 9WA, 9WC, 9YB, 9YF, 9ZL, 9ZT, (9ZY), 9AAP, 9AAS, 9AAU, 9AAV, 9ABV, 9ACE, 9ACW, 9AEY, 9AFK, 9AHJ, 9AHO, 9AIX, 9AIY,9AJH, 9AKY, 9AMH, 9AMI, 9AMT, 9ANC, 9ANQ, 9AOD, 9AON, 9APM, 9APS, 9APW, 9AQA, 9AQM, 9ARK, 9ARZ, 9ASE, 9ASW, 9ASJ, 9ATC, (9ATN), 9ATO, 9AUS, 9AVN, 9AVP, 9AWF, 9AWM, 9AUX, 9AZA, 9BAK, 9BBF, 9BCB, 9BCF, 9BCH, 9BDB, 9BDS, 9BED, (9BFM), 9BHD, 9BHM, 9BIE, 9BIJ, 9BIK, 9BIL, 9BKG, 9BKJ, 9BKK, 9BKW, 9BLG, 9RLT, 9BOP, 9BQW, 9BRK, 9BRS, 9BRX, 9BSQ, (9BSZ), 9RUC, 9BUH, 9BVZ, 9BXM, 9BYA, 9BZI, 9BZZ, (9CBA), 9CCM, 9CCV, 9CCQ, 9CFK, 9CFI, (9CGD), 9CGK, 9CGN, 9CHE, 9CHK, 9CIL, 9CJA, 9CJC, 9CJH, 9CKM, 9CKW, 9CLQ, 9CMV, 9CNY, 9CPN, 9CPY, 9CTE, 9CUI, 9CWP, 9CWR, 9CXC, 9CYM, 9CYW, 9CZF, 9CZY, (9DBF), 9DBL, 9DCA, 9DCB, 9DCR, (9DDW), 9DDY, 9DFB, 9DGE, 9DGQ, 9DGV, 9DGX, 9DHQ, 9DIO, 9DJB, (9DKY), 9DLR,, 9DOK, 9DPD, (9DQU) 9DRB, 9DRI, 9DRK, 9DSM, (9DTJ), 9DVA, 9DVL, 9DWK, 9DWM, 9DWQ, 9DXC, 8DXE, (9DXN), 9DYN, 9DZB, 9DZG, 9ECE, 9ECR, 9EDE, 9EEY, 9EKF, 9XAC, 9ZAA, 9ZAF. Canadians: 2AF, 2AM, 2BE, 2EI, 2HG, 2KF, 2BP, (3BV), 3CO, 3DE, (3DH), (3DS), 3FC, 3FO, (3GK), (3JL), 3KP, 3SX, 3TA, 3XN, 9AL, 9BA, 9BJ, 9BV. Specials: NOF, DF-1, YX-2; Fone 1BKA, 2EL, 3CCU, 4BK, 8ALT, 9KP, 9DTJ.

I.C.W.: 1FD, 1BES, 1BKR, (1CKP), 2FP, 2NZ, 2SQ, 2XQ, 2XZ, 2CCD, 2CFE, (3FQ), 3OT, (3AQR), 3BFU, 4BX, 4HW, 4ZC, 5HL, 5FV, 5FU, 8HH, 8HJ, 8UE, 8VQ, 8ZW, (8ZZ), 8ADH, 8AJX, 8ALT, 8AOX, 8AQL, 8AWP, 8AXB, 8BDO, 8BQO, 8BSY, 8BZQ 8CJY, 8CMI, 8CUR, 8CXX, 8DAA, 9RC, 9ZN 9BED 9BZI, 9CCM.

Spark: 1AMD, 1ASF, 1BHO, 1BOQ, 1BTF, 1CNI, 2FP, 2NS, 2OM 2ABG, 2ARY, 2CJX, 3GM, (3ACY), 3AHK, 3API, (3BRL), 4BC, 4EG, 4FB, 4FD 4GN, 4IZ, 5JD, 5XA, 5XAC, 8CC 8EB, 8EO, 8EX, 8BU, 8JQ, (8KY) 8MR, 8TC, 8TH, 8UC, 8VW, 8ACF, 8AEO, 8AFG, 8AIJ, 8AIT, 8AUV, 8AXN, 8BAH, 8BDA, 8BOV, 8BRL, 8CKV, 8CLF, 8COA, 8COD, 9AU, 9JV, 9JX, 9LF, 9OF, 9ON, 9VZ, 9AAW, 9ACB, 9AFL, 9AGG, 9AHQ, 9AIR, 9AIU, 9AOJ, 9AVP, 9AZA, 9AZE 9AZF, 9BAR, 9BEC, 9BPJ, 9BOO, 9DAG, 9DAY, 9DHZ, 9DQQ, 9DTN, 9DWK 9DWP, 9DWX.

4BL, Lakeland, Florida

Spark: 1ARY, 2AHK(?), 2ARY, 2BK, 2FP, 3CCB, 4BC, 4DF, 4EG, 4FB, 4FD, 4GN, 4HS, 4LI, 4MY, 4SK, 5AQ, 5ACQ, 5AEJ, 5FP, 5GK, 5HU, 5JN, 5QS, 5RZ, 5SB, 5TP, 5UD, 5UP, 5XA, 5XAC, 5XAJ, 5ZR, 8BBY, 8BDA, 8OQ, 8RG, 9AAW, 9ACN, 9AGG, 8AHQ, 9AIF, 8AOJ, 9BMN, 9DHZ, 9DXK, 9DWK, 9DWXX, 9DXK, 9EFC, 9NQ.

C.W.: 1ADL, 1AGH, 1AJL, 1AJP, 1ALZ, 1ASF, 1AUB, 1AWL, 1BAN, 1BDI, 1BRQ, 1BSD, 1BSZ, 1CBJ, 1CDR, 1CIT, 1CJC, 1CKP, 1CNF, 1COT, 1CRW, 1BM, 1IV, 1KC, 1QP, 1RD, 1XZ, 2AAC, 2AER, 2AJA, 2AJF, 2AWL, 2AYV, 2BBB, 2BDU, 2BGI, 2BKK, 2BLP, 2BQB, 2BQD, 2BQW, 2BRB, 2BZV, 2CCD, 2CFE, 2CGS, 2CJR, 2COR, 2CPD, 2CPK, 2CQI, 2CQZ, 2CYT, 2XAO, 2BK, 2FP 2PF 2ZS, 3AAG, 3ABJ, 3ABW, 3ACY, 3ADP, 3AJG, 3AJJ, 3APB, 3APR, 3APT, 3AQR, 3AR, 3ATB, 3ATS, 3AUU, 3BEC, 3BFE, 3BFQ, 3BFU, 3BIJ, 3BIT, 3BIY, 3BKT, 3BLF, 3BSB, 3BUC, 3BUV, 3BVC, 3CDY, 3CEL, 3AS, 3BG, 3BJ, 3BZ, 3CA, 3CG, 3CX, 3FK, 3FQ, 3HD, 3HG, 3HK, 3IP, 3JJ, 3LK, 3MO, 3OE, 3PZ, 3RF, 3SU, 3TJ, 3WF, 3ZG, 3ZS, 3ZZ, 4AZ, 4BB, 4BG, 4BK, 4BX, 4BY, 4CA, 4CG, 4CL, 4DC, 4DO, 4EA, 4EB, 4EH, 4EL, 4EU, 4FG, 4FT, 4FW, 4HW, 4HZ, 4IK, 4IZ, 4JE, 4JY, 4JZ, 4KC, 4KI, 4KK, 4KL, 4KM, 4KU, 4LE, 4LP, 4MT, 4NA, 4NE, 4NT, 4PD, 4XK, 4YA, 5YD, 4ZC, 5AAG, 5AAM, 5AAT, 5ABG, 5ABH, 5ABY, 5ADE, 5AEC, 5AGJ, 5AGN, 5AHJ, 5AHT, 5AMS, 5ZAB, 5ZAG, 5ZAK, 5ZAS, 5ZAZ, 5BW, 5CI, 5CZ, 5DA, 5DN, 5DQ, 5EK, 5FT, 5FV, 5FZ, 5GA, 5GK, 5GP, 5GR, 5HL, 5HO, 5HZ, 5IK, 5IX, 5JS, 5JW, 5KC, 5KK, 5KN, 5LJ, 5MY, 5ND, 5NK, 5NN, 5NV, 5OV, 5PV, 5PX, 5QM, 5QY, 5RH, 5RN, 5SG, 5SK, 5SS, 5SZ, 5TJ, 5UJ, 5UK, 5UN, 5VA, 5VJ, 5VY, 5XA, 5XB, 5XT, 5XV Fone (QRA?), 5ZA, 5ZB, 5ZK, 6AAK, 6AVR, 6AWT, 6CBG (QRA?), 6JD, 6ZZ, 8ABE, 8ABN, 8ADG, 8ADH, 8ADT, 8AFD, 8AGR, 8AIM, 8AJX, 8APT, 8APW, 8APN, 8ARD, 8ATX, 8AVD, 8AWR, 8AWZ, 8AZQ, 8BBF, 8BBQ, 8BBX, 8BBY, 8BCH, 8BDU, 8BEK, 8BEN, 8BEO, 8BGT, 8BIN, 8BLC, 8BJC, 8BKH, 8BNH, 8BOE, 8BOG, 8BOZ, 8BPJ, 8BPQ, 8BPU, 8BQA, 8BRC, 8BRM, 8BSU, 8BSY, 8BTV, 8BVR, 8BWK, 8BXX, 8BYN, 8BYO, 8CAA, 8CAB, 8CCU, 8CGX, 8CHU, 8CJZ, 8CKM, 8CMI, 8CPX, 8CRB, 2CRC, 8CRD, 8CUR, 8CUU, 8CXW, 8CYT, 8CYU, 8CZN, 8DAE, 8AB, 8CP, 8FU, 8GP, 8II, 8JY, 8LS, 8ML, 8MZ, 8NR, 8NN, 8ON, 8QC, 8QK, 8RJ, 8RR, 8RV, 8SB, 8SM,

8SP, 8UE, 8UK, 8VN, 8VQ, 8WA, 8WV, 8XE, 8ZAG, 8ZB, 8ZE, 8ZZ, 9AAS, 9ABV, 9AEP, 9AEY 9AFK, 9AFR, 9AHQ, 9AIF, 9AJH, 9AMI, 9AMO, 9AMZ, 9AOJ, 9AON, 9AOQ, 9APS, 9APW, 9AQJ, 9AQZ, 9ARZ, 9ASE, 9ATN, 9AVH, 9AWF, 9AWN, 9AWS, 9BAI, 9BBF, 9BBK, 9BCF, 9BDB, 9BDE, 9BDS, 9BEG, 9BFG, 9BGW, 9BIJ, 9BIZ, 9BJI, 9BKJ, 9BKK, 9BKX, 9BLR, 9BLY, 9BMN, 9BOE, 9BRI, 9BRL, 9BSZ, 9BUH, 9BVL, 9BXL, 9BXT, 9BZI, 9BZZ, 9CCS, 9CDU, 9CGD, 8CGK, 9CIE, 9CJA, 9CJC, 9CLW, 9CMN, 9CQK, 9CTG, 9CTV, 9CVO, 9CWR, 9CYW, 9DAH, 9DBV, 9DFB, 9DGE, 9DGV, 9DIS, 9DKK, 9DKY, 9DLR, 9DMJ, 9DQU, 9DSD, 9DTA, 9DTS, 9DWK, 9DXN, 9DYN, 9DZY, 9ECE, 9ECI, 9EFC, 9EFW, 9EHT, 9EKF, 9XAC, 9XAQ, 9BK, 9CP, 9II, 9KP (fone), 9OF, 9OR, 9PE, 9PF, 9QF, 9UC, 9UH, 9UU, 9ZT. Can.: 3AD, 3DH.

4EB, Palmetto, Ga. (All Districts Worked)

1FD, 1GV, 1II, (1MC), 1MV, (1QP), 1ADL, 1ANK, 1ANM, 1ANR, (1ARY), 1AWS, (1BAS), (1BES), 1BET, 1BKQ, (1BQD), (1BSD), (1BSZ), 1BYN, 1CJA, 1CMK, 1CNF, 2DA, 2FP, (2KL), 2MX, 2RY, (2ZS), 2AFC, 2AFP, 2ANM, 2AYV, (2BAY), 2BGI, (2BII), 2BMS, 2BRC, 2BSC, 2BUE, 2BUY, 2BZQ, (2CCD), 2CGT, 2CKK, 2COR, (2CQI), 2CQZ, 2CUI, 2CJV, 3BZ, (3FK), 3JG, 3JT, 3MO, 8RF, 8SM, 3SU, 3ADT, 3AGJ, 3AKR, (3ATG), (8BFU), 3BIY, 3BLF, (3BRE), (3BTL), (3BUC), 3BZL, (3CAN), (3CEL), 4OI, 5BW, 5CM, 5DQ, 5ES, 5FV, (5GF), (5HL), (5HO), (5IX), 5ML, 5MO, (5NS), 5NV, (5PB), (5QI), (5RN), 5US, 5VY, 5XA, 5XK, 5XV, (5AAG), 5ABY, 5AEC, (5AGJ), (5AHC), 5XAK, 5ZAS, 6ABX, 6BIC, 6EA, (6XAD) 6XH, 6XK, 6ZH, 6ZI, 6ZZ, (7NA), 7NF, (7SC), 7ZU, 8FM, (8KC), (8ON), 8QK, (8RJ), 8RW, (8AAF), 8ABE, (8AGC), 8AGO, 8AIM, 8ALF, 8ASV, 8ATC, (8AUE), 8AVD, (8BEN), 8BEO, 8BNH, 8BOG, (8BQC), (8BRM), 8BSF, 8BZD, (8CCB), 8CIE, (8CJZ), 8CLW, 8CNW, 8COA, (8COK), 8CPD, 8CQH, (8CVM), (8CWP), (8DAE), (8DAT), (8ZAE), 9BE, (9BX), (9EP), 9FM, 9PF, (9QF), 9UC, 9UK, 9ZN, (9ZY), 9AFD, (9AHM), 9AOD, (9AOG), 9APS, 9APW, 9AQP, (9ASF), 9AZA, 9BHI, 8BIJ, 9BIN, 9BJI, (9BJV), (9BKX), (9BLG), (9BOP), 9BOZ, 9BPS, 9BPW, 9BRE, 9BRS, 9BTA, (9BWR), (9BXC), 9BXT, 9BZI, (9CBS), 9CCS, 9CCV, 9CCY, (9CEH), 9CFK, (9CFZ), 9CGK, (9CPY), 9CVD, 9CXH, 9DGV, 9DIO, 9DJM, 9DKW, 9DLF, (9DMJ), 9DPL, 9DQW, 9DRI, (9DSG), 9DSL, (9DTJ), 9DTU, 9DWK, (9DWS), 9DXE. Canadians: 2AF, 2AT, 2FU, 3GK, (3JI), (4BV), 4CO, 5CN.

5EL, 2410-10th St., Wichita Falls, Texas

C.W.: (1ANA), 1ARY, 1BEP, 2XQ, 2ZK, 2BQH, 3OT, 3RF, 3YO, 3AJJ, 3BIJ, 3CDY, 4AC, 4BW, 4DB, 4DK, 4DL, 4DN, 4EA, 4EB, 4EL, 4FG, 4HX, 4ID, 4KL, 4KM, 4ME, 4OD, 4OI, 4ZC, 6AW, 6EA, 6LU, 6RM, 6RR, (6ZH), 6ZK, 6AAG, (6AIB), 6ARB, 6BIP, (6BSQ), 6KVN, 6CBI, 7LU, 7AFW, 8BN, 8CP, 8CF, 8ER, 8FU, 8GP, 8QC, 8SP, 8TT, 8UV, 8VN, 8YO, 8ZD, 8ZF, 8ZZ, 8ART, 8ADK, 8AFD, 8AIK, 8AIM, 8AIZ, 8AJX, 8ALF, 8AMM, 8APN, 8APT, 8APV, 8APW, 8ATN, 8AVT, 8AWP, 8AZH, 8BAF, 8BDA, 8BLK, 8BEN, 8BKU, 8BUT, 8BUW, 8BVK, (8BWA), 8BXA, 8BYO, 8BYT, 8BZC, 8BZQ, 8CAA, 8CDK, 8CFP, 8CHU, 8CJH, 8CJZ, 8CQH, 8CRN, 8CUU, 8CWP, 8CXF, 8CZC, 8DAE, 5's and 9's galore.

F. M. Rives, Au tin, Texas. (On- tube)

C.W.: 1BES, 1CNF, 1CWM, 2FP, 2ZS, 3BGJ, 3BLF, 3KM, 3YO, 3ZO, 4BB, 4BI, 4BK, 4DB, 4CG, 4DO, 4EB, 4EH, 4FG, 4GL, 4HH, 4HW, 4KC, 4OI, 4YA, 4ZC, 6AVV, 6APV, 6AWT, 6BGS, 6BH, 6BIC, 6BOE, 6BQG, 6BRF, 6BRS, 6BVG, 6BVW, 6CC 6CBI, 6CEB, 6OM, 6RM, 6XAD, 6ZAA, 6ZE, 6ZN, 6ZR, 6ZT, 6ZZ, 7BJ, 7LR, 7ZU, 7ZU fone, 7ZV, 8ADT, 8AIM, 8ALT, 8ANN, 8APW, 8ATX, 8AVT, 8AZD, 8AZG, 8AZO, 8BDA, 8BDB, 8BDO, 8BEN, 8BGJ, 8BKU, 8BJC, 8BMW, 8BOG, 8BRC, 8BXH, 8BXX, 8BYO, 8BYT, 8CE, 8CJY, 8CKV, 8CLD, 8CLK, 8COC, 8CVM, 8CXW, 8CYU, 8DAG, 8ER, 8FQ, 8HN, 8JJ, 8OK, 8UC, 8VQ, 8VY, 8XAN, 8YD, 8YV, 8ZD, 8ZO, 8ZQ.

5ZAV, Oklahoma City, Okla.

C.W.: 1AJP, 1ARY, 1AGC, 1BAS, 1BED, 1CNF, 1UJ, 1YD, 1XM, (1XZ), 2AXF, 2BZV, 2CNK, 2BZQ, 2BQ, 2EL, 2CK, 20K, 2NZ, 2FP, 2XZ, 2ZS, 3ADX, 3AJD, 3ATB, 3ACY, 3ARK, 3ARI, 3ARO, 3ASI, 3AJJ, 3BLF, 3BWI, 3BVA, 3BVC, 3BHL, 3BSS, 3BGL, 3BGJ, 3BIF, 3CEP, 3DVA, 3AB, 3AT, 3CC, 3CX, 3CM, 3FQ, 3FO, 3FG, 3GK, 3HK, 3HG, 3II, 3JJ, 3LP, 3LS, 3RF, 3SX, 3TA, 3XM, 3ZO, 4BB, 4BO, 4BX, 4BI, 4BY, 4BK, 4CG, 4CL, 4CD, 4CO, 4DB, 4DO, 4DK, 4EB, 4EH, 4EP, 4EL, 4FT, 4FU, 4FD, 4HS, 4IX, 4IL, 4JK, 4JZ, 4JM, 4KL, 4KU, 4NV, 4KC, 4OI, 4PF, 4YA, 4ZC, (5SF), (5NV), 6AAY, 6AEL, 6ABX, 6ARB, 6ANH, 6AAU, 6AWT, 6BOE, (6BVG), 6BSG, 6BHB, 6BWB, 6BTV, 6BWX, 6BBE, 6BUN, 6BGE, 6BPI, 6BIC, 6CC, (6EA), (6EB), 6EF, 6LU, 6LV, 6KA, 6NR, 6RM, 6RR, 6JD, 6IF, 6UC, 6XAD, 6XK, 6ZB, 6ZH, 6ZI, 6ZT, (6ZZ), 7LU, 7AIU, 7AWF, 7NA, 7QN, 7SC, 7LR, DDDD RR7 SS5ER VZ 7ZO, 7ZU, 7ZV 8AAF, (8ADT), 8AIP, 8AJW, 8ALF, 8AVT, 8AVD, 8AWU, 8AZO, 8BED, 8BEK, 8BEF, 8BJC, 8BIN, 8BKZ, 8BRG, 8BRF, 8BLU, 8BOZ, 8BXX, 8BYO, 8BWT, 8BXA, 8BZD, (8BEO), 8CAB, 8CAE, 8CEI, 8CLK, 8CLZ, 8CRB, 8CTU, (8CUU), 8CPD, 8CON, (8CPX), 8CYT, 8CWZ, 8CZC, 8CZN, 8DAY, 8DVR, 8AB, 8AA, 8BO, 8CF, 8CV, 8CH, 8ER, 8FQ, 8HW, 8HZ, 8HG, 8HH, 8II, 8IJ, 8JJ, 8KJ, 8LF, 8KI, 8NB, 8NZ, 8NN, 8PJ, 8QK, 8QN, 8RR, 8RV, 8SB, 8SN, 8TT, (8UK), 8UP, 8UC, 8UU, 8VP, 8VF, 8VY, 8WS, 8WA, 8XH, 8XY, 8ZAF, (8ZW), 8ZY, 8ZZ, (9BLG), 9ZN.

Cans.: (3BV), (3AD), 3BQ, 3DH, 3KO, 3PG, (4BV), 9AJ.

Fone: 5JA, 5ZA, 9BAY, 9BHC, 9LJ, 9KP, 9YF, 9XM.

For receiving used one step tuned radio. det. and one step audio. Used circuit as suggester by Paul Godley in "Listening for Europe."

6AND, Pepeekeo, Hawaii (One tube)

1BER, 1GV, 4CN, 4DA, 4EY, 4QA, 4XD, 4XA, 4XAJ, 4ZAS, 5XD, 5ZA, 6ASX, 6BH, 6BQF, 6BT, 6BTG, 6BU, 6CC, 6DT, 6DQT, 6DQF, 6LX, 6TI, 6XH, 6XS, 6XAD, 6ZU, 6ZX, 6ZD, 6ZN, 6ZT, 7SC, 7NA, 7PF, 7DU, 7ZU, 7SK, 7SU, 8AZG, 8ASV, 8XR, 8YD, 9ZN, 9YW, 9YAW, 9GK, 9ZAC, 9AC, 9AMB, 9AGR, 9APS, 9AWM, 9DF, 9DY, 9RED, 9BJ, 9BD, 9BEK, 9SC, 9RC, 9RK, 9RY, 9DSG, 9CAW, 9ARZ, 9BBF, 9YF, 9BX.

6AOR, Berkeley, Calif. (One tube)

C.W.: 1AGH, 1AJZ 1AYZ, 1BAS, 1BES, 1BDI, 1BYN, 1CCZ, 1CJA, 1CMK, 1XM, 2GR, 2FP, 2NZ, 2BFX, 2BYC, 3FS, 3JK, 3OD, 4EN, 4FT, 4GH, 4NT, 4OI 4PA, 4YK, (5CN) Can., 5DI, 5EK, 5KC, 5PX, 5TK, 5UO, 5UU, 5XY, 5ZA, 5ZO, 5ZAE, 5ZAK, 6ZAC, 6ZO, 6ZZ, 6BOE, 6 too numerous. (7BA), (7BJ), (7DC), 7DP, 7HJ, 7CU, 7LR, 7LU, 7MF, 7MC, (7NA), 7NF, 7NN, 7NY, 7PB, (7SC), 7SF, (7TO) 8 a.m., (7TQ) 8 a.m., 7TT, 7UD, 7ADF, 7ADM, 7ADP, (7AEA), (7AEM), (7AFW), 7AGU, 7AHI, (7AIC), 8IB, 8KG, 8NN, 8UK, 8YD, 8ARR, 8AEM, 8AIM, 8AGO, 8ASU, 8AWP, 8BCY, 8BXX, 8BEF, 8BXH, 8BRY, 8BPL, 8BSS, 8CPX, 8CRB, 8CPX, 8ZG, 8ZU, 8ZZ, 9AO, 9BX, 9DG, 9DR, 9EI, 9FU, 9IO, 9IP, 9LZ, 9MF, 9OX, 9PW, 9WP, 9UU, 9YF, 9AAP, 9AFK, 9AIG, 9AIY, 9AJA, 8AMN, 9AMB, 9ANQ, 9AOG, 9AON, 9APH, 9APS, 9AQR, 9APY, 9ARZ, 9ARR, 9AUN, 9AUL, 9AWL, 9AXU, 9AWM, 9BCH, 9BCT, 9BBF, 9BDS, 9BGH, 9BJI, 9BJU, 9BJK, 9BLY, 9BNO, 9BRI, 9BRK, 9BUD, 9BVA, 9BXK, 9BVE, 9BXT, 9BZZ, 9CAA, 9CCI, 9CCU, 9CFY, 9CFI, 9CGH, 9CJK, 9CLN, 9CNV, 9CNS, 9CXP, 9XAB, 9YM, 9YL, 9DNK, 9DPL, 9DSD, 9DTM, 9BZI, 9DYN, 9DYM, 9DXN, 9BVO, 9DZB.

Arthur Martini, San Francisco, Calif.

C.W.: 1BES, 2ON, 2BQD, 3XN, 4CG, 4EB, 4EH, 4JM, 4KM, 4YA, 5DI, 5EK, 5GA, 5HQ, 5KC, 5MO, 5NN, 5PX, 5QA, 5QY, 5TJ, 5UJ, 5WO, 5XD, also fone, 5ZA, 5ZB, 5ZH, 5ACF, 5AEC, 5XAD, 5XAJ, 7AU, 7BJ, 7EX, 7HJ, 7HM, 7KE, 7LU, 7MF, 7NF, 7NY, 7OT, 7PF, 7PX, 7QF, 7QT, 7RN, 7SC, 7TQ, 7TO, 7XF, 7XI, also fone, 7YG, 7ZB, 7ZO, 7ZU, 7ARB, 7ADZ, 7ABY, 7AFW, 7AIU, 8AB, 8BK, 8CH, 8FU, 8IQ, 8KG, 8LS, 8ML, 8MZ, 8SB, 8YD, 8ZW, 8ZY, 8ABS, 8AFD, 8AIM, 8AJX, 8ASV, 8AXB, 8AXC, 8AZQ, 8AZU, 8BEF, 8BFM, 8BDV, 8BVR, 8BSY, 8BXH, 8BXX, 8CAA, 8CRB, 8CXW, 8XAE, 8ZAG, 9AJ, 9BM, 9BP, 9CR, 9DK, 9EI, 9GK, 9HM, 9IC 9II, 9KM, 9KP, 9LZ, 9OX, 9PI, 9PN, 9PS, 9RC, 9TZ, 9UU, 8XM, 9YW, 9YY, 9ZL, 9ZN, 9ZT, 9AAP, 9AAW, 9ABU 9AEQ, 9AIO, 9AIX, 9AMB, 9AMD 9AMH, 9AMI, 9AON, 9APS, 9ARZ, 9ASF, 9AVZ, 9AWA, 9AWM, 9AWS, 9AYS, 9AZA, 9BAK, 9BBF,

9BCF, 9BDB, 9BDS, 9BED, 9BEY, 9BIK, 9BJI, 9BJV, 9BLY, 9BSG, 9BSZ, 9BUD, 9BXA, 9BXQ, 9BZI, 9BQW, 8CBA, 9CFY, 9CNS, 9CTG, 9CUC, 9DFB, 9DFL, 9DJB, 9DJD, 9DKY, 9DSM, 9DTM, 9DWR, 9DXM, 9XAQ, 9XAY, 9YAJ, 9ZAA, 9ZAF, 9XJA???QRA? Canadian: 5CN, 9BX.

R. R. Martindale, Los Angeles, Calif. (1 tube)

C.W.: 1XU, 1XX, 2XAP, 3BIF, 3YO, 4EB, 4KC, 4JK, 4LP, 4XO, 5AAR, 5AC, 5AEC, 5BE, 5DI, 5EK, 5GJ, 5GO 5HO, 5KC, 5MA, 5NN, 5NS, 5NZ, 5QI, 5QM, 5QS, 5QY, 5RH, 5RN, 5UO, 5VJ, 5XA, 5XD, 5XK, 5ZA, 5ZAE, 5ZAG, 5ZAS, 5ZAV, 5ZAY 5ZAZ, 5ZB, 6's too numerous, 7AD, 7ADM, 7AEM, 7AFW, 7BA, 7BJ, 7DK, 7HJ, 7HM, 7NA, 7NY, 7MF, 7OM, 7OT, 7PF, 7SC, 7TQ, 7ZB, 7ZO, 7ZU, 7ZV, 8AAF, 8ABS, 8ADT, 8ADU, 8AIM, 8AJE, 8ALT, 8APV, 8AQF, 8ASC, 8ASV, 8ATB, 8AVT, 8AXC, 8AZF, 8BBF, 8BFB, 8BGJ, 8BGT, 8BLC, 8BLT, 8BOG, 8BRD, 8BXH, 8BXX, 8BYO, 8BZD, 8CAZ, 8CDZ, 8CEI, 8CEZ, 8CKX, 8DAK, 8FM, 8HN, 8IB, 8IQ, 8ML, 8QK, 8VQ, 8VY, 8XAE, 8XJ, 8YD, 9AAF, 9AEQ, 8AIX, 9AIY, 9AJH, 9AMH, 9AMI, 9AMT, 9ANQ, 9AOG, 9AOU, 9APH, 9AQR, 9ASF, 9ATN, 9AVM, 9AYL, 9AYU, 9AZA, 9BAK, 9BBF, 9BCB, 9BCH, 9BHZ, 9BIK, 9BJI, 9BJN, 9BRK, 9BSG, 9BSZ, 9BTO, 9BTT, 9BUN, 9BVY, 9BWF, 9BXA, 9BXH, 9BXQ, 9BZI, 9CA, 9CAA, 9CBA, 9CCM, 9CFY, 8CIY, 9CJY, 9CM, 9CNV, 9CTU, 9CR, 9CTE, 9CTG, 9CUC, 9CWR, 9DAH, 9DCA, 9DFB, 9DGN, 9DIO, 9DKQ, 9DKY, 9DPD, 9DSG, 9DTE, 9DTM, 9DUG, 9DVA, 9DWK, 9DXE, 9DXG, 9DXM, 9DYG, 9EI, 9EP, 9GK, 9HV, 9KM, 9KP, 9LQ, 9MC, 9OF, 9OX, 9QR, 9RC, 9UC, 9UK, 9UR, 9VK, 9WA, 9XAC, 9XAI, 9YAJ, 9YU, 9ZL, 9ZY.

Spark: 7YA.
Phone: 5ZA, 7ZU, 9AK, 9XAC.
Can.: 3XN, 4BV, 4HH, 5CN, 9AC, 9BA.

6ZH ex 6AJH, San Ysidro, Calif.

C.W.: 2FP, 2CQZ, 3GK, 3HG, 3OT, 3ALN, 3ARO, 3BFU, 3BLF, 3BUC, 3ZV, 4EB, 4EH, 4HW, 4GH, 4ID, 4II, 4KK, 4OI, 4YA, (5DI), (5EK), (5ER), (5GR), (5IR), 5JL, (5KC), 5MT, 5MY, 5NK, 5PB, (5PX), (5QY), 5RH, 5SK, 5SM, 5UJ, 5UN, 5UO, 5VO, (5ACF), (5ADB), 5ADO, 5AEC, 5XB, (5XD), 5XK, 5XT, 5XY, (5ZA), 5ZB, (5ZH), (5XAD), (5XAJ), (5ZAK), 5ZAS, 5ZAV, sixes too numerous, 7BB, (7BJ), (7BK), 7DP, 7HJ, 7IY, 7JW, (7LN), 7LR, (7LU), (7MF), 7MK, (7NA), (7OT), (7OZ), (7QF), 7SC, 7TH, (7TJ), (7TQ), (7TT), (7VF), (7ABB), (7ADP), (7AEM), 7AFW, (7ZK), 7ZO, 7ZU, 7ZV, 8AB, (8BK), 8CF, 8FU, 8IB, 8IQ, 8LS 8MZ, 8PD, 8QK, 8SM, 8SP, 8UZ, (8WR), 8AIM, (8AJX) 8AMM, 8AIT, 9AAF, 8AEA, 8APY, 8AQO, 8ASC. 8ASV, 8AWX, 8AXB, 8AXC, 8AZB, 8BDU, 8BEF, 8BFM, (8BKE), 8BOZ, 8BSY, 8BXH, 8BXX, 8BZY, 8CAZ, 8CGJ, 8CGX, 8CEI, 8CMI, 8CPD, 8CPF, 8CUN, 8CUR, 8CYV, 8XE, 8XU, 8YD, 8ZW, (8ZY), 8ZZ, 8ZAF, 8ZAG, (9BM), 9BP, 9EI, 9FH, (9FV), 9GK, 9KP, 9LZ, 9OX, 9PI, (9PS), (9PW), 9RC, 9UH, 9UU, 9AAP, 9ABV, 9AFK, 9AIX, (9AMB), 9AMI, 9AMU, 9ANQ, 9APW, 9ARZ, 9ASF, 9ATN, (9AUL), (9AVZ), (9AWM), 9AYH, (9AYS), (9AYU), 9BCB, 9BCB, 9BDS, (8BED), 9BEY, 9BGH, 9BHD, 9BIK, 9BIL, 9BIE, 9BJK, (9BJI), 9BJV, 9BQW, 9RUD, (9BXA), (9BXM), (9BXQ), 9BPL, 9BZI, 9BSG, 9CCV, 9CDE, 9CFY, 9DAJ, (9DCA), (9DFB), 9DKY, 9CNS, 9COW, 9CMK, 9DOZ, 9DPF, 9DSM, (9DTE), (9DTM), 9DWR, 9DYN 9DUG, 9DIO, 9XAC, (9XAQ), 9YAJ, 9ZN, 9ZY, 9ZAA, (9ZAF). AD7 Can.. 3CO, 3DH, 3XN, (4BV), (5CN), 9AW.

7ACS, Kent Burson, Tekoa, Wash.

C.W.: 1AJP, 1BES, 1CMK, 2AF, 2BMR, 2FP, 3AQR. 3ARO, 3AVW, 3BFN, 3CAN, 3OM, 3YO, 4CG, 4EB, 4KK, 4KM, 4RF, 4YA, 5DI, 5EK, 5KC, 5KP, 5NN, 5PB, 5QI, 5XB, 5XV, 5XAD, 5XAJ, 5ZB, 5ZAI, 5ZAT. 8AB, 8AAF, 8ADG, 8ADZ, 8APW, 8AIO, 8AJX, 8AZD. 8ASC, 8BCH, 8BDV, 8BEF, 8BEO. 8BLC, 8BNJ, 8BO, 8BWA, 8BXX, 8CAA, 8CP, 8CPX, 8CPD, 8CRB, 8CXW, 8DAT, 8FU, 8IB, 8QK, 8VY, 8XAK, 8YD, 8ZO, 8ZW, 8ZY. Sixes, sevens, nines too numerous.
Canadian: 2HG. 4BV, 4HH, 5AC, 5GO.

7LR, Eugene, Ore.

C.W.: 1MC, 1BDI, 1BGF, 1CPN, 2FP, 3OT, 3ARO 3BHM, 3BHW, (3BLF), 3ZO, 4BF, 4EB, 4EH, 4BI, 4JZ, 4KM, 4UU, 4YA, 5AR, (5ABB), 5ABY, 5CT, 5CF, (5DI), 5ER, 5EX, 5FJ, 5GH, 5JT, 5KC, (5KP), 5LO, 5NK, 5NC, (5NS), 5QI 5SF, 5SK, 5SM, 5TC, 5UJ, 5VO, 5XK, 5XAJ, 5XAK?, 5ZA, 5ZAV, 5ZAT, 5ZH, 5XC, 5ACF, 6AA, (6BF), 6BU, (6BM), (6CU), (6CC), 6CP, (6EB), 6EA, 6EN, (6EX), (6FH), (6GX), (6GR), (6JD), (6JN), 6KA, (6KU), 6LF, (6LU), (6NX), (6OM), 6PI, (6RM), (6RD), (6RR), 6SU, (6SZ), (6TC),(6TI), (6XK), 6XAD), 6XAF, 6XAS, 6ZE, 6ZF, (6ZH), 6ZI, 6ZN, 6ZS, 6ZX, 6ZZ, (6AAG), (6AAK), (6AAJ), (6AAT), 6ASC, 6AWP, (6AWT). 6ASJ, 6ACR, (6ABX), 6APW, 6ATV, (6ATC), 6ATG, 6AUU, (6AJF), 6AIY, 6AQW, (6AOR), 6ATY, 6ATQ, 6AGP, 6ARV, 6ASX, 6AKG, (6AKT), 6AEN, (6AJD), (6APV), (6APL), (6AJR), (6AMZ), (6BAE), 6BOE, 6BJD. 6BJY, 6BES. (6BMD), 6BUO. (6BIC), (6BUN), 6BEG, 6BOD, 6BPZ, (6BVF), 6BRK, 6BZL, (6BIP), (6BIQ), (6BIN), (6BUM, 6BNT. 6BVD, (6BCL), (6BCR), (6BRG), (6BVG), (6BCJ), (6BQC), (6BQD), (6BQE), (6BQG), (6BQP), (6BQZ), 6BQR. 6BOW, 6BMY, (6BRU), 6BTZ, 6BCI. (6BJU), (6BNU), (6BKG), 6BFY, (6BGD), (6BEQ), (6BQW), (6BJC), (6BWE), (6BQR), (6BQZ), (6BVF), 7HM, 7IY, 7JG, 7CE, 7SH, 7HI, 7BK, 7NR, 7DH, 7EY, 7LW, (7NG), (7OM), (7QN), (7NN), (7LN), (7VF), (7GE), (7AK), (7WK), (7BA), (7SA), (7TQ), (7WQ), (7ZN), (7GP), (7TT), (7ZA), (7CZ), (7BJ), (7BH), (7SG), (7TQ), (7LU), (7QT), (7TH), (7NJ), (7DP), 7ZO, 7CN, 7PF, 7OE, 7NY, 7NV, 7AW, 7NE, 7NF, 7VE, 7ZV, (7SC), (7OH), (7RN), (7RI), (7TQ), (7ABB). 7AFF, (7AFF), (7AFT), (7ADF), (7ADM), (7ADP), (7ADG), (7AEA), (7AIF, (7AGI), 7AIY, 7AEW, 7ABY, 7AHI, 7AFH, 7AFW, 7ABS, (7AJQ), (7AIC), 8AA, 8AB, 8CD, 8BO, 8BK, 8HN, 8JJ, 8OW, 8QK, 8SP, 8UC, 8UE, 8VL, 8AIM, 8ANB, 8AFD, 8AMQ, 8AOX, 8ASV, 8AXC, 8AZD, 8BCH, 8BFH, 8BFX, 8BIF, 8BNJ, (8BSF), 8BSY, 8BVA, 8BVT, 8BXA, 8BXX, 8BOZ, (8CXW) QRA?, 8CYU, (8CMI) QRA?, 8DWA, 9DTM, 9RH, 9AWM, 9ZAF, 9DPL, 9NX, 9ANI, 9BAF, 9PS, 9BCT, (9ZT), 9AIY, 9BWA, 9BBF, 9ARZ, 9ANZ, 9UU, 9BVI, 9BJD, 9DTE, (9BJI), 9BED. (9CNS), 9ZN, 9GK, 9CMM, 9DLT, 9BXQ, 9CNI, 9CCU, 9ADF, 9BDS, 9CFY, 9PI, 9EI, 9BEY 9OX, 9CT, 9AVZ, 9AUL, (9BHD), 9AMI, 9BAM. 9YAJ, 9II. 9DYN, 9EJ, 9DMF, (9YW), 9EP, 9BIK, 9QK, 9AFN, 9BZI, 9CCV, 9AFO, 9APW, 9XM, 9ARG, 9BSG, 9GR, 9DSO, 9DCU, 9PW, 9YU, 9GK, 9DKQ, 9BXQ, 9PN, 9AMU, 9BLY, 9BTA, 9DWK, 9BVI, 9ANF, 9AAU, 9BJV, 9DSD, 9AZA, 9CFY, 9BXK, 9BRS, 9BRK, 9DDY, 9AMB, 9VM, 9BUH, (9UH), 9CDU, 9BJB, 9ASF, 9AEY, (9BXM), 9DNY, 9BGH, (9CTV), 9RTZ, 9DHI, (9BLT), 9BZI, 9DVL, (9ABU), 9AMQ, 9CNR, (9DGN) QRA?, (9APV) QRA?, (9DGE), QRA?.

Spark: 1CNI, (6AOA). (6AWH), (6AMK), (7FH), (7KJ), (7AFF), (7ABH), (7AFT), (8BDA), 9AOJ.
Canadian: C.W.: (4DQ), 4DY, 4BV, 4HH, (5AC), 5AK, (5CT), (5CN), (5EJ), (5GO), (9BX), 9AC, 9BD. Spark: (5GO), (5GT), 9BD, 3CO.
All hearing my 50 watt A.C.W. pse qsl. All cards answered.

7ADF, H. J. Olschewsky, Montesano, Wash.

C.W.: 1LL, 2AFP, 3ARO, 4BQ, 5AC, 5ADO, 5CT, 5EY, 5FM, 5FT, 5FV, 5KC, 5MT, 5NK, 5PX, 5QI, 5QM, 5QT, 5RH, 5SS, 5TJ, 5UK, 5ZAE, 5ZAG, 5ZAS, (6ABX), 6AHB, 6AHQ, 6AIY, 6AJC, 6AJF, 6ALU, 6ALV, 6ALX, 6AMZ, 6ANB, 6ANG, 6OAX, 6ARB, (6ARK), 6ATC, 6ATQ, 6ATU, 6AVD, (6AVM), 6AVV, 6AX, 6BAK, 6BBH, (6BC), 6BCJ, 6BCL, 6BCV, 6BDF, 6BET, 6BH, 6BIA, 6BIP, 6BIQ, 6BKO, 6BMD, (6BMN), 6BOD, 6BOE, 6BOF, 6BOO, 6BPV, 6BPZ, 6BQC, 6BQF, (6BQL), 6BQR, 6BRF, 6BRU, 6BSJ, 6BSW, 6BTB, 6BU, (6BUM), 6BUN, 6BUR, 6BVG, 6BVW, 6BW, 6BWP, 6BZF, 6CAI, (6CAN), 6CBI, 6CP, 6CT, 6CU, 6DP, 6EA, 6EB, 6EN, 6EO, 6FV, 6GH, 6GX, 6II, (6KU), 6IV, 6LO, 6LU, 6LV, 6NH, 6NN, 6NX, 6QA, 6QM, 6QV, 6RM, 6RR, 6SM, 6SU, 6TC, 6TS, 6UD, 6UW, (6VF), 6VM, 6XAD, 6XX, 6ZB, 6ZH, 6ZL, (6ZO), 6ZT, 6ZZ, 8AQO, 8ASV, 8AWS, 8BB, 8BXQ, 8CUR, 8EU, 8HW, 8IB, 8JU, 8LS, 8ML, 8MZ, 8RA, 8SB, 8UE, 8ZD, 8ZY, 8ZAF, 9AEN, 9AEY, 9AFK, 9AJA, 9AJW, 9AMI, 9ANI, 9AOY, 9ARZ, 9ASF, 9AUL, 9AUU, 9AVC, 9ACG, 9AVS, 9AVZ, 9AWM,

9AX, 9AXU, 9BBF, 9BDS, 9BEY, 9BIF, 9BIK, 9BJI, 9BJK, 9BJV, 9BKW, 9BLV, 9BM, 9BRI, 9BSU, 9BUN, 9BVD, 9BX, 9BXQ, 9BXY, 9BZI, 9CCV, 9CFY, 9CNS, 9CTF, 9CXP, 9DFB, 9DFY, 9DGE, 9DGY, 9DKQ, 9DLM, 9DPL, 9DSM, 9DVL, 9DY, 9DYG, 9DYN, 9DZ, 9IB, 9LF, 9LQ, 9OJ, 9PI, 9PN, 9PS, 9VM, 9XAC, 9XAY, 9YAJ, 9YM, 9ZAF, 9ZT, 9ZY, BT3, CL8.

Spark: (6AGF), 6EX, 6LV, (6ARK), 6OM, 6XN, 7ABH, (7AFF), 7BH, 7LY, 7RY, 7TM.

Canadian C.W.: 4BV, 4CG, 4HH, (4DQ), 5AC, (5CN), (5CT), (5EJ), 5EY, 5GO.

8AM, Detroit, Mich. (1 Tube No Aerial or Ground)

1AW, 1BES, 1CNR, 1XZ, 2AGH, 2AYV, 2BAE, 2CCD, 2CCN, 2CNF, 2CNK, 2NZ, 3AAJ, 3AQR, 3ARO, 3BJ, 3PZ, 3RF, 3SU, 4FA, 4IA, 4OI, 4YA, 5EH, 5EK, 5ES, 5MO, 5ZA, 5ZB, 5ZAK, 6XAD, 6ZZ, 7UU, 7XAD, 7XWI, 7ZO, 8AB, 8AHR, 8AIP, 8ALT, 8ASK, 8ASV, 8ATX, 8AXU, 8AYC, 8AYN, 8BK, 8BDR, 8BEO, 8BFQ, 8BGT, 8BKE, 8BKX, 8BQB, 8BRC, 8BRK, 8BSY, 8BYO, 8BZD, 8CF, 8CV, 8CAA, 8CDD, 8CGX, 8CHK, 8CHX, 8CKV, 8COZ, 8CRB, 8CTP, 8CUU, 8CXW, 8DU, 8DV, 8HW, 8IB, 8JJ, 8KG, 8LS, 8LV, 8MZ, 8NB, 8UF, 8UK, 8VE, 8XE, 8YO, 8YD, 8YV, 8ZW, 8ZX, 8ZY, 9AV, 9AAR, 9AAV, 9AIV, 9APS, 9ASG, 9BBE, 9BCB, 9BDF, 9BDS, 9BGI, 9BHD, 9BIK, 9BLY, 9BRK, 9BSQ, 9BZI, 9CP, 9CR, 9CX, 9CZ, 9CBA, 9CTE, 9DM, 9DAF, 9DIO, 9DKY, 9HR, 9KP, 9OX, 9UA, 9UC, 9UR, 9UU, 9YB, 9ZT, 9ZN, AD7, NOF. Can.: 2HG, 9BJ.

8AUU, Canton, Ohio

C.W.: 1AYZ, 1ANQ, 1AGH, 1AJU, 1ADL, 1ATJ, 1AUS, 1AKL, 1ACB, 1AZW, 1ALZ, 1AXT, 1AWH, 1AOK, 1AJP, 1AWJ, 1AWB, 1AJX, 1ALA, 1AJC, 1AF, 1BSZ, 1BIY, 1BET, 1BWJ, 1BAN, 1BRE, 1BAS, 1BES, 1BYG, 1BGE, 1BGF, 1BRQ, 1BQD, 1BKA, 1BKR, 1BFE, 1BDE, 1BKQ, 1BOQ, 1CIR, 1CNF, 1CWM, 1CNC, 1CNJ, 1CDO, 1CAK, 1CKJ, 1CKP, 1CJH, 1CVE, 1CPP, 1CPT, 1CFX (fone), 1CWS, 1CMK, 1CCU, 1CIF, 1CDR, 1CND, 1CBX, 1CPO, 1CN, 1DO, 1EE, 1GL, 1GV, 1II, 1KI, 1MC, 1OW, 1SN, 1SJ, 1UD, 1UJ, 1XAE, 1XM, 2ANM, 2APR, 2AYV, 2AFP, 2AWF, 2AOL, 2AWI, 2ALJ, 2AFJ, 2ASE, 2AN, 2BGF, 2BDM, 2BUE, 2BQU, 2BUM, 2BEW, 2BUS, 2BFU, 2BBB, 2BZV, 2BGB, 2BGI, 2BJJ, 2BJO, 2BQB, 2BLS, 2BK, 2BU, 2BY, 2CCD, 2CBG, 2CGT, 2CLU, 2CHG, 2CQO, 2CKK, 2CBT, 2CHJ, 2CVJ, 2CQZ, 2CGK, 2CJW, 2CM, 2FP, 2GK, 2GZ, 2HM, 2HO, 2MX, 2OM, 2RM, 2RY, 2SM, 2WR, 2XZ, 2ZK, 2ZS, 3AJJ, 3AJD, 3ARO, 3ALN, 3AJC, 3AVW, 3AFB, 3AIF, 3AAW, 3ARM, 3AOD, 3AHV, 3AQR, 3AWI, 3AWE, 3APT, 3AKR, 3ASP, 3AJG, 3ALC, 3ARN, 3AAO, 3ACY, 3ALU, 3ASI, 3AA, 3BIJ, 3BHM, 3BJY, 3BWT, 3BVA, 3BHL, 3BOF, 3BUC, 3BIU, 3BKT, 3BVC, 3BVW, 3BHO, 3BWV, 3BIC, 3BLO, 3BLF, 3BLU, 3BOB, 3BSS, 3BPJ, 3BLR, 3BES, 3BOU, 3BJX, 3BUP, 3BJ, 3BK, 3BG, 3BQ, 3CDY, 3CEL, 3CCC, 3DH, 3ESB, (?), 3FO, 3FQ, 3FS, 3FZ, 3GK, 3GL, 3HD, 3HG, 3HJ, 3HK, 3HT, 3II, 3JJ, 3KI, 3KM, 3MB, 3MK, 3MO, 3OD, 3OT, 3OV, 3OZ, 3PZ, 3RF, 3SZ, 3TH, 3TJ, 3TW, 3UV, 3VW, 3WF, 3WR, 3WV, 3XM, 3YO, 3YV, 3ZO, 3ZV, 3ZZ, NOF, 4AL, 4BE, 4BI, 4BK, 4BW, 4BX, 4BY, 4CG, 4CY, 4DB, 4EA, 4EB, 4EH, 4EL, 4FA, 4FG, 4FT, 4GN, 4ID, 4JK, 4JS, 4KC, 4KL, 4KM, 4KP, 4LJ, 4OI, 4TC, 4YA, 4ZC, 4ZK, 4ZV, 5AAG, 5AAM, 5AGJ, 5AWG, 5AMS, 5BK, 5BM, 5BW, 5DZ, 5EK, 5ER, 5FV, 5GR, 5HZ, 5II, 5JS, 5KC, 5KK, 5MB, 5MO, 5NA, 5NO, 5NN, 5NV, 5OM, 5PO, 5PX, 5QM, 5SM, 5SS, 5TJ, 5UN, 5VA, 5VV, 5VY, 5XA, 5XB, 5XK, 5XV, 5XW, 5XAJ, 5ZAK, 5ZAS, 5ZAW, 5ZB, 5ZD, 5ZM, 5ZW, 6BSY, 6VF, 6XAD, 6ZZ, 7EH, 7EY, 7GS, 7MH, 7QH, 7VK, 7ZD, 7ZO, 7ZU, [8's as thick as in the call book—Ed.] 9AAD, 9AAU, 9AAW, 9ABV, 9ACD, 9ADF, 9AEY, 9AFD, 9AFK, 9AIB, 9AIG, 9AKK, 9AKY, 9AMC, 9AMT, 9AMU, 9ANA, 9AON, 9APJ, 9APN, 9APS, 9APW, 9ARK, 9ARZ, 9ASD, 9ASE, 9ASN, 9ATO, 9ATZ, 9AUS, 9AVC, 9AWF, 9AZA, 9BAC, 9BAD, 9BAQ, 9BBC, 9BBF, 9BBI, 9BCB, 9BCF, 9BDB, 9BDS, 9BED, 9BFM, 9BGH, 9BHI, 9BHD, 9BHX, 9BIK, 9BIL, 9BJR, 9BJT, 9BKG, 9BKH, 9BKW, 9BKX, 9BLN, 9BLT, 9BOB, 9BPJ, 9BRE, 9BRH, 9BRI, 9BRK, 9BRS, 9BRX, 9BSQ, 9BSZ, 9BTL, 9BTT, 9BUD, 9BUO, 9BVY, 9BVZ, 9BYA, 9BYB, 9BXC, 9BXL, 9BXM, 9BZI, 9BZR, 9BA, 9BJ, 9BN, 9BP, 9CAO, 9CBA, 9CBS, 9CCH, 9CCM, 9CCS, 9CDA, 9CDU, 9CEV, 9CGD, 9CGK, 9CHA, 9CHE, 9CJC, 9CJI, 9CJJ, 9CJM, 9CJN, 9CKW, 9CLW, 9CLY, 9CMV, 9COR, 9CPB, 9CRD, 9CRO, 9CTE, 9CTG, 9CTH, 9CTV, 9CUI, 9CVO, 9CWC, 9CWR, 9CXH, 9CXS, 9CXP, 9CYC, 9CYQ, 9CYW, 9CZF, 9CZY, 9CM, 9CR, 9DCB, 9DCR, 9DDY, 9DET, 9DGE, 9DGQ, 9DGV, 9DHN, 9DIO, 9DJB, 9DJC, 9DJF, 9DJM, 9DJY, 9DKY, 9DLR, 9DOF, 9DRI, 9DSD, 9DSM, 9DTN, 9DVI, 9DWH, 9DWK, 9DXC, 9DXE, 9DXN, 9DZA, 9DZE, 9DZX, 9DZY, 9EAU, 9ECE, 9EDB, 9EFX, 9EEY, 9EFX, 9EI, 9EP, 9FP, 9HK, 9HY, 9JR, 9KP, 9KR, 9LZ, 9MC, 9OC, 9OR, 9OX, 9PF, 9PH, 9PS, 9QR, 9QU, 9UC, 9UR, 9UU, 9VM, 9WC, 9XAC, 9XAQ, 9YAR, 9YB, 9YF, 9YY, 9ZL, 9ZY. Canadian: 2EI, 2HG, 3AT, 3BP, 3BV, 3CO, 3DE, 3DH, 3GX, 3JI, 3JL, 3OH, 9AL, 9BH, 9BJ, 9BV.

9AOG, Lawrence, Kansas

C.W.: (1XZ), 1AJP, 1BAS, 1BKA, fone, 1BWJ, (1CMK), 2BT, 2FP, 2MX, 2WR, 2ZK, 2ZL, 2ZS, 2BMR, 2BQD, 2CQZ, 3CA, 3FS, 3HJ, 3IW, 3KD, 3PZ, 3SU, 3VW, (3YO), 3ZO, 3AKR, 3ALN, 3APR, 3ARO, 3AUW, 3BEI, 3BFQ, 3BGJ, (3BHM), 3BIT, 3BIY, 3BLF, (3BUC), 3BVL, 3CAN, 4CY, (4EB), 4EL, 4FA, 4FT, 4HW, 4IZ, (4JH), 4JZ, 4KC, 4KL, (4KM), 4ME, 4YA, (5AAH), 5AAT, 5ABB, 5ADE, 5ADO, 5AEC, 5AGJ, 5AGN, 5AGY, 5XAD, (5XAJ), 5ZAK, 5ZAS, 5ZAT, 5BM, 5BW, 5CY, 5DI, (5EK), 5EL, 5EN, (5FV), 5GA, 5GG, 5GJ, 5GR, 5HO, 5HQ, 5HZ, 5IA, 5IQ, 5IX, 5JL, 5JS, 5KC, (5KK), 5KL, 5NK, (5NN), 5NS, 5NV, 5OV, 5PB, (5PO), 5PX, 5RN, (5QI), (5QM), 5RH, 5RN, 5SF, 5SS, (5TC), 5TJ, 5UJ, (5UK), 5UO, 5YA, 5VM, 5VO, 5WE, 5XB, 5XV, 5ZA, 5ZB, 5ZH, 5ZS, 5ZU, 6CC, 6EA, 6EB, 6EX, 6FH, 6IF, 6RE, 6RM, (6II), 6ZT, (6ZZ), 6AAK, 6ABX, 6ANH, 6APV, 6ARB, 6AVR, 6AWT, 6BNH, 6BOD, 6BOE, 6BUN, 6CAJ, 6XAD, 7BJ, 7LR, 7LU, (7SC), (7WX), 7ZU, 7ZV, 7ABB, 7AFW, 8's and 9's too numerous. Canadian: 3AD, 3AT, 3BV, (3FC), 3JI, 3JL, 3KO, 3SI, (3SX), (3TA), 3XN, 3ZL, 4BV, 4HH, 9BX.

Spark: 5AQ, (5TO), 5XAC, 8EB, 8BDA, 8COA.

9ZT, D. C. Wallace, 54 Penn Ave. N., Minneapolis, Minn.

C.W.: 1FD, (1QP), 1XM, 1XU, 1ASF, 1BAS, 1BES, (1BKA), (1BKQ), 1BOQ, (1CKP), (2FP), 2KF, (2XQ), 2AFB, 2AGV, 2AJF, 2BMR, 3BV, 3FO, (3OE), 3OT, 3SU, (3XM), 3VO, 3ZO, (3AVA), 3BIJ, 3BOF, 4BI, 4CG, 4CO, 4EL, (4GG), 4GZ, (4HW), 4KL, 4KM, 4YA, (5BE), 5CY, 5DI, (5EE), (5EK), 5FV, 5GJ, 5GR, 5JB, 5ML, 5NN, (5NS), 5NZ, (5PD), (5PX), 5QI, 5QM, 5RZ, (5SF), 5SM, 5TA, 5TC, 5TJ, (5UK), (5US), (5WE), 5XA, (5XB), (5XT), 5XV, 5ZA, 5ZB, (5AAH), (5AAM), 5ADE, (5AEC), 5AIB, 5ANT, (5XAD), (5XAJ), 5XAV, (5ZAK), 5ZAT, 5ZAW, (5ZAX), (5ZAZ), 6FH, 6JT, 6QN, (6ZZ), (6ABX), 6ANH, (6APW), 6BOE, (6XAD), (7LU), 7QM, (7SC), 7AFW, (8AA), (8CF), (8CP), (8CY), (8EK), (8IJ), (8JJ), (8OI), (8RJ), (8WX), (8YD), (8YU), (8ADG), (8ADT), (8AIM), (8ALC), (8APW), (8AWP), (8AZG), (8BDO), (8BRD), (8BWA), (8CCB), (8CED), (8CGB), (8CRB), (8CTN), (8CWP), (8DAL).

Canadian: (3AD), (3CO), 3DE, 3JI, (3TA), (4HH), (9AL), 9BX.

9UH, Fargo, N. D.

C.W.: 1ARY, 1AW, 1BES, (1BLI, 1BSZ, 1CKP, 1CBJ, 1GV, 1XZ, 2AYV, 2BRC, 2CCD, 2CQZ, 2GK, 2MX, 2XQ, 2ZS, 3AAY, 3AJJ, 3ALN, 3AQR, 3ARI, 3ARO, 3AUH, 3BEI, 3BEC, 3BFU, 3BG, 3BHL, 3BHM, 3BLF, 3BOB, 3BQ, 3BUC, 3BRA, 3BVM, 3CCU, 3CG, 3DH, 3FQ, 3FS, 3HG, 3HJ, 3IJ, 3LP, 3MB, 3MK, 3OE, 3OI, 3OT, 3PZ, 3SU, 3WS, 3XM, 3ZO, 4BQ, 4BY, 4EB, 4EH, 4FT, 4HW, 4KC, 4KL, 4KM, 4YA, 5AAA, 5AAM, 5AAR, 5ADE, 5ADO, 5AEC, 5AHR, 5AIB, 5AQI, 5BM, 5CM, 5CX, 5DI, (5EK), 5GK, 5GR, 5IX, 5JB, 5JS, 5KC, 5LF, 5ML, 5MO, 5ND, 5NN, 5NV, (5OV), 5PB, (5PO), 5PV, (5PX), (5QI), 5QM, 5QR, (5RH), (5SF), 5SS, 5SK, (5TC), 5TJ, 5UJ, 5UO, 5UY, 5XAJ, 5XB, 5XT, 5XV, (5YA), (6ZA), 5ZAS, 5ZAT, 5ZAK, 5ZR, 6AJF, 6ARB, (6AWT), 6BIC, 6BIP, 6BOE, 6BRF, 6BVW, 6CC, 6EA-6EB, (6FH), 6KA, 6LU, 6RE, 6RM, 6TI, 6XAD, 6XH, 6ZH, 6ZN, 6ZO, 6ZZ, (7ABB), 7ARY, (7AFW), 7EX, (7HM), 7LR, (7LU), (7LW), (7SC), (7ZU), 7ZN, 8's and 9's too numerous. Canadian: 2AF, 3AD, (3BQ), 3BV, (3DE), 3JL, (4BV), 4DK, (4HH), 9AB, 9AL.

Radio Communications by the Amateurs

The Publishers of QST assume no responsibility for statements made herein by correspondents

Where Are We?

Editor, *QST:*

I have decided that it is a fruitless thing to put up an antenna at all because it is certain to be utterly worthless. According to this dope in Ballantine, my antenna is not worth the price of the screw eyes in the main mast and the 9ZN gang had better pull theirs down because it will never get out of town.

Is there such a thing on this earth as a perfect antenna? Can one be built? If so, where? You can't do it on the Sahara because the ground is N.G. and you can't do it in the hills because there are trees around. And almost anywhere except in the State of Indiana you have to start leveling the neighborhood with a steam shovel.

And then this antenna resistance thing. Does it mean anything at all? At WNY we used to make measurements an hour apart and get totally different results. We blamed it on the instruments then. Now I read that the thing isn't constant anyway. Now where are we?

ED.

Calling

Editor, *QST:*

We could learn a good lesson from the method of calling used by the high power stations of the United Fruit Co., who in turn learned it from the commercial wires. The almost universal method of making a long call is this—3JJ 3JJ 3JJ 3JJ 3JJ 3JJ 3JJ 3JJ 3JJ 3JJ 3JJ 3JJ de 5ZA 5ZA 5ZA 5ZA 5ZA 5ZA 5ZA. (I never heard Falconi make such a call but am using him to illustrate the idea.) Now suppose you tuned in on the last quarter of this show—you would not be at all sure who was being called, and if there is QSS or QRM on any part of the performance the whole call is wasted because some portion is blanked out and is not repeated.

The United Fruit method of calling would have been: 3JJ 3JJ 3JJ 5ZA 3JJ 3JJ 3JJ 5ZA, so that any operator hearing a *part* of this call would have the *whole* idea at once. It takes *less time* and is *more effective.* The idea is especially useful where CQ is being called. How often have you listened to a string of CQ seven yards long and then have the three lonesome signatures fade or be blotted out by QRM? All of this is neither defending the long call or the CQ—both of them are infernal pests—but with C.W. they seem more necessary.

Sincerely,
9KW.

Re Bum Locations

Editor, *QST:*

Just want to tell the gang a little about why Birmingham has not been on the relay map very strong.

For one thing the geographical location of our fair city is all wrong, we are hedged between two mountains of ore, coal and other minerals. Last winter our station was the only one to work out of town. 5XA is only a hundred miles and it took three operators to work us, one to copy, one to tune, and one to cuss. For fading we get the cast iron insulators. The same way here when we tried to work them, they would come in strong on the "5" and fade completely out on the GI. The Bureau of Standards should have made their tests for fading here.

Now the funny part of it is we could work north and west fine, but south, ND OM absolutely. We have worked as far north as Clinton, Iowa, and have been heard in Colorado, but we couldn't get that paltry hundred to 5XA with four amps. in the aerial.

All the above was experienced with spark, we just put in a fifty watter and added a sink to the spark so hope we have better luck this winter, but if you have a msg for us and can't raise us, just say that two mountains of iron ore stopped us.

Best 73's,
5ZAS (ex 5GI).

Whoops M' Dear

Dear Editor:

A long time ago, you asked me to tell how it seems to be a radio man's wife. Well, I'll tell you, and you can tell the world—if you dare.

As to being a radio man's wife—I like it. For sixteen years I have been the faithful wife of a golfer, a camera fiend, a mountain climber, a camper, a fisherman, and now a radio man. After sixteen years of trying to keep up, I find being the wife of a radio man the most restful of all. It hasn't, so far, involved climbing anything

higher than the ridge-pole of the house. It doesn't mean waking up at three A.M., like camping, because the true radio family is always awake at three A.M. anyway. It isn't as bad as fishing; it doesn't require scaling anything slimy or skinning anything—only being skinned occasionally.

Only one thing worries me. This is the man I promised to love, honor, cherish, and obey. Of course I don't obey him—he never expected I would, so I didn't put anything over on him there. I can love and honor him without bothering him much. But cherishing is a different proposition. My idea of cherishing a man is everlastingly and affectionately keeping after him about something, like telling him to wear his rubbers, or change to his winter underwear, or eat his dinner before it's cold, or the money's gone and where will we get some more. This doesn't go any more. He doesn't mind—he simply isn't there. In mind and soul he's listening in (usually all at once) to Newark, Pittsburgh, Los Angeles, and Atlanta, Georgia, and if you'll kindly quit talking he expects to hear Mesopotamia.

I have learned much in a technical way. The secret is careful attention to details. How few, for instance, understand the art of soldering. Every electrical contact must be soldered; every soldered connection must be scraped clean, smeared with hot rosin-core solder, and then neatly damned into place. Skillful damning is what does the trick. The art is best acquired, not in a technical school, as some think, but in a well equipped garage. If you pick it up as some do around old fishing boats and mule trains, it may do as a makeshift, but it will never have a fine finish.

There is one thing more that worries me, and worries me a lot. It would anybody. So far the Old Man has been merely a listener. Now I see signs of his learning the code. I hear him singing da-da-da-da at his morning bath. He is making enquiries about the A.R.R.L. Now I have seen some of these A.R.R.L.ers and the thought of being cooped up for life with anybody like them is awful. I need a bit of expert advice from the experienced—shall I leave him at the first signs, or shall I turn in on the code myself and beat him to it?

The absolute necessity of my remaining anonymous will make it well nigh impossible to send on check for this. But in case I am caught, friends are requested to send flowers. As for the check, I don't suppose *QST* pays contributors anyway—who would ever have to pay a radio man to talk? In fact, I have always suspected that they paid the subscribers to listen to them.

E.G.C.

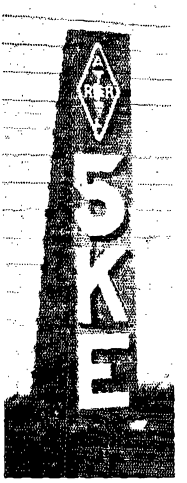
Welcome Signs

Oklahoma City, Okla.

Editor, *QST:*

Well, OM, we saw in December *QST* an appeal for an A.R.R.L. welcome sign, so we are sending a photo of ours. QRV?

When we finished building our C.W. set we found we had quite a sum of money left so we decided to make a sign for our station. QRK? We obtained a bakelite panel, 72" x 12" x ½", and proceeded. Having pronounced abilities along artistic lines, our preliminary training being barn painting, we undertook to decorate the sign. Hi-jacking an old miser (who sold radio apparatus) we secured a supply of $5.00 gold pieces which we hammered flat and with which we inlaid our panel.



Next, feeling nothing was too good for an A.R.R.L. man's sign, we seized upon our battered and dilapidated wouff-hong and, shrieking and screaming as only a harrassed ham can do under stress of extreme QRM, we assailed a broadcaster, and cheerfully, happily, murdered him. He said narry a word. Catching the gushing, gurgling, gore as it flowed from his body, we rushed it to our station where we exposed it to the Z-(b) rays of an old rotary spark gap, and thru this treatment retained the brilliant hue of fresh blood of bull. With this we smeared our sign, shading the gold very beautifully. This panel we hung high up on a mast where it now reposes, serving as a constant reminder of modern science and a scarecrow for the neighborhood gardens. Here is the photographic proof.

Truthfully,
5KE.

Broadcast QRM

Salem, Mass.

Editor, *QST:*

At a time when considerable comment is being made regarding the amateur interference with broadcast reception, and especially where the bulk of the complaints come from those who are unable to read the code, it seems advisable, in the interests of fair play, to bring to your attention the condition that exists here in Salem. Regardless of the type of receiving set used on a regular type of antenna it is impossible to tune out station WBF or to prevent

them from entirely breaking up either local or long distance broadcast reception.

Inasmuch as the amateur is required to stay on or below 200 meters it would seem that such commercial stations should stay sharply tuned on 600 meters, and any movement which you can start bearing toward this end would be very much appreciated by the writer, and any other listener—either broadcast or code—in this vicinity.

Sincerely yours,
Kathryn M. Estey.

In Memoriam

We quote from the Washington (D.C.) Star for January 12, 1923. "Andrew J. White, of the firm White & Boyer, 812 13th St. N.W., disappeared last night, after leaving a note announcing his intention of 'ending the whole thing'." Mr. White had been in very poor health for some time, suffering from violent headaches and insomnia. No trace of him has yet been discovered but the third district gang still hope that he will be found. We have a mighty soft spot in our hearts for the man that engineered the wonderful banquet at the last Third District Convention, whose broadcasting station WJH did everything possible in co-operation with us, who did much for the Washington Radio Club, and whose little shop on 13th Street was famous for its friendliness and fair dealing. "Daddy" White was to us a good and unselfish friend and his going leaves a gap that will not soon be filled.

* * *

We also regret to announce the death of Arthur Gardenhour, 3DY, of Waynesboro, Pa. He was seventeen years old, a junior in high school, secretary of the local club, and representative of all that is good in amateur radio.

Sparks May Come, and Sparks May Go,
But the A.R.R.L. Forever!

The gap it roared both loud and long,
The spark it sang a mighty song,
The key did flame, the ham was proud,
No other note was half so loud.

The bottles glow with quiet light,
The key has lost its arc so bright,
A motor purrs on the station floor,
And the meter reads just two point four.

But whether you care for the roar or the squeal,
There's only one way that a ham should feel,
Put thru your traffic and boost as well,
And stick right by A.R.R.L.

"Continuously," C. W. Paddon.

OPERATING DEPARTMENT

(Concluded from page 57)

Superintendent McCracken who expresses it as an "off month." Enthusiasm seems to exist, but there is a general disregard of traffic work. The San Antonio district shows an encouraging increase in traffic this month, which is largely due to the reappearance of that star station of last season 5ZAK. Serious illness of 5MT at Laredo caused a very big drop in traffic in the valley. 5ADI has changed over to C.W. but as report goes to press, best results have not yet been found with present adjustments. We are strong for 5ADI because of the splendid possibilities in his section. District Superintendent Wall, has been getting some dandy reports from his new 15 watter and is almost a top-notcher with his 108 messages this month. 5KP and 5GR run very close for honors this month, being the two best stations in the second district of southern Texas. 5YK is now 250 watts—rock crusher "never again"—writes District Superintendent E. A. Sahm. Where is 5NH, 5ZAG, and several other old faithfuls? District Superintendent Sundstrom at Houston has the same complaint to register this month. Stations who have applied for and been duly appointed official relay stations won't come across with the necessary dope to be included in reports. What's the matter with 5XAD this month? Eastern Texas district leads easily this month with but about half of the busy stations reporting. This sort of stuff can't continue fellows, if you believe in the principles of the A.R.R.L. Let's all pull together this next time, and put the thing over 100% as it ought to be.

WINNIPEG DIVISION

J. A. Gjelhaug, Mgr.

4CE reports that traffic is on the increase and that amateurs around Winnipeg are beginning to show more interest in the game. 4AS has a 5 watt set and is reaching out. 4CE has a 5 watt C.W. but as yet has not been able to get much DX. 4CJ and 4CX are still working on a 10 watt set and will be in line as soon as the new Government regulations are out. 4CN on 5 watts of C.W. is getting out in great shape. 4DK seems to be the best DX station. He started on 5 watts and did fine work, then went up to 10 watts and was logged in Frisco, Calif. Now he has 20 watts.

MOOSE JAW: 4HH is keeping the ether hot around Moose Jaw and doing F.B. DX work. LOREBURN: 4BV is still going as strong as ever and stronger as he has worked right across the U.S. The other terminal being U.S. 4EB. 4EZ at Stenen

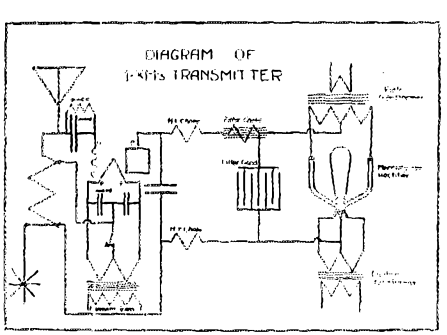
works 4BV OK in daylight. MORSE: 4CB is again on the air. His call, however, is now 9BX, special license on 275 meters. SASKATOON: We have broken out and 4FN is going OK with two 5 watt tubes. We will be open for traffic at 4FN after 10:00 P.M. each night.

Mr. Paul Socolofsky, 4BV, of Loreburn, Saskatchewan has now been appointed Division Manager of the Winnipeg Division. 4BV is well known throughout Canada and the U.S. through his DX work. He sure is a live wire in amateur radio and will no doubt make a good division manager. It is up to each and every one of you to blow your horn to the District Superintendent of your district. The District Superintendents make their reports to the Assistant Division Managers, and they in turn make their report to the Division Manager. The final report which the Division Manager sends in to the Traffic Manager of the A.R.R.L. depends on YOU. BLOW YOUR HORN to your District Superintendent.

1XM

(Concluded from page 52)

filament voltmeter, relay, etc. The maximum power employed for any length of time has been 100 watts and a large part of the work has been done on only fifty watts. Several interesting features in the transmitter may be gained by a close examination of the wiring diagram and the fotos.



The experimental work is carried on on a long bench on the other side of the room where apparatus of all sorts is handy. Outlets are provided for filament battery, 110 volts A.C. and D.C., 220 volts A.C., and 500 cycles A.C. Busses of antenna and ground leads are run along the table and switches are arranged so that an experimental transmitter set up on this bench can be controlled from the regular operating desk, and given a thorough test under actual operating conditions. A large number of circuits have been tried out for transmitting and receiving without interfering with the regular operation of the permanent installation, and this arrangement should be of interest to colleges, clubs, and individual stations where experimental work is being carried on at a handicap to the station proper. From practically every point of view, 1XM is one of the best stations in America.

A. H. K. RUSSELL

(Concluded from page 50)

the leading Canadian amateurs and has been Division Manager of the Ontario Division since November, 1920. He is in his second term as president of the Wireless Association of Ontario (affiliated) and was toastmaster at the recent First Canadian Amateur Radio Convention in Toronto.

Susbsequent to his release from military service Russell entered as a student at Osgoode Hall, Toronto, where he graduated as barister and solicitor in the spring of 1920. After several years of practice he has now become a member of the law firm of Foster, Lester & Russell, in which new connection he is now accepting congratulations.

J. L. REINARTZ

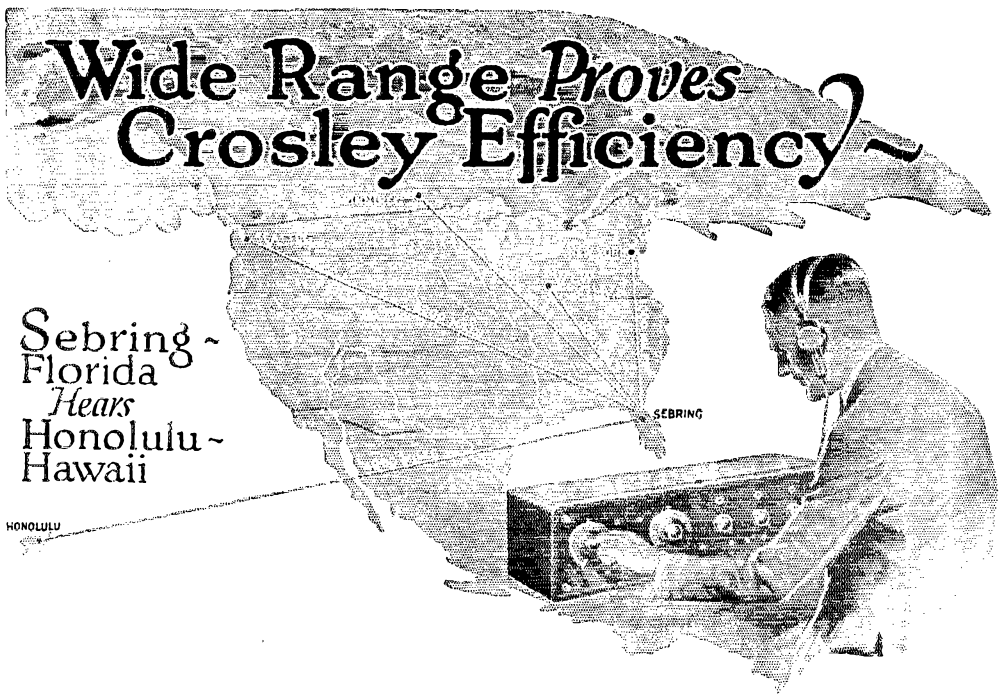
(Concluded from page 50)

roof. This not working, he went to the other extreme and strung 500 feet of No. 6 stranded wire along the tops of trees. This picked up NAA fine. Not satisfied with just listening, he had to have a transmitter so a spark coil set was fixed up and the distance to his neighbor's house was covered OK in spite of an untuned helix. During the war he served as an instructor in one of the state schools and later went to Camp Upton.

At the end of the war, Reinartz set about building 1QP. He too experienced that thrill in working the first DX station. He has been improving his education and learning the reason *why* everything in his station works as it does, and in delving into these mysteries he has constantly found places for improvement. His first job was to convince his wife that when he raves about *LC* that it is not a girl. Being located near our headquarters, *QST* has been in close touch with his work and has forced him to write up his interesting results. (Right here let us state that there may be others who have just as good dope but we aren't where we can jump on their hides continually to get them to write it up.) His first masterpiece to attract attention was described in June 1921 *QST*. The improved tuner was brought to light in March 1922 *QST*. Then in the following June issue a new circuit for a transmitter was described, which was also worked out by 1QP. Our October 1922 issue contained as many refinements and attachments for the Reinartz tuner as there are "gilhikkies" and "goojads" for

a Ford. The improved tuner that appeared in the March issue has met the most favor and thousands are probably in use. This article has been reprinted in many newspapers, club papers, and has been translated and reproduced in the radio magazines of nearly every civilized country in the world, attracting world-wide attention. Who would think an amateur in a shop in South Manchester could do such a thing? QP has an analytical mind and is still working out things and we have not heard the last of him by any means. He is held down by hundreds of letters most of the time but still finds time to be on the air and handle the job of A.R.R.L. Assistant Division Manager of Conecticut.

Wide Range Proves Crosley Efficiency



Every day there comes to us unsolicited new evidence of the remarkable results achieved with various models of Crosley Radio Receiving Sets.

Sebring, Fla., using a Model X Crosley Receiver—price only $55 for this four tube set—"clearly hears three selections and two announcements from KDYX at Honolulu, 4900 miles away."

Centerburg, Ohio receives 1920 miles from Los Angeles, Calif.; 950 miles from Fort Worth, Tex.; 1200 miles from Havana, Cuba; and 750 miles from South Dartmouth, Mass. A Crosley Model VI, a two tube set that costs but $28, was used.

Wide-awake radio dealers everywhere are making large profits handling the Crosley line.

They know that every Crosley Model does everything claimed for it—and more besides. They have found by experience that they are building a clientele of satisfied customers by pushing Crosley instruments.

From our smallest complete receiving outfit at $25 including other sets incorporating Crosley radio frequency tuned amplification at $28, $48, $55 and up to our beautiful console Model XXV, price $150, Crosley instruments offer the highest efficiency at the lowest cost.

We also manufacture a complete line of parts for those who wish to make their own outfit. Among these are Variable Condensers, Knobs and Dials, V-T Sockets, Variometers, Vario-Couplers, Rheostats and the well known Crosley Radio Frequency Amplifying Tuner.

Write For Complete Catalog.

CROSLEY

Better---Cost Less

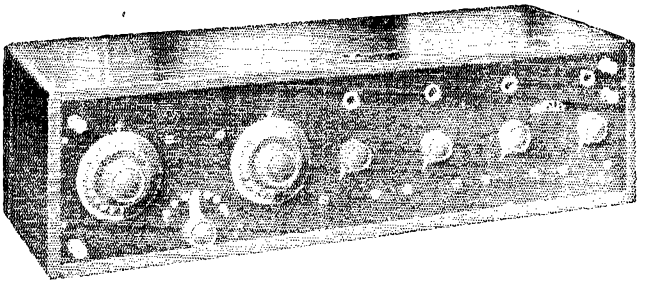
RADIO RECEIVERS

CROSLEY MANUFACTURING CO.

318 ALFRED STREET, CINCINNATI, OHIO

The Three Most Popular Receivers on the Market

CROSLEY RECEIVER MODEL X

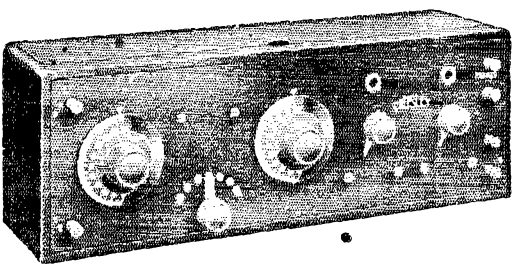


A four tube set that gives remarkable results. Combines one stage of tuned radio frequency amplification with a tuner, audion detector and the Crosley Two Step Amplifier. Price without bulbs, batteries or phones **$55.00**

CROSLEY
Better---Cost Less
RADIO

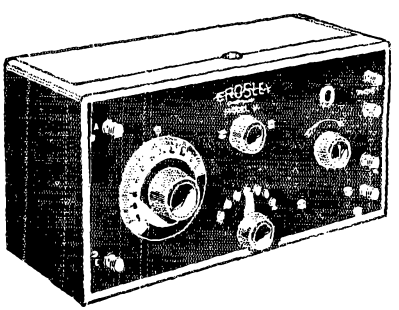
CROSLEY RECEIVER MODEL VI

A two tube set that gives uniform satisfaction everywhere. Combines one stage of tuned radio frequency with tuner and audion detector.
Price without bulbs, batteries or phones..... **$28.00**



CROSLEY MANUFACTURING CO.
318 ALFRED STREET, CINCINNATI, OHIO

CROSLEY MODEL V



Remarkable records are being achieved by owners of the Crosley Model V regenerative radio receiver, which is the greatest result-producing one-tube set being manufactured today. With a range of from 150 to 600 meters, this little wonder brings in amateur, broadcasting and commercial stations. Concerts broadcast more than 1000 miles away are heard by those who own the Model V. The name "Crosley" is used by permission of the Crosley Manufacturing Co. The regenerative feature licensed under Armstrong U. S. Patent No. 1,113,149, October 6, 1914.
Made in two models.

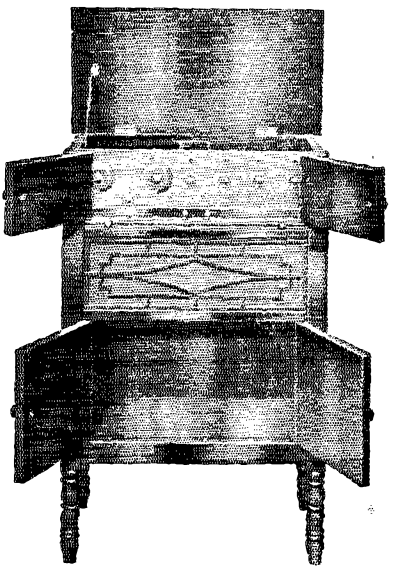
Model V-C **$20.00**
Model V-D **19.00**

Model V-D is the same as V-C but with overhanging lid.

THE PRECISION EQUIPMENT CO.
318 GILBERT AVE., CINCINNATI, OHIO

Beauty and Efficency in Crosley Cabinet Models

CROSLEY
Better---Cost Less
RADIO

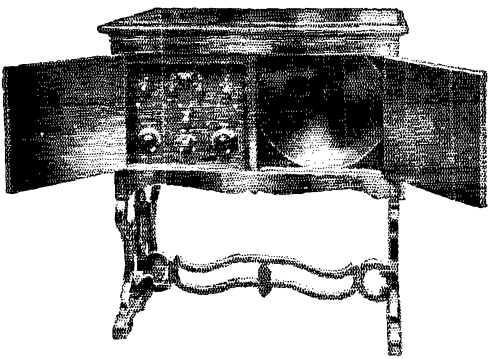


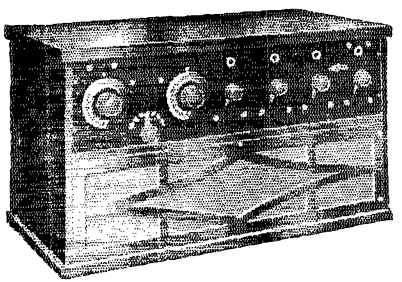
CROSLEY MODEL XX

This beautiful cabinet is practically our Model X built into a highly polished mahogany cabinet. A hinged lid, when raised, allows the operator access to every part of the receiving apparatus. Directly under the receiving apparatus is a highly finished board that slips in and out forming a desk for the operator. Wires lead from the binding posts on the receiver to batteries in the lower compartment. A loud speaker is contained in the middle compartment which makes it possible for music, etc. received, to be heard all over the house. This cabinet is a beautiful addition to any room.
Price without tubes, batteries or phones, ***$100.00.***

CROSLEY MODEL XXV

This is a cabinet model of unusual beauty equipped with four tube panel incorporating the same units as the Model X, but the panel is of different shape as will be noticed from the illustration. This cabinet is arranged to take the Model R-3 Magnavox and also contains space for "A" Battery and "B" Battery and battery charger if desired. Guaranteed to bring in distant broadcasting stations 1000 miles or more loud enough to be heard all over the room. Price without tubes, batteries or phones, **$150.00.**





CROSLEY MODEL XV

The same receiving apparatus is incorporated in this model as in the other receivers on this page with the exception of compartment for batteries. This set will bring in distant broadcasting stations loud and clear. Price without tubes, batteries or phones, **$70.00.**

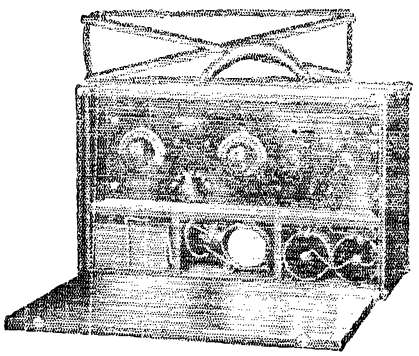
CROSLEY MANUFACTURING CO.

318 ALFRED STREET, CINCINNATI, OHIO

Crosley Portable Sets for
Camp and Traveling

Wherever you may be—at a hunting lodge, in camp or on an automobile trip—Crosley Portable Sets have made it possible to have an unlimited supply of entertainment at your command.
Packed complete with batteries, tubes, phones and aerial in a neat, substantial case these sets may be conveniently carried any place with very little trouble. Crosley Portable Sets will be found a great help in relieving the monotony of a dull evening and in offering a variety of entertainment that everyone present will enjoy.
These sets have been thoroughly tested and found to be highly efficient and accurate in long range reception.
Take a Crosley Portable with you and you take a wide variety of the best entertainment obtainable.

CROSLEY
Better---Cost Less
RADIO

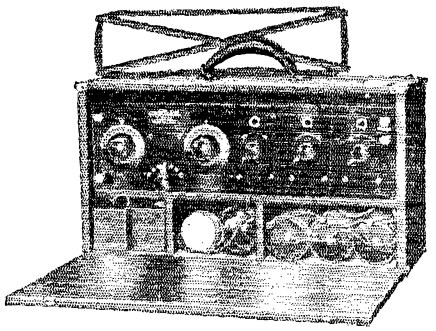


CROSLEY MODEL VI PORTABLE

This set consists of detector and one stage of tuned radio frequency amplification. As the illustration shows, there are separate compartments for batteries, phones, etc., the aerial wound as shown in the picture, is supposed to stand in front of the set when the case is closed. We have received favorable comment from satisfied users all over the country on this set. Price without tubes, batteries or phones, **$40.00.**

CROSLEY MODEL VIII PORTABLE

Consists of one stage of tuned radio frequency amplification, detector and one stage of audio frequency amplification. The general construction of this set is the same as Model VI portable and a wider range and slightly better results are guaranteed. That this is an efficient set is confirmed by the hundreds of letters we have received telling us of the remarkable results obtained with it. Price without tubes, batteries or phones, **$60.00.**



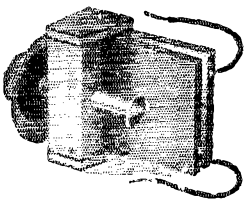
CROSLEY MANUFACTURING CO.
318 ALFRED STREET, CINCINNATI, OHIO

CROSLEY RADIO PARTS are manufactured from the best materials money can buy and are the acme of quality. We draw your especial attention to the CROSLEY patent BOOK-TYPE VARIABLE CONDENSER which impartial tests show to have less resistance than any other condenser on the market.

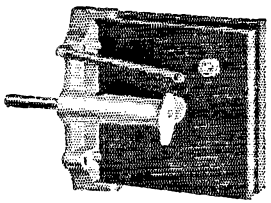
CROSLEY

Better---Cost Less

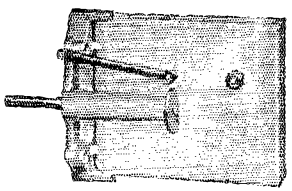
RADIO



MODEL A



MODEL B

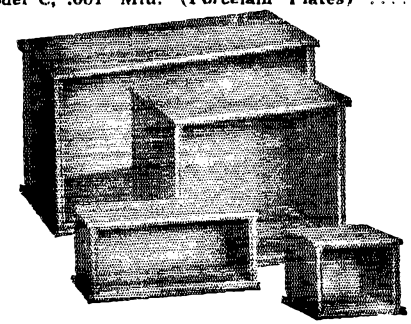


MODEL C

CROSLEY VARIABLE CONDENSERS

The CROSLEY VARIABLE CONDENSERS are unquestionably one of the most radical improvements in radio during the past few years. By using it, louder signals are obtained as it not only is simple and easy to tune, but also has less internal resistance and no body capacity effect.

Model A, .0005 Mfd. (Wood Frame) **$1.25**
Model B, as illustrated, .0005 Mfd. **$1.75**
Model C, .001 Mfd. (Porcelain Plates) **$2.25**



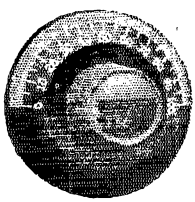
CROSLEY RADIO CABINETS

Realizing the demand for stock cabinets for those who build their own sets, we have developed a line of cabinets that are neat in design, attractive in appearance and finish, and of the best workmanship.

The Crosley Radio Cabinets are made of hardwood Adam brown mahogany finish.

Live dealers handle them—prices and sizes in our catalogue.

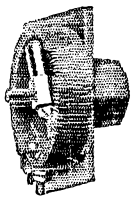
CROSLEY KNOB AND DIAL



Attractive and inexpensive CROSLEY KNOBS and DIALS are extremely well made for all required purposes. The dials are made of shellac composition, 3 inches in diameter, with the letters and figures moulded into them and white enameled.

Furnished Standard for ¼" shaft or ⅛" shaft, optional—**$0.50.**

CROSLEY RHEOSTAT



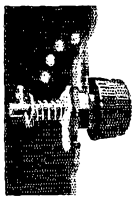
Note the new Crosley Rheostat with ball bearing contact, patent pending.

This rheostat permits exceptionally accurate and delicate variations of the filament current. With it, the best possible results are received from expensive vacuum tubes.

Unique construction allows the CROSLEY RHEOSTAT to be mounted on a panel of any thickness up to and including ⅜ inch. A special grade of non-corrosive wire forms the resistance and results in highly efficient service.

This rheostat is much more attractive, works better and is easier to assemble than the old Crosley Rheostat. It is better in every way and yet the price is the same.....**50¢**

CROSLEY TAP SWITCH



The unique construction of CROSLEY TAP SWITCHES assures a constant tension and eliminates all possibility of the switch loosening and developing a faulty contact on the taps. A stationary washer of our own design has a soldering lug which makes possible a bus wire connection. All CROSLEY TAP SWITCHES are furnished with a newly designed tapered knob and nickel-plated switch arm and bushing.

Price each complete..... 30 cents

Switch Taps for the above made of brass, nickel-plated and complete with brass nut, 3½ cents each.

Your Dealer or Jobber should be able to furnish you with Crosley Apparatus. If not, send us his name and order direct.

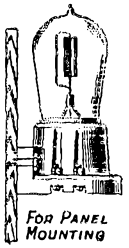
Send for Catalog

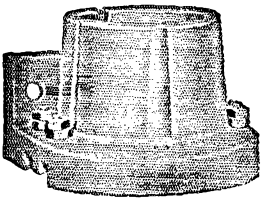
CROSLEY MANUFACTURING CO.

318 ALFRED STREET, CINCINNATI, OHIO

CROSLEY RADIO PARTS shown on these pages are the personification of economy and efficiency. The fact that they are endorsed and used by the best Radio Men in the country should be sufficient testimonial.

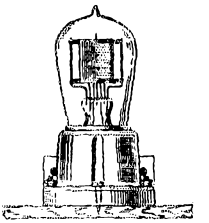
CROSLEY
BETTER-COST LESS
RADIO


FOR PANEL MOUNTING

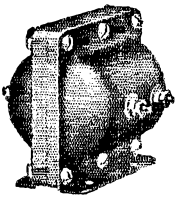


CROSLEY V-T SOCKET

This socket has been pronounced by many radio engineers as the best socket on the market. Ever since its announcement, its success has been phenomenal. Although the success has been largely due to the price, its real popularity is based on its high quality, efficiency, service and practical unbreakability. Patents pending. Beware of imitators.
Made of porcelain for base or panel mounting.....$0.40


FOR BASE MOUNTING

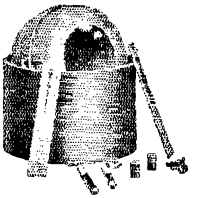
CROSLEY SHELTRAN



Incorporated in the design of the CROSLEY SHELTRAN, are all the characteristics, so essential and necessary to obtain the maximum amplification from the modern vacuum tubes used in radio work. These tubes, with their high amplification constant, operate most effectively at large fluctuations of the grid potential. The CROSLEY SHELTRAN is designed to accomplish these results and tests have shown that the design is correct to insure maximum efficiency. Completely shielded—9 to 1 ratio
Better—Costs Less—$4.00

CROSLEY VARIO-COUPLER PARTS

The CROSLEY VARIO-COUPLER is made with the same accuracy as the CROSLEY VARIOMETER, and is designed to function perfectly with it. Each Vario-Coupler set consists of a formica tube, rotor and the necessary hardware for complete assembly.

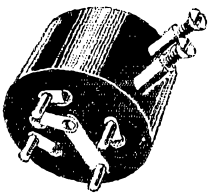


Complete as shown in illustration, ready for assembly—$1.25. Also furnished completely wound and assembled. "Better-Costs Less" $3.00

CROSLEY BINDING POSTS

These are made in three sizes—⅜" diameter, ¼" diameter and ½" diameter. They are all of the same design, however, as shown in the illustration.
No. 1 ..... 5¢ each
No. 2 ..... 7½¢ each
No. 3 .....10¢ each

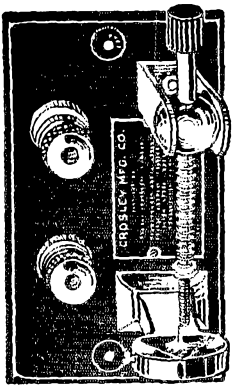
VACUUM TUBE ADAPTER



These adapters permit use of 1½ volt tubes which cannot be inserted in ordinary sockets. There are many people especially those residing in rural districts, who have trouble recharging their storage batteries. By using these special tubes in the Crosley Adapter it is not necessary to have a storage battery, because they require but a 1-5-volt dry cell battery. Price 70¢ without screws and bushings. For panel mounting 60¢.

CROSLEY CRYSTAL DETECTOR STAND

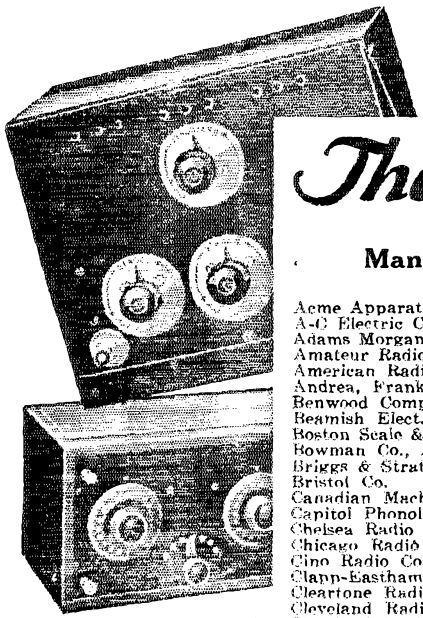
This unit is especially well constructed, neatly mounted on black base covered on the bottom with green felt. All parts are bright nickel finish, complete with mounted crystals, binding posts, etc., manufactured under the following patents: "Patented January 21, 1908; November 17, 1908; June 15, 1909; September 7, 1909; July 21, 1914; September 8, 1914; November 24, 1914; April 27, 1915; January 23, 1917. Licensed for amateur, experimental or entertainment purposes only. Any other use will constitute an infringement. —$1.60.



Your Dealer or Jobber should be able to furnish you with Crosley Apparatus. If not, send us his name and order direct.

Send for Catalog.

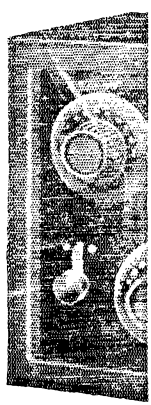
CROSLEY MANUFACTURING CO.
318 ALFRED STREET, CINCINNATI, OHIO

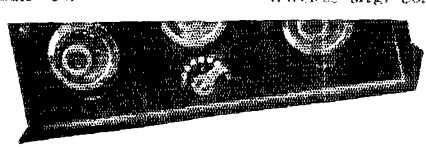


The Leading Radio

Manufacturers of Complete Radio Sets Using Formica

Acme Apparatus Co.
A-C Electric Co.
Adams Morgan Co.
Amateur Radio Supply Co.
American Radio & Research Co.
Andrea, Frank A. D.
Benwood Company
Beamish Elect. Co.
Boston Scale & Machine Co.
Bowman Co., A. W.
Briggs & Stratton
Bristol Co.
Canadian Machine Telephone Co.
Capitol Phonolier Corp.
Chelsea Radio Co.
Chicago Radio Apparatus Co.
Cino Radio Co.
Clapp-Eastham Co.
Cleartone Radio Co.
Cleveland Radio Mfg. Co.
Cleveland Radio Laboratories
Cleveland Products Co.
Consolidated Radio Call Book Co.
Connecticut Telephone & Elect. Co.
Corwin Co., A. H.
Crosley Mfg. Co.
Central Station Equipment Co.
Delancey, Felch & Co.
Doron Bros. Elect. Co.
Dreyfuss Co., P. M.
Duck Co., Wm. B.
Echo Radio Company
Electric Machine Corp.
Experimenters Information Service Co.
Fargo Radio Service Co.
Fast Feed Drill & Tool Co.
Federal Institute of Radio Telegraphy
Federal Telegraph Co.
Federal Telephone & Telg. Co.
Freed-Eiseman Co.
Galvin Electric Co.
General Apparatus Co.
Great Eastern Radio Corp.
Halliwell Electric Co.
Hartman Electric Co.
Heslar Radio Co.
Hyman & Co., Henry
Ingersoll Radio Shops
Kennedy Co., Colin B.
Klaus Radio Co.
Kilbourne & Clark
Laurence Radio Electric Co.
Magnavox Co.
Marshall-Gerken Co.
Manhattan Elect. Supply Co.
McCorkel Mfg. Co.
Meteor Radio Laboratories
Michigan Radio Co.
Midwest Radio Co.
Missouri Radio Co.
Moon Radio Corp.
Mutual Purchasers Assn. (Standard Assem. Co.)
National Radio Institute
Nairsand Radio Mfg. Co.
New York Coil Co.
Paramount Radio Corp.
Premier Radio Mfg. Co.
Precision Machine Co.
Precision Equipment Co.
Radio Apparatus Co.
Radio Amusement Co.
Radio Service & Mfg. Co.
Radio Shop of Newark
Radio Distributing Co. (Radisco)
Radio Products Co.
Radio Electric Company
Radio Shop of California
Radio Instrument Co.
Radio & Scientific Apparatus Co.
Raymond Radio Corp.
J-Ray Mfg. Co.
R. T. Radio Corp.
Reynolds Radio Co.
Scientific Engineering Co.
Signal Electric Co.
Simplicity Mfg. Co.
Simplex Radio Co.
Ship Owners Radio Service Co.
Smith & Smith
Stanley & Patterson
States Radio Corp.
Stern & Co.
Sleeper Radio Corp.
Telephone Maintenance Co.
Tresco
Tuska, C. D.
Waveland Radio Co.
Western Electric Co.
Western Radio Co.
Winkler, Frederick
Wireless Shop, The
Wireless Mfg. Co.





Manufacturers use *and* like

FORMICA

The radio engineers of the leading radio manufacturers all over the United States have approved Formica in the most sincere and convincing way—by adopting it and using it in their production of radio equipment.

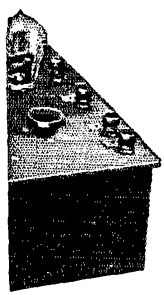
No other insulating material for panels, tubes, and other parts can show a list of makers of high grade radio equipment using their material that is comparable to that printed on the page opposite. It is practically a directory of independent radio manufacturers in the United States.

This overwhelming preference for Formica among the men who, among all others, know most intimately the qualities and characteristics of radio insulation means only one thing.

IT MEANS THAT FOR YEARS FORMICA HAS MAINTAINED A QUALITY AND UNIFORMITY THAT IS NOT TO BE HAD ELSEWHERE.

These men like the handsome Formica finish. They like the way it works with ordinary tools. They like its high dielectric strength and the wonderful uniformity of the product. They like the fact that it improves with age instead of deteriorating.

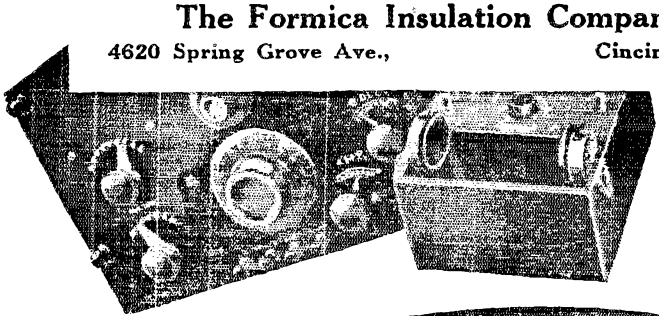
The trained engineers and purchasing agents of these manufacturers can scarcely be mistaken in their judgment of materials. The amateur is perfectly safe in following their lead.

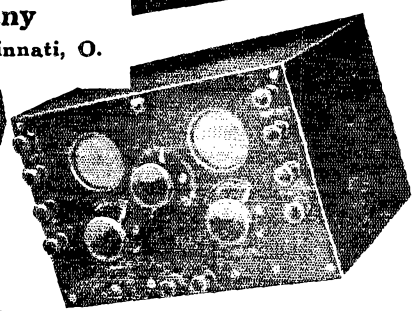


DEALERS: Formica advertising and sales support is the most aggressive and effective in the industry. The Formica Insulation Company treats you right.

The Formica Insulation Company

4620 Spring Grove Ave., Cincinnati, O.





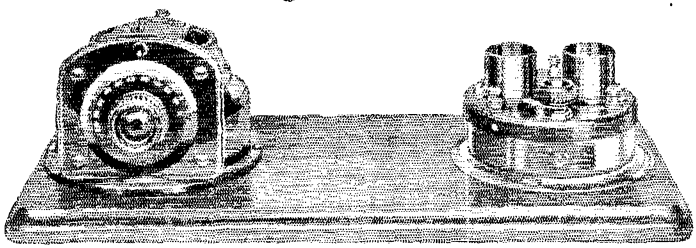
FORMICA

Made from Anhydrous Redmanol Resins

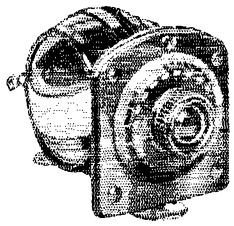
SHEETS TUBES RODS

ATWATER KENT

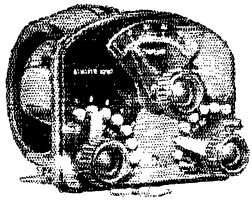
Receiving Sets and Parts



Complete Receiving Set—Coupled Circuit Tuner and Detector 1-stage
A similar set includes Detector 2-stage Unit



Mounted Variometer

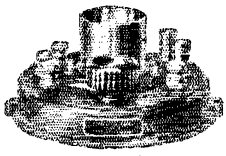


Mounted Variocoupler

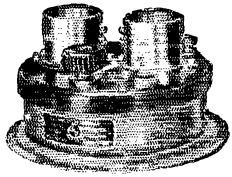
YOU'LL buy ATWATER KENT Radio Equipment on appearance; but you'll keep it for the quality of its performance.

You can buy complete sets in several different combinations, or you can start, if you wish, with a single tube set and add to it as you go along.

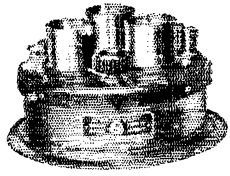
If you prefer to build your own set, the line includes sockets, trans-



Detector Unit



Detector 1-stage Amplifier

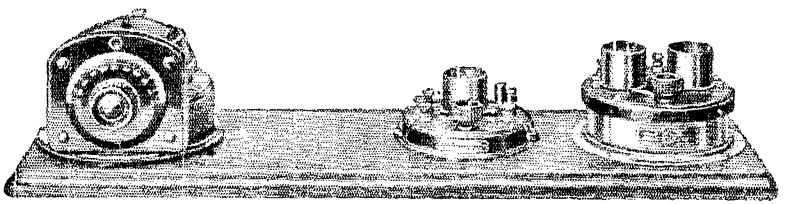


Detector 2-stage Amplifier

ATWATER KENT MANUFACTURING COMPANY
4945 STENTON AVE. *Radio Dept.* PHILADELPHIA, PA.

ATWATER KENT

Receiving Sets and Parts



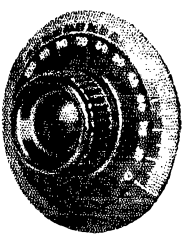
Complete Receiving Set—Coupled Circuit Tuner, Detector, and 2-stage Amplifier
A similar set is furnished without the Amplifier Unit

formers, rheostats, etc., every unit of which is made with the same particular care that characterizes all ATWATER KENT products.

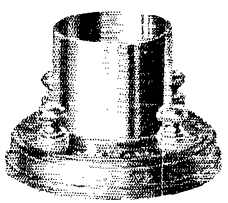
The Detector and Amplifier units are complete including all necessary grid leak condensers, 'phone condensers, transformers and rheostats.

Hear an ATWATER KENT set at your dealer's.

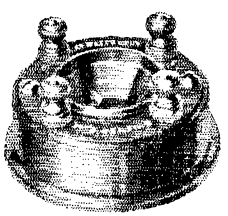
Type L Transformer



Condensite Dial



Standard Audion Socket



1½-Volt Tube Socket

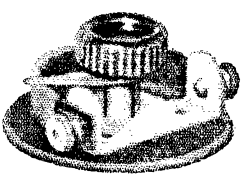


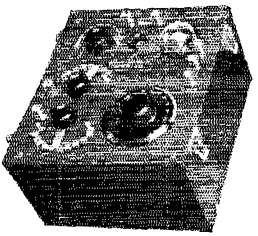
Table Rheostat

ATWATER KENT MANUFACTURING COMPANY
4945 STENTON AVE. *Radio Dept.* PHILADELPHIA, PA.

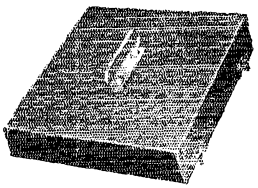
WEBSTER
RADIO APPARATUS

In Webster Radio Apparatus you get real dollar-for-dollar value. It represents the finest in design and construction.

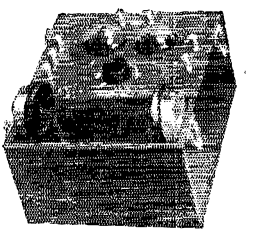
Take, for instance, the Webster 2 A Receiving Set. This set is unusually easy to tune. It is ideal for local broadcasting and for distances of about 50 miles. Under favorable conditions, powerful stations located 150 miles distant and more can be distinctly received.



Webster 2A Single Tube Receiving Set, Nickel Trimmings, Bakelite Panel and Moulded Knobs and Dials. Walnut finished cabinet. Less Head Set and Tubes $30.00



For use with this set we offer our 3B Audio Frequency Amplifier Unit—a combination with a greatly increased radius of reception.



Webster 3B Audio Frequency Amplifier Unit—same fine construction as the 2A Set—Less Head Set and Tubes $27.50

Prices on Webster Receiving Sets are suitably arranged from $30.00 to $119.00. The Webster line of radio parts is high quality in every way. It includes variometers, variocouplers, transformers, palintrometers — in fact it is complete. If your dealer cannot supply you write for our 24 page catalog and order direct.

WEBSTER ELECTRIC COMPANY
RACINE, WISCONSIN, U. S. A.

Manufacturers of the Webster Magneto
Over three quarters of a million now in use.

Super-Inspected Quality

FROST-FONES

have always been true to an engineering ideal. Built for precision and sensitivity, they quickly won national repute.

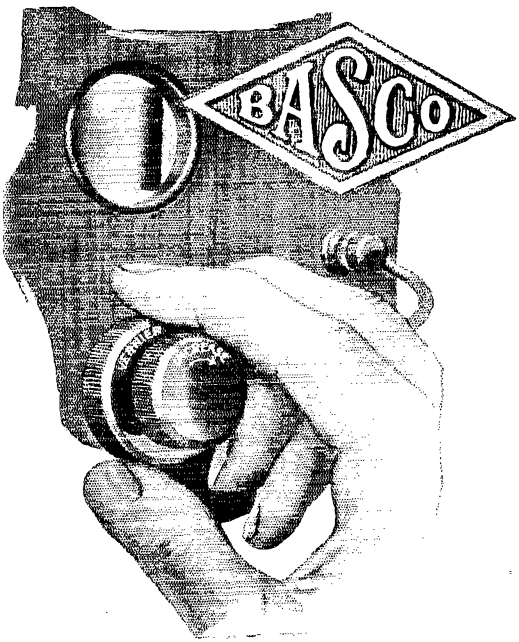
Today Frost Fones are the largest selling head fones in the world. Frost ideals of quality—of precision in manufacture—of rigid inspection during every stage of the making of these famous Fones—insure permanent satisfaction to every one who buys a pair.

Each item in the Frost Radio line is made up to highest standards of radio engineering. You can order Frost Fones, Plugs, Jacks and other apparatus from your dealer with the certain assurance that your money buys the best that can be made, at prices which only quantity production makes possible.

Your dealer sells Frost Fones
See him today

No. 162	No. 163
2000 Ohm Set	3000 Ohm Set
$5.00	**$6.00**

HERBERT H. FROST, Inc.
154 WEST LAKE STREET, CHICAGO, ILLINOIS.



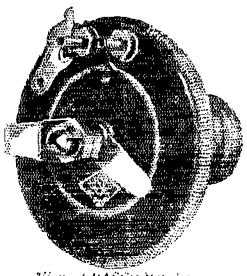
.015 of an Ohm

with BASCO Vernier Rheostat

THE finest adjustment necessary for even the most critical filament. Smooth, positive control—no jumping—no flickering of light. No variation in resistance with change of temperature — no consequent "mushing" of signal—not the slightest. Small knob regulates initial adjustment — large vernier knob, the final sharpening-up of the tone quality.

You need a BASCO for maximum clear-tone quality. They are small, compact and easy to install. Only one panel hole to drill—no bother lining-up two or three screw holes.

$1.25



View of BASCO Vernier Rheostat showing resistance coils.

Resistance coils are rigidly inset in heat-resisting fibre—coils cannot shift in operation. All metal parts, binding posts, etc. heavily nickeled. The highest type of workmanship in every detail.

Jobbers and Dealers! Write for our exceptional discount proposition on our complete line of parts and name of our nearest factory representative.

BASCO PRODUCT

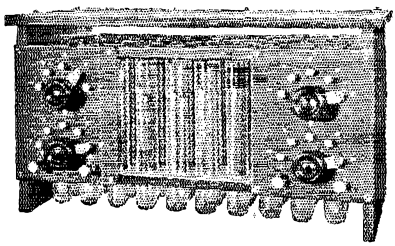
Briggs & Stratton Co.
Milwaukee, Wisconsin

"B" Battery with Panel Control

Storage Batteries

designed for

RADIO



KICO Storage "B" batteries are used by thousands of amateurs who understand radio and consequently buy nothing but the most efficient equipment.

A FEW REASONS

1. Alkaline type. Unlimited Life
2. They eliminate noises caused from "Bs" that are rapidly deteriorating.
3. The switch control allows single cell variations from 12 volts up. (A critical plate adjustment is essential on your detector bulb for C.W. and Radiophone reception.)
4. Rechargeable from your 110 Volt A. C. line in connection with the rectifier supplied with each battery.
5. Will last from three to six months on a single charge while in the detector plate circuit.
6. NOT an experiment. All batteries sold with the privilege of receiving your money back if unsatisfied within a 90 day trial.
7. Neat, Efficient and Compact.

			(Plain)	(With Panels)
16 cell	22 volts		$6.50	
24 cell	32 volts		8.00	$12.00
36 cell	48 volts		10.00	14.00
50 cell	68 volts		12.00	17.00
78 cell	100 volts		16.00	21.00
108 cell	145 volts		21.00	26.00

F.O.B. Buffalo, N. Y.

Literature gladly furnished

We distribute KING Chargers

KIMLEY ELECTRIC CO.

1355 Fillmore Ave., Buffalo, N. Y.

Q.—What is the most important thing in a *wireless* outfit?

A.—The *wire!*

YET we've seen wireless apparatus that seemed almost to take its name literally—as far as having had any serious attention paid to its wire.

Magnet wire is the basic material of radio equipment. For the manufacturer it holds a dual significance. It must perform *economically* in his plant, in the hands of his operators; and it must perform *efficiently* in the finished jobs, in the hands of his customers.

Acme Magnet Wire was made—long before the days of practical radio—to meet these two standards in the field of general electrical manufacturing. It winds easily and economically, because it is uniform, free from imperfections, and its insulation is scientifically applied to insure smooth, rapid production. Its long-continued use by the leading makers of standard electric equipment is ample testimony of its quality in performing the work expected of it.

Acme has pioneered in the development of the finer sizes of enameled magnet wire for radio use and, in winding *hundreds of thousands* of transformer coils in the Acme plant, has gained the practical experience in this field that is of such inestimable value in improving the quality of Acme Wire and maintaining the Acme Service in radio work.

THE ACME WIRE CO., New Haven, Conn.
NEW YORK CLEVELAND CHICAGO

Acme Wire

"*It goes in the space*"

Acme Radio Users

Acme Apparatus Co.
Adams Morgan Co.
Atwater Kent Mfg. Co.
Auth Electrical Specialty Co.
Chicago Telephone Supply Co.
Connecticut Telephone & Electric Co.
Chas. Cory & Son, Inc.
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General Radio Co.
A. C. Gilbert Co.
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Acme Wire Products

"Enamelite," plain enameled Magnet Wire; "Cottonite," Cotton-covered Enamelite; "Silkenite," Silk-covered Enamelite; Single and Double Cotton Magnet Wire; Single and Double Silk Magnet Wire. We also have a complete organization for the winding of coils in large production quantities.

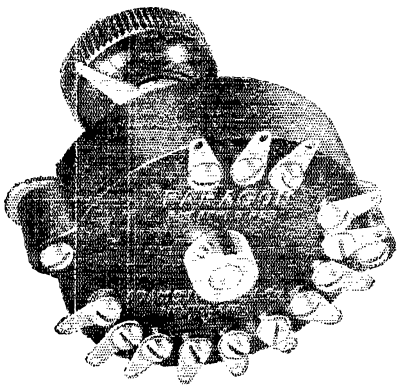
Acme Electrical Insulations

Flexible varnished tubing in all sizes and colors; standard or special.

Acme Radio Specialties

Audio Transformer windings.
Radio Frequency windings.
Magnet windings for Head Sets.
Enameled wire—especially the finest sizes, 40-44 B & S gauge, Silk- and cotton-covered magnet wire.
Enameled Aerial wire—single wire and stranded.

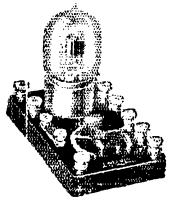
Illustrated Catalog will be sent upon request to Purchasing Agents and Engineers.



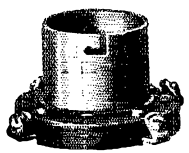
New Paragon Stage Control Switch—$3.00

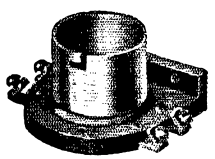
Plugs and jacks are now obsolete. The new Paragon Stage Control Switch combines the functions of three multi-circuit jacks and the telephone plug. It controls, automatically and progressively, all the filament circuits, plate battery circuits and input and output circuits of the detector-two-stage amplifier.

Switching from stage to stage is instantaneous, positive, noiseless. This switch may also be used for an unlimited combination of vacuum tube circuits. 2¾ inches in diameter, ¾ inch in thickness. No. 90.



Paragon V. T. Control No. 70
Attractive — compact — efficient
$6.00





Paragon V. T. Sockets
Perfect contacts — heatproof — mirror finish — non-breakable
Standard
No. 30, $1.00
Universal Mounting
No. 32, $1.25

Paragon Rheostat No. 25
Panel or Table
Rugged — dependable — smooth action
$1.50

Paragon Audio-Frequency Amplifier Transformer
No. 81, $5.00

Paragon Potentiometer No. 35
300 ohms — economical — rugged
$1.75

An illustrated Catalog of Paragon Radio Products is yours for the asking.

DEALERS—The Adams-Morgan Company has an interesting proposition to make to reputable radio dealers who believe in quality merchandise. Details on request.

ADAMS-MORGAN CO., 4 Alvin Ave., Upper Montclair, N. J.

PARAGON

Reg. U. S. Pat. Off.

RADIO PRODUCTS

READ WHY

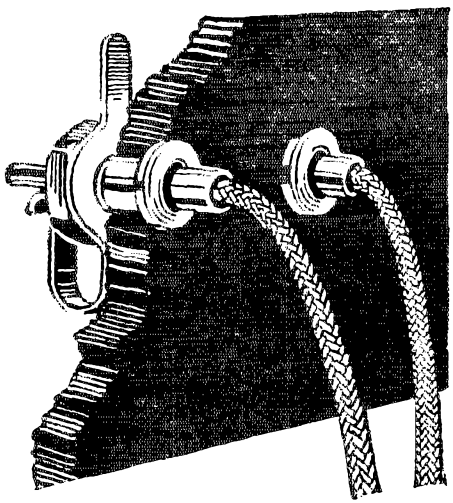
YOU SHOULD USE

UNION RADIO

PHONE TIP JACKS

(Pat. Applied For)

25c A PAIR



Here's the Radio device that you have been waiting for. These Phone Tip Jacks assure quick connection and a positive contact. They replace unsatisfactory binding posts. Soldering lug incorporated but use optional.

Accomodate any standard round phone tip and several sizes of bare wire. Great for W D 11 connections and coil mountings. Save buying expensive telephone plugs and jacks. They live up to the Union Radio Standard of Quality. Guaranteed to satisfy. Only 25¢ a Pair.

FOR ASSURED RESULTS

you should "try out" Union Radio Tip Jacks, Variable Condensers, Rheostats, Vacuum Tube Sockets, Condensite Dials, Complete Receiving Sets and Two Step Amplifiers.

Union Radio Apparatus and Accessories are sold by most good dealers. If you can't obtain them from your local store mail your order to us. Write for a copy of our Catalogue D Radio Apparatus.

WHOLESALERS AND RETAILERS:
Write for our liberal proposition. Dealers Catalogue D and Price List, also samples sent on request.

UNION RADIO CORPORATION
200 MT PLEASANT AVENUE, NEWARK, N.J.
NEW YORK OFFICE — 110 WEST 42ND STREET.

BUILD YOUR OWN RADIO

The Radio Specialty Company — RASCO for short—specializes in small orders; in fact, 50% of our orders are less than one dollar. 24-hour service guaranteed.

This Company specializes in small parts for radio, selling only the highest class of materials. This Company is aware of the fact that very high prices prevail in radio now. By buying material from us you not only save anywhere from 50 to 75% on the cost of the instruments, but you have the fun and instruction of making them yourself.

Our quick, 24-hour service means satisfied customers. We have no Complaint Department. Hundreds of letters such as the following, unsolicited, are in our files:

41 Rodney St., W. St. John, N.B.
Dear Sirs:

Enclosed you will find one (1) dollar for which please send me 1 dozen binding posts No. 201 at $1.00 per dozen and oblige.

Geo. B. Ingraham

P.S. — Rasco Service is sure all it is cracked up to be. I have received three different orders from Rasco and I am still waiting for an order from another Company which was sent in before the first Rasco order.

Yours truly,
G. B. I.

64 page catalog

Our prices are low and all goods are shipped prepaid. You deal with the oldest and only Company exclusively manufacturing the small parts in their own two big factories. Our big 64-page catalog, No. 7, containing over 300 illustrations will save you money. This catalog also contains

75 Diagrams of Vacuum Tube Hook-Ups

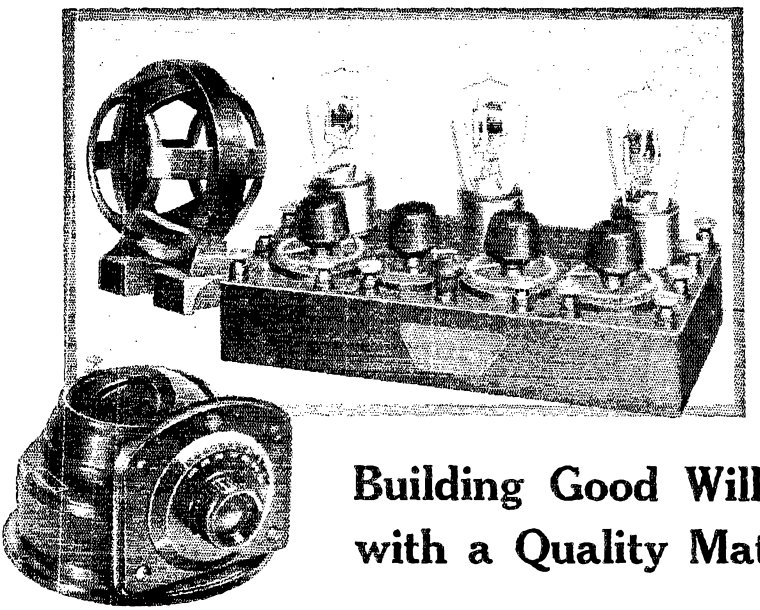
not to be found in any catalog, only found in expensive text books. This catalog sent only upon receipt of 15¢

Once you have tried the RASCO service you are a customer for life. 85% of our customers always come back.

Detector 50c

Radio Specialty Co.

98-100 PARK PLACE, NEW YORK CITY



Building Good Will with a Quality Material

The high quality of much of the Radio apparatus available today is due to the consistent policy of leading manufacturers in this field, who early adopted the phenolic resin material Bakelite, Condensite, and Redmanol, for their electrical insulation. Its uniformity assures them of a constant, unvarying standard. Its dielectric and mechanical strength, dependability, and fine finish, and its availability as a molding material, or in laminated sheets, rods, and tubes, or as varnishes and cements, have met the exacting needs of manufacture.

Write for a copy of Booklet C.

Divisions of
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Bloomfield, N. J.

REDMANOL
Redmanol Chemical Products Co.
636-678 West 22nd St.
Chicago, Ill.

BAKELITE CORPORATION

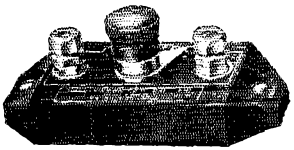
Address the Divisions

Bakelite, Condensite, and Redmanol are the trademark names for the phenolic resin materials manufactured by the several Divisions of the Bakelite Corporation. Each Division maintains a research laboratory which will gladly cooperate with manufacturers in the working out of new applications.

The Material *of a* Thousand Uses

FRESHMAN PRODUCTS

Accurate and Dependable



VARIABLE RESISTANCE LEAK

With .00025 Mfd. Micon Condenser Combined **$1.00** Without Condenser **75c**

Unbroken range—Zero to 5 Megohms, Clarifies signals, lowers filament current, increases battery life, eliminates hissing.

"MICON"

TESTED MICA CONDENSERS

Size	Price
.00025	$0.35
.0005	.35
.001	.40
.002	.40
.0025	.50
.005	.75
.006	1.00
.01	1.50

Assure absolute noiselessness, clarity of tone, accuracy, constant fixed capacity

.006 Micons and Variable Resistance Leaks, especially adaptable for Flewelling Circuit.

ANTENELLA

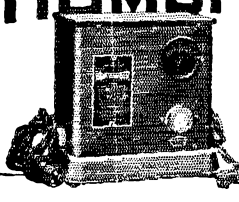
No antenna or aerial needed. Eliminates all the inconveniences in radio. Operates from any light socket. Price only—**$2.00**

At your dealers—otherwise send purchase price and you will be supplied without further charge.

CHAS. FRESHMAN CO., Inc.

97 Beekman Street, New York

HOMCHARGE



Your RADIO BATTERY for A NICKEL

Enjoyable concerts and maximum receiving range are obtained only when your battery is fully charged.

THE HOMCHARGER

charges your "A" or "B" battery over night for a nickel without removing it from your living room. No muss—no trouble—no dirt—requires no watching.

After the concert connect to any lamp socket, snap the clips on your battery and "turn in." While you sleep the HOMCHARGER is silently charging your battery, the charging rate being governed automatically. In the morning it is fully charged. No OTHER battery charger can boast of such QUICK and ECONOMICAL performance.

The HOMCHARGER is the only battery charger combining all of these NECESSARY HOMCHARGING features—SELF-POLARIZING—FIVE to EIGHT AMPERE charging rate—UNDERWRITERS APPROVAL—beautifully finished in mahogany and old gold—UNQUALIFIEDLY GUARANTEED. OVER 60,000 NOW IN USE.

Sold complete with ammeter, etc. by all good radio and electrical dealers for $18.50. ($25.00 IN CANADA.)

See the Radio HOMCHARGERS DE-LUXE at your dealers or write for our FREE circular showing why the HOMCHARGER is the BEST battery charger at any price.

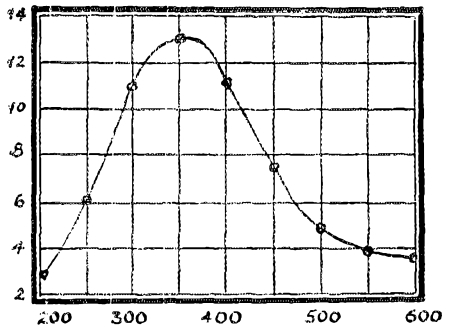
MOTORISTS

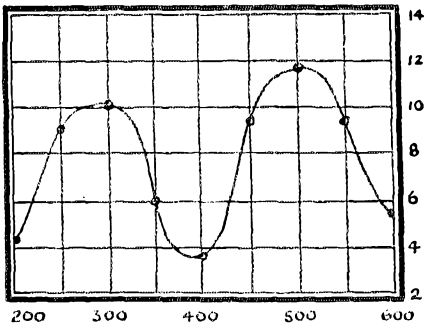
The HOMCHARGER will also charge your AUTO battery.

THE AUTOMATIC ELECTRICAL DEVICES CO.

127 West Third St., Cincinnati, Ohio

Largest Manufacturers of Vibrating Rectifiers in the World.





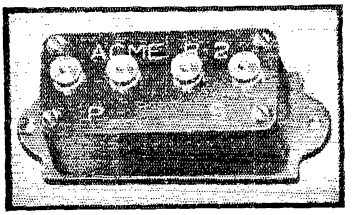
How to get distant stations clearly

Why the Acme Radio Frequency Transformers eliminate distance and distortion

BEFORE you purchase a radio frequency amplifying transformer find out if it has marked depressions and peaks in its amplification range between 250 and 500 meters (indicating absence of amplification in the depressions)—or whether the amplification range curve is uniform.

A Test

THE two charts above tell a graphic story of tests made on radio frequency transformers in the laboratories of a well known concern. The chart at the left plots the amplification range curve of 12 Acme R-2's taken from stock. (Note: The Acme R-2's are made with a special iron core and windings.) The chart at the right represents a composite plot of the curves of 6 ordinary types of different makes taken from stock. The superiority of the Acme R-2 is self evident. Note its steadily increasing amplification curve with its maximum at 360 meters—just where it is most needed.



ACME R-2 Radio Frequency Amplifying Transformer.
Price $5.00 (East of Rocky Mts.)

Better results--greater distance

TO HEAR the distant stations is not enough. To understand them—to be entertained by them—that is the real thrill. The Acme R-2 used in a radio frequency amplifier builds up wave energy without distortion before passing it onto the detector. Even the simplest and most elementary types of set either vacuum tube or crystal receiver type will have its useful range tremendously increased when the Acme R-2 and a vacuum tube are employed.

The best method

TO GET the distant stations clearly, use Acme Radio and Audio Frequency Amplification. This insures maximum sensitivity and intensity, quietness in operation and freedom from distortion. A small indoor antenna or loop may be used and sufficient intensity obtained to operate the Acme Kleerspeaker providing perfect entertainment for a roomful of people.

You can get these and other Acme Products at radio, electrical and many hardware stores. Write for booklet R-2 showing proper hook-ups and other information.

The Acme Apparatus Company
Pioneer transformer and radio engineers and manufacturers
CAMBRIDGE, MASS., U.S.A.
New York, 1270 Broadway
Chicago, 184 West Washington Street

For Amateur Wave Lengths Use R-1, R-2 and R-4

ACME ~ *for amplification*

Enjoy Radio at its *best*

Dependable, even-powered batteries mean better control—quicker and sharper tuning—more complete and constant mastery of your radio set. Westinghouse Batteries are right in step with the latest advancements in radio receiving. Can be easily and repeatedly recharged. No discouraging results from run-down batteries!

Westinghouse "A" Batteries are carefully constructed, full-capacity, slow-discharge, long-life batteries. Made in 4-, 6- and 8-volt sizes with 3, 5, 9 and 13 plates per cell, to meet all filament-battery requirements.

Westinghouse "B" Batteries. The Westinghouse 22-MG-2 (22 volts) is a marvel for steady, noiseless, full-powered service. Glass case; visible interior; sealed-in tops. Larger types, too; also 2-volt single cells for "C" batteries.

At radio dealers and Westinghouse Battery Service Stations everywhere. *Write for illustrated folder, "Westinghouse Radio Storage Batteries."*

WESTINGHOUSE UNION BATTERY CO., Swissvale, Pa.

WESTINGHOUSE

RADIO "A," "B" and "C"

BATTERIES

This combination completes any RADIO RECEIVING SET

MAGNAVOX Radio

The Power Amplifier and Reproducer Supreme

THE Magnavox, in amplifying with extreme sensitiveness every signal supplied to it from the receiver, must necessarily amplify any extraneous sounds which may originate in the receiver or power amplifier itself.

Therefore, the *combination* of Magnavox Reproducer with Magnavox Power Amplifier (as illustrated) is very desirable. By this equipment, in connection with a good receiver, you get the music or speech with true clearness—and in practically any volume required.

To own a good receiving set without Magnavox equipment, is like having your house properly wired and then using only small, feeble candle-power lamps in the sockets!

The Magnavox Co., Oakland, California
New York: 370 Seventh Avenue

MAGNAVOX

R-2 Magnavox Radio with 18-inch horn: this instrument is intended for those who wish the utmost in amplifying power; for large audiences, dance halls, etc.

R-3 Magnavox Radio with 14-inch horn: the ideal instrument for use in homes, offices, amateur stations, etc.

Model C Magnavox Power Amplifier insures getting the largest possible power input for your Magnavox Radio. 2 and 3 stage.

When you purchase a Magnavox product you possess an instrument of the highest quality and service.

Magnavox products can be had of good dealers everywhere. Write us for copy of new illustrated booklet.

THE ACOUSTICAL AMPLIFIER

BEL-CANTO

TRADE-MARK

Loud Speaker

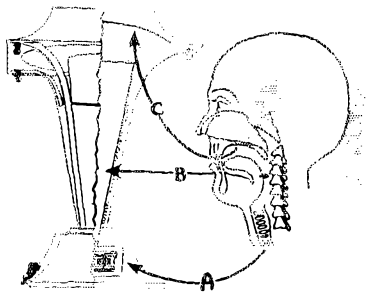
Amplifies Without Distortion

Built along scientifically correct principles, following minutely the natural functions of the human throat. The unexcelled acoustical amplifier!

The receiver is the vocal cord (A); the long tapering inner horn is the throat (B); and the sounding board at the top is the roof of the mouth (C).

With this superlative amplifier you can readily distinguish the delicate tonal differences between the harp and the piano, even when the two are playing together. A test never before equalled.

Patent Applied for



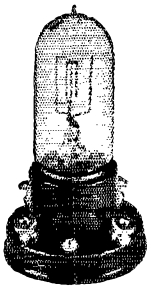
Is adjusted for regenerative two stages of amplification, also five tube radio and audio frequency.

Special phone, cord and plug, price $30.00 F.O.B. New York. If dealer can't supply, we can.

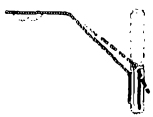
Full line of radio parts.

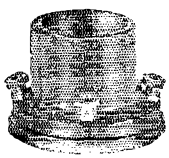
BEL-CANTO CORPORATION

417 East 34th Street **New York City**



Na-ald W.D.-11





Na-ald De Luxe

It's the contact that counts

The special phosphor bronze clips of the Na-ald W. D. 11 Socket maintain perfect contact regardless of any variation in tube prongs and bases.

Moulded from genuine Condensite, these sockets are made for use with the famous W. D. 11 tubes, operated by a single cell battery.

The Na-ald De Luxe V. T. Socket is of highest quality throughout. Its laminated phosphor bronze strips press firmly with a side wipe action on the contact pins, keeping surface clean and insuring perfect contact.

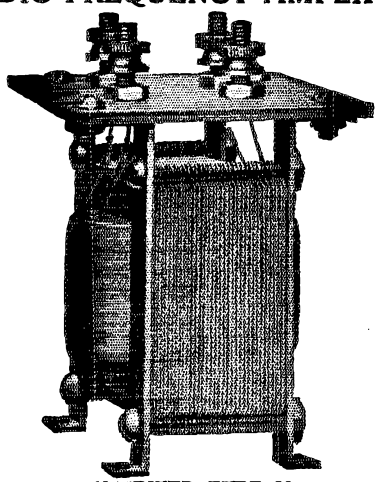
These sockets retail at 75c each

Send stamp for dial, small space socket, condenser and R. F. Transformer circulars.

ALDEN MFG. CO.
formerly
ALDEN-NAPIER CO.
Dept. M 52 Willow Street
Springfield, Mass.

NA-ALD

AUDIO FREQUENCY AMPLIFIER



MOUNTED TYPE M

Silicon Steel Cores; Shell Design—Bakelite Terminal Board; Ratio—9 to 1; Insulation tests 1500 Volts.

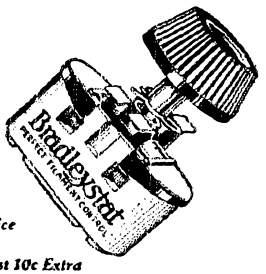
Mounted Type M—$5.00
Semi Mounted Type SM—$4.50
Unmounted Type UM—$4.00
Discount 10% for cash with order

Designed by Packard *Engineers—*

A quality Name in Radio

THE STANDARD TRANSFORMER CO.
Warren, Ohio

Audiola adopts the Bradleystat



Retail Price
$1.85
Parcel Post 10c Extra

Another Radio Manufacturer discards the wire rheostat!

Why? Read this letter—

January 2, 1923.

Allen-Bradley Co., Milwaukee, Wis.

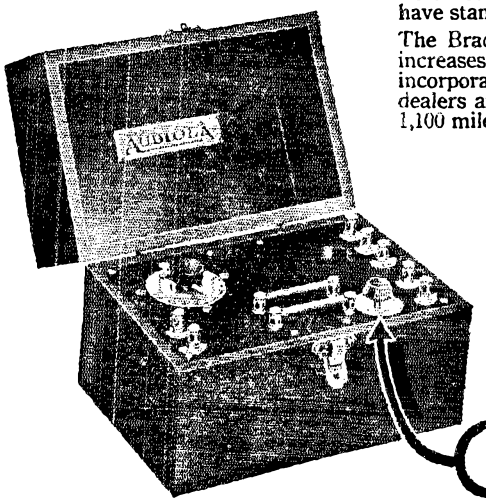
Gentlemen:

Regarding the Bradleystat in the Audiola Receiving Set, we wish to advise that while your rheostat is more expensive than the wire-wound type, we would not go back to the wire rheostat and have standardized on the Bradleystat.

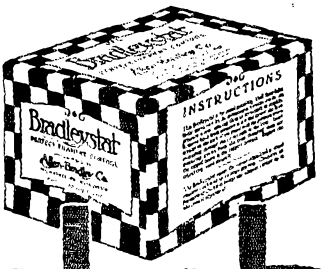
The Bradleystat is noiseless, permits more accurate tuning and increases the loudness of signals and the range of our set. Since incorporating the Bradleystat, we have received many letters from dealers and users stating that they are receiving stations 700 to 1,100 miles distant with our single tube detector set.

Yours very truly,
AUDIOLA RADIO COMPANY.

Sales Manager.



For bulletins, write to
Allen-Bradley Co.
Electric Controlling Apparatus
277 Greenfield Avenue
Milwaukee, Wis.



Bradleystat

REGISTERED U.S. PAT. OFF.

PERFECT FILAMENT CONTROL

Do You Want a *REAL* Headset?

The Dictograph is the Best Headset in the World at ANY Price

This is the same supreme Dictograph Headset that has always sold for $12—same in quality, same in guarantee, same in everything but the price—$8 complete. Made by the makers of the world standard Dictograph products—the marvelous "Acousticon" for the Deaf, the famous Detective Dictograph, the Dictograph System of Interior Telephones and the Dictograph Radio Loud Speaker for the Home.

Read a few of the many letters we have received from Dictograph Headset users. You, too, can enjoy the utmost in Headsets if you own one.

U. S. Marine Hosp. #43,
Ellis Island, N. Y.

"The undersigned has for the past sixteen years been an amateur, commercial, and government operator, and has used every known make of radio receiver on the market. On April 21st one of your Type R-1 3000 ohm receivers was purchased and it can be safely said without dispute that they are absolutely the best radio receivers on the market today; bar none."

C. H. West, U. S. P. H. S.

Laporte, Ind.

"I wish to compliment you on the 3000 ohm Headset you now have on the market retailing at $12.00, (now $8.00). I have been experimenting with the radio game for the past year. In my experience I have tried out 14 different headsets, including the ----- which I purchased for $16.50. I at last have found the ideal phone where tone quality excels, and harshness is eliminated, and I cannot express myself in words as to the wonderful results I have obtained."

J. T. Bachman.

Madison, South Dakota.

"We are using a Dictograph Headset, also Dictograph Loud Speaker. Both are O.K. In fact I would not trade my headset for any other I have ever listened through."

Dan C. Coutts, Radio Operator.

Havana, Cuba.

"In my long distance receiving set have four pairs of Phones, a 4000 ohm French make, two Pairs of ----- and a pair of your Dictograph 3000 ohm and I assure you that none of the others afford me the service I get from the Dictograph. The Dictograph gives me a truer clearer tone than all the others combined. I use them in extremely long distance work (phone). I hear Chicago, Schenectady, Iowa and Frisco most every night with one detector and two steps of amplification using the standard regenerative honey comb set."

David E. Masnata.

Go to your dealer's today and listen in with this supreme instrument. Note the difference. Buy two or three Dictograph Headsets and let the rest of the family enjoy your set.

Alway insist on Dictograph Products. *They are fully guaranteed.*

If your dealer cannot supply you, send direct to us.

The Standard of the World

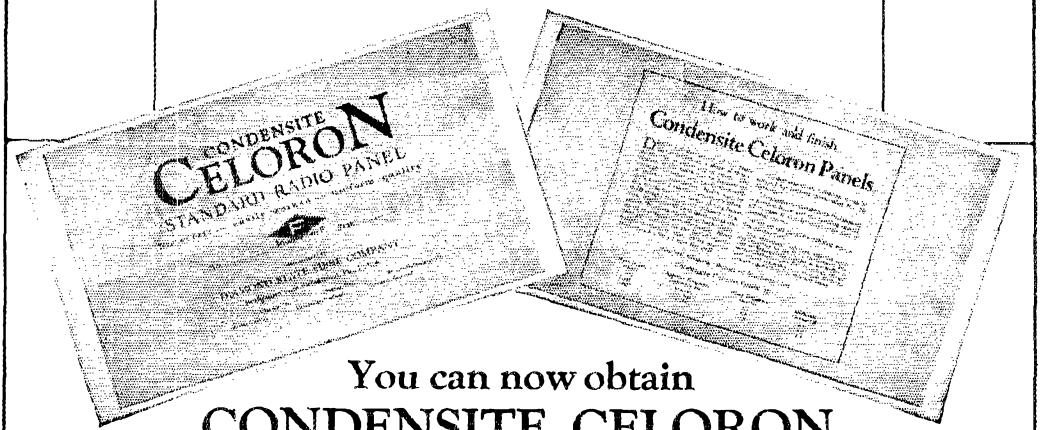
Type R-1, 3000 ohms. For all types of crystal and vacuum tube receiving sets.

DEALERS:—The Dictograph is the choice of all experts and radio fans. Order through your jobber or write direct for names of authorized distributors.

DICTOGRAPH PRODUCTS CORPORATION

Suite 1304, 220 W. 42nd Street, New York City

Branches in all principal cities



You can now obtain CONDENSITE CELORON RADIO PANELS

cut in standard sizes

YOU can now get radio panels already cut to a size to fit your needs. For your convenience we are making Condensite Celoron Radio Panels in seven standard sizes. No longer will you have to wait and pay extra cost for having your panel cut to order.

These sizes have been so designed as to meet practically every need of the set-builder. Each panel comes trimmed and wrapped separately in glassine paper to protect the surface. They are all ready for immediate use. On every one are full instructions for working and finishing.

What Condensite Celoron Is

Condensite Celoron is a laminated phenolic condensation product used by many of the leading manufacturers of radio equipment. It has high insulation resistance, high dielectric strength, low dielectric losses and is easily worked. Because Celoron has these qualities it has received the approval of the U. S. Navy Department Bureau of Engineering and the U. S. Signal Corps.

You can obtain any of these seven standard sizes:

1. — 6 x 7 x 1/8
2. — 7 x 9 x 1/8
3. — 7 x 12 x 1/8
4. — 7 x 18 x 3/16
5. — 9 x 14 x 3/16
6. — 7 x 21 x 3/16
7. — 12 x 14 x 3/16

Select the size you need for your set. If your radio dealer has not yet stocked them, ask him to order for you. Or write direct to us, designating by number the size you want. We can make prompt shipment.

To radio dealers: Write for special dealer price list showing standard assortments

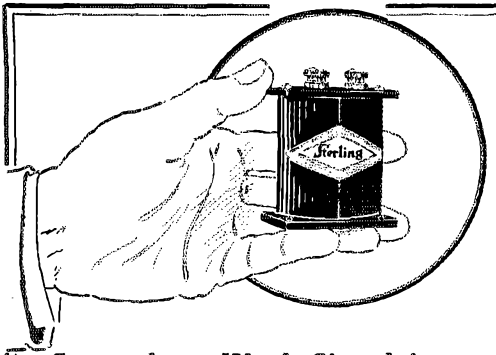
Diamond State Fibre Company

BRIDGEPORT (near Philadelphia) PENNSYLVANIA

BRANCH FACTORIES AND WAREHOUSES
BOSTON CHICAGO SAN FRANCISCO

Offices in Principal Cities
In Canada: Diamond State Fibre Company of Canada, Limited, 245 Carlaw Avenue, Toronto

CONDENSITE CELORON STANDARD RADIO PANEL



Look At This Little Transformer!

—A GIANT FOR WORK—

Strengthens Weak Signals! **Brings in Distant Stations!**

An Audio or Radio Frequency Amplifying Transformer—regular Tom Thumbs in size but Giants for work. That's the Sterling.

For pure amplification, reducing distortion and increasing your range, make sure you ask your dealer for the STERLING. Size 1½" by 2" by 2⅞".

Radio Frequency Amplifying Transformers

OPERATE ON ANY WAVE LENGTH

List Price $5.00
Trade Discounts on application

Sterling

AMPLIFYING TRANSFORMERS

mean success to your radio receiving

Other STERLING Radio Products

Portable Rectifiers — Filament Rheostats
— Filament Meters — Pocket Voltmeter
— Filament Meters — Pocket Voltmeters

—and increasing fast.

THE STERLING MANUFACTURING CO.
2845 Prospect Ave., Cleveland, O.

Audio Frequency Amplifying Transformers

MAGNETIC CIRCUIT OF CLOSED CORE PERMEABILITY SHELL TYPE

STRAY FIELDS REDUCED

List Price $4.00
Trade Discounts on application

BIG PROFITS IN R. T. S. EQUIPMENT

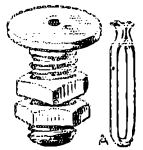
R. T. S. Equipment converts the one-time buyer into a profitable, permanent customer. By handling R. T. S. Standard and Special Equipment you can fill every demand promptly, with satisfaction to your customer and profit to yourself.

The R. T. S. Condenser, shown here, is proving unusually popular. They make the tubes perform properly, cut out "howling," and clear up phone speech. Furnished complete with mountings, ready for connection.

Made in three capacities, prices to retail trade as follows:

Grid Condenser .0005 MF.....30¢ each
Grid Condenser & Leak, Combined.....45¢ each
Phone Condenser .0013 MF.....30¢ each

R. T. S. CORD TIP JACK



This R. T. S. Cord Tip Jack leads the way in quality, service and price. Constructed of spring phosphor bronze, highly nickeled. A wiping spring contact insures a clean, positive contact at all times. Where others sell from $1.00 to $2.50, this R. T. S. Cord Tip Jack Retails at.....per pair, 50¢

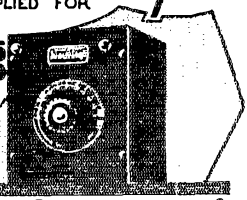
Jobbers and Dealers: Send Today for NEW Wholesale catalog, with scale of prices and discounts to recognized trade.

RADIO TESTING STATION
Dept. Q-3, 25 Sturgis Street
Binghamton, New York

TRADE Wave Trap MARK

PATENT APPLIED FOR

The Missing Link in RADIO



Stops Interference!

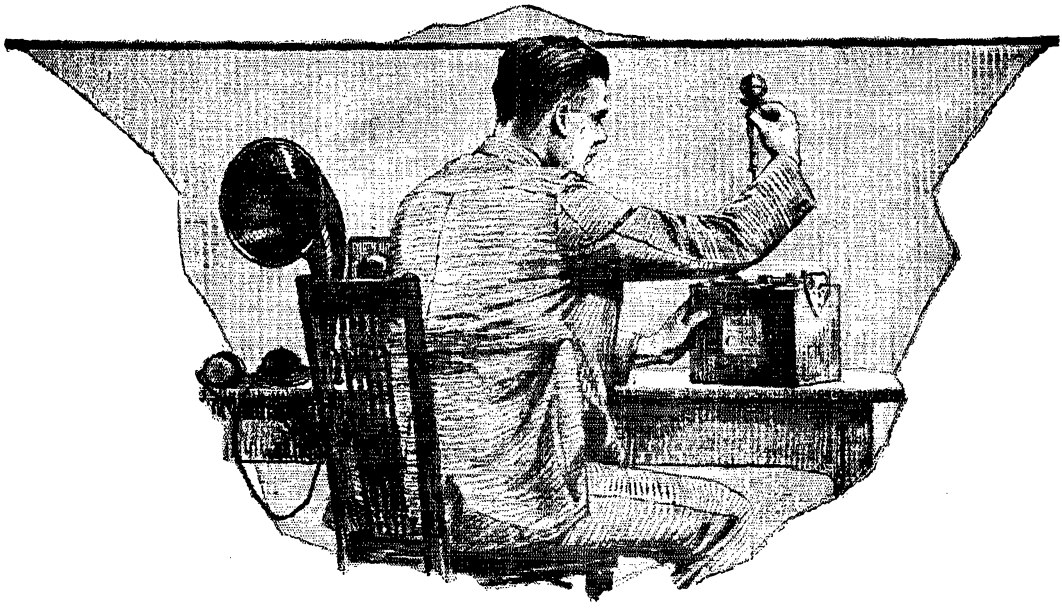
Get that elusive DX station thru heavy QRM. With the "WAVE TRAP" you can do it and greatly increase your range.

It is installed in a minute by changing only one connection and is indispensable on any receiving set, with any type of antenna. It is mounted on a Formica panel in a handsome mahogany finished cabinet 6x6x6, and is a high-grade instrument throughout.

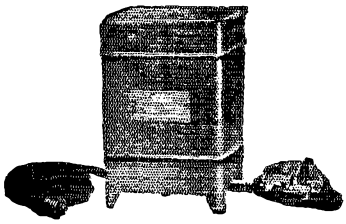
8.50 CHARGES PREPAID

Ferbend Electric Co.
19 E. SOUTH WATER ST.
CHICAGO

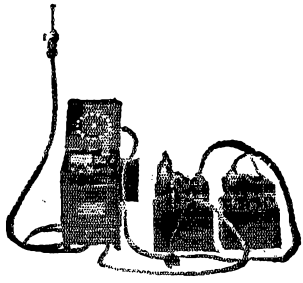
Circular on Request



Tungar
BATTERY CHARGER



This enables you to keep batteries fit, right at home. With simple attachment, it will also charge "B" storage batteries.



This is the way "B" Storage Batteries are charged with Tungar and attachment.

Your Battery Should be Kept Fit

The Tungar Battery Charger makes it a simple matter to keep your storage battery tuned-up and fit. With it you can recharge your battery at home—and at little cost.

Tungar is a small, compact rectifier, which can be connected with any a-c. lighting circuit. It is easy and safe to operate—in fact, requires no attention after starting. And when properly connected, the current can go only the one way, eliminating any danger of ruining the battery.

There is no excuse for allowing your battery to run down and spoil the evening's fun. A Tungar doesn't cost much—and it charges the starting and lighting battery in your automobile also.

Send for our new booklet on Tungars for radio, if your dealer cannot supply you.

Address Merchandise Dept., General Electric Company, Bridgeport, Conn.

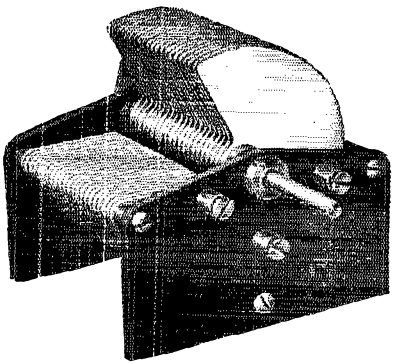
General Electric Company

General Office Schenectady, N.Y.

Sales Offices in all large cities

35A-78C

HERE'S A PAIR OF WINNERS



THE WIMCO CONDENSER

Made to meet a demand for quality — highest efficiency, 3 plate, 23 plate and 43 plate sizes.

Very low resistance and very low zero capacity. The phase angle does not depart from 90° sufficiently far to be detectable. Highly recommended for the fine tuning necessary in amateur apparatus.

THE CARCO COUPLER

Just the thing for the popular receiving set. Bakelite tube and rotor, silk covered wire, perfect contacts. Designed and developed by an amateur for the amateur.

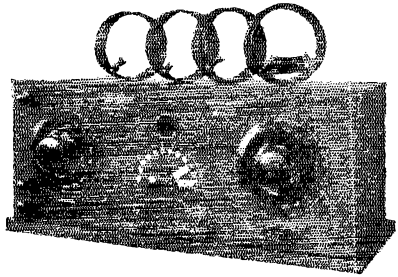
Guaranteed to produce superior results. Range 150 to 700 meters. Not just "a coupler" but the real coupler—peer of all, the Carco.

We invite Dealer and Jobber inquiries.
Send for literature and prices on the
WIMCO SOCKET FOR WD-11 TUBES

THE WIRELESS MANUFACTURING CO.

CANTON, OHIO

Manufacturers—Distributors



Grebe RORN

The New Grebe Radio Frequency Amplifier Type RORN represents one of Grebe's finest products.
One user states "the sweetest music I ever heard over the Radio was with the New Grebe Radio Frequency Amplifier together with the regular Grebe C-R8."

PHILADELPHIA WIRELESS SALES CORPORATION

Formerly Philadelphia School of Wireless Telegraphy

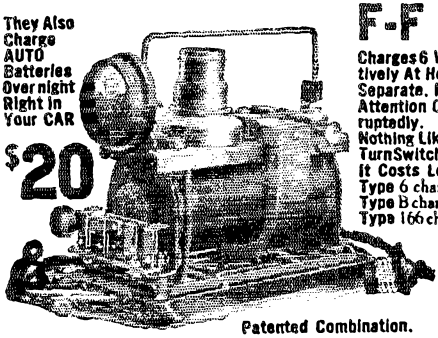
Wholesale Dept.
1533 PINE STREET

Retail Dept.
1326 ARCH STREET

RADIO "A" & "B" STORAGE Batteries CHARGED at Home For a Few Cents Overnight with "The PATENTED FULL WAVE" 100-130 Volts 60 Cycle A. C. Magnetic Taper Charge Design

They Also Charge AUTO Batteries Over night Right in Your CAR

$20

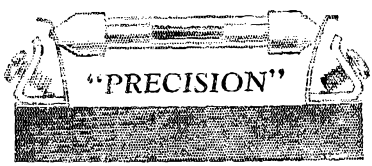


Patented Combination.
CHARGES "A&B" RADIO & AUTO BATTERIES.

F-F RADIO RECTIFIER

Eventually You Will Buy An F-F RECTIFIER. Why Not Now? The Sooner You Buy It; The More You Save. It Charges 6 Volt "A" & Auto: & up to 120 Volts Of "B" & Loud Speaker Storage Batteries In Series Inductively At Home Overnight; Disconnecting & Multiple Connections Unnecessary. Charging Circuits Separate. No Chance For Grounds Or Short Circuits. Nothing To Slop Over, Be Filled, Burn Out, Need Attention Or Cause Trouble. Infusible Rectifying Brushes Maintain Constant Efficiency Uninterruptedly. Complete Portable Automatic. No Skill Required. AMMETER Eliminates Guess Work. Nothing Like It Made. Lasts Lifetime. Screw Plug In Lamp Socket; Snap CLIPS On Battery Terminals; Turn Switch & Battery Is Charged In Morning. Charged Batteries Mean Fewer Expensive Replacements. It Costs Less To Buy An F-F RECTIFIER Than To Be Without ONE. 7 Types. POPULAR PRICES.
Type 6 charges "A" 6 Volt Battery At 6 amperes $15 Type 12 charges 12 Volt Battery At 5 amperes $15
Type B charges Radio "B" Batteries Up to 120 Volts $15 Type A-B is Combination Of Types 6 & B $20
Type 166 charges 6 Volt Battery At 12 amperes $20 Type 1612 charges 12 Volt Battery At 7 amperes $20
Type 1626 is a Combination of Types 166 & 1612 and Charges Both 6 & 12 Volt Batteries $28
The 3 Lower Types are recommended for heavy Batteries, or where time is limited. SHIPPING WEIGHTS Complete with AMMETER & BATTERY CLIPS 11 to 15 lbs. Purchase from DEALER, or Mail Check for Prompt Shipment. Include Postage and Insurance Charges for P. P. Shipment, or Write us to Ship Type desired C. O. D. Order Now, or WRITE Immediately for FREE Descriptive BOOSTER Bulletins 31 & 31-A.

THE FRANCE MFG. CO., CLEVELAND, OHIO, U. S. A.
Canadian Distributor THE JACK V ELLIOT COMPANY Hamilton, Ontario, Canada.



HIGH RESISTANCES 60c.

Ranging from .25 to 5 megohms. Made by specialists in this line for use in Radio Circuits. Individually calibrated. Accuracy guaranteed. Lower values on order.
12,000 ohm Resistance.....$1.00
Mountings.....50

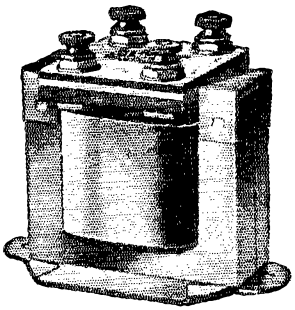
Radiophone Equipment Co.
47 New Street, Newark, N. J.

Super-Sensitiveness!

The crystal is the "bull's-eye" of your crystal receiving set. Unless it is supersensitive you are wasting time and entertainment and cannot "hit" the combination for best results. Insist upon the genuine original Arlington Tested "NAA" Detector minerals They are carefully selected from bulk stock, individually tested and guaranteed super-sensitive. Galena, Goldite or Silicon, price for crystal, 25¢. Same mounted in brass cup, 40¢. Obtainable at your dealers or sent direct (post-paid) on receipt of price.

The Newman-Stern Co.

Newman-Stern Building, Cleveland



Our new audio frequency amplifying transformers are the result of recent improvements and represent the best in amplifying transformer design. They give the maximum of amplification possible without distortion. The windings are of #40 copper wire, carefully layer wound, thus reducing the tendency to open circuit, as is common with transformers using finer windings. The core is twice the cross section of that of the ordinary amplifying transformer and is made of special 36 gauge silicon steel.

We recommend the high ratio (6 to 1) transformer for the first step and the standard ratio (3½ to 1) transformer for the second step, however, the standard can be used on first and second steps with excellent results and is recommended to be used throughout with over two steps to avoid distortion. These transformers can also be used with excellent results on low voltage tubes.

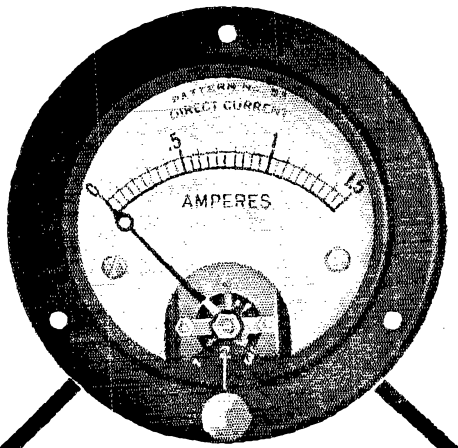
Prices, mounted as illustrated!

3½ to 1 ratio transformer $4.50 "with black label"

6 to 1 ratio transformer.. 5.00 "with red label"

Get a supply of Thordarson Transformers from your jobber now.

THORDARSON
Electric Mfg. Co.
500 W. Huron St., Chicago, Ill.



TRIPLEX FILAMENT METER

Filament control by the use of proper instruments in receiving sets is the trend of the times. The Jewell triplex filament instrument, made as an ammeter or voltmeter, places on your panel the proper means for controlling the filaments of three tubes. It has a self contained mechanism for switching to either tube and being of small size, can be accommodated on the most compact tube set.

PRICE $10.00

We were the first to supply a complete line of miniature radio instruments of uniform size. Ask your dealer or write to us for complete radio circular.

Jewell Electrical Instrument Co.
1650 Walnut St., Chicago

O-B Radio Co.

Distributors for

Colin B. Kennedy Co.
Horne Receiving Sets
Remler Accessories
Horne Accessories
Cunningham Tubes

If your dealer can't supply you, write to us direct for any standard Radio material.

O-B Radio Company
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of the

THIRD RADIO DISTRICT

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Are now made for this convention. The trip to "NSS" ASSURED. This is you chance to see this wonderful station; also, a delightful trip down the Chesapeake Bay.
Excellent technical program by speakers well known to us all.
A five dollar ticket entitles you to all.—Boat trip to "NSS," technical addresses, exhibits, and banquet.

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Show the world your strength. Let all know that the "Knights of the Midnight Key" are real fellows.

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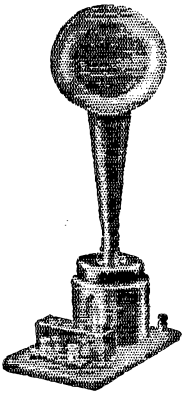

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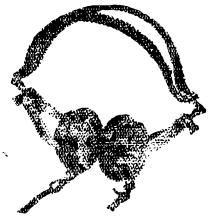

Stromberg-Carlson
No. 2-A Headset, $7.50

IMMEDIATE DELIVERY ON ALL ITEMS LISTED

D-H, E Crystal Receiving Set-R-24 Jr.	$20.00
Radiola Sr. Receiving Set	65.00
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Enclose Certified Check or P.O. Money Order with orders.

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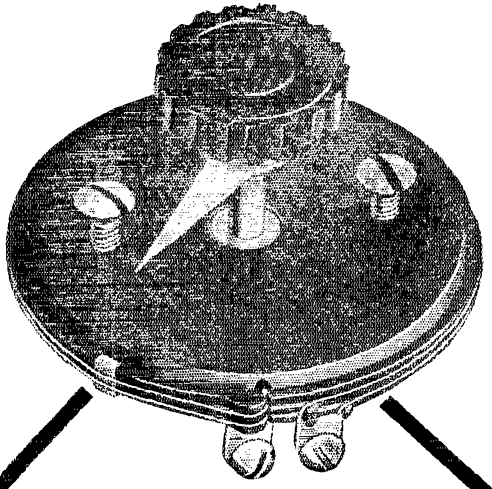
WASHINGTON, D. C.—DEALERS WRITE FOR DISCOUNT—PITTSBURGH, PA.



VERNIER RHEOSTAT

The Jewell vernier rheostat is extremely simple and substantial in construction, employing a new principle of contact which we have patented. Made of the highest grade bakelite and using the best resistance wire obtainable. Very fine adjustments are obtained by a single turn of the knob. Ask your dealer or write to us for special circular.

PRICE $1.00

Jewell Electrical Instrument Co.
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Direct factory to user sales methods save you 50%. Highest quality material insures you 100% service. Every battery backed by our written two-year guarantee. You take no risk. Batteries shipped express C. O. D. for your inspection. Mail your order today—at once.

COMPARE THESE PRICES

RADIO PRICES:	
6 Volt. 40 Amps.	$ 8.50
6 Volt. 60 Amps.	10.00
6 Volt. 80 Amps.	12.50
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No other manufacturer offers such a high quality battery at such a low price. Save 50 per cent on your next battery and get better and longer service—buy a **World Storage Radio Battery.** Write today.

World Battery Co., Dept. 2, 58 E. Roosevelt Rd. Chicago

FOR SALE

CW-936 Sub Chaser Telephone Transmitting and Receiving Set including:—Remote Control System, Power Amplifier, Loud Speakers, Tubes, Spare Microphone, etc. Can be tuned down to 200 meters.

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RADIO AND ELECTRIC SUPPLY CO.
34 PARK PLACE AND 48 FULTON STREET **NEW YORK**

DE FOREST TRANSMITTER

1000 Watts

Broadcasting or commercial service, complete from generator to aerial. Five 250 watt tubes. For sale at half price. Write

THOS M. GALEY, Indep ndence, Kansas

Unequalled Quality of Volume and Purity of Tone

are assured by adding to your Radio Set the newly constructed 100% perfect Audio Frequency Transformer R T-A2.

This Audio Transformer is exactly the same shape and size as the R T-6 Radio Transformer, but the color is brown, thus making a neat match when both Radio and Audio transformers are used together. Why build up beautiful tone quality with Radio Frequency and destroy it with inferior Audio transformers? For best results on both tone and distance, use Radio Service Laboratories Radio Frequency (R T-6 and R T-6A) in the black case, retail price $6.00, and Audio Frequency (R T-A2) in the brown case, retail price $6.50.

Order by type number, accept no substitute and remember that all Radio Service Laboratories Transformers are individually triple tested and unconditionally guaranteed. For sale at all reliable electrical or Radio Stores or order direct from us.

Send ten cents for new booklet on Radio Frequency with schematic diagrams—a most valuable and helpful publication for the radio amateur and expert.

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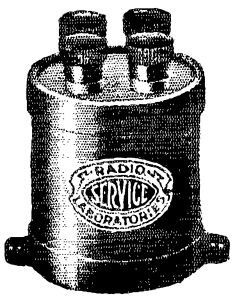
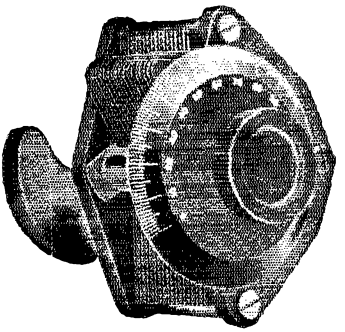
RT A2



RT A2

The new member of the Rasla Family — in the brown case.

CHELSEA CONDENSERS



No. 3

PRICES

No. 1	Table	.001 mf.	$5.00
No. 2	Table	.0005 mf.	4.50
No. 3	Panel	.001 mf. with dial	4.75
No. 3a	Panel	.001 mf. without dial	4.35
No. 4	Panel	.0005 mf. with dial	4.25
No. 4a	Panel	.0005 mf. without dial	3.85
No. 5	Panel	.00025 mf. with dial	3.75
No. 5a	Panel	.00025 mf. without dial	3.35
No. 6	Panel	vernier with dial	2.90
No. 6a	Panel	vernier without dial	2.50
No. 7	Table	.001 mf. wih vernier	6.75
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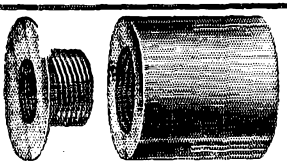
Genuine Bakelite Construction
The best and most complete line of condensers in existence.
Write for our catalog No. 7.

CHELSEA RADIO CO.
156 FIFTH STREET
CHELSEA, MASS.



IF YOU USE AMPLIFYING TUBES you can make your Victor talking machine a RADIO LOUD SPEAKER, with a "BEEKO" Radio-Phone attachment.
Sample by mail, 40¢.
Liberal discount in quantities
Send stamp for our new 245-Q Catalog
J. H. BUNNELL & CO.
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250 WATT set complete, slightly used. Will sell cheap. 4217 Sheridan Ave. So., Minneapolis, Minn.

VARIOMETERS—built and nationally advertised to sell for $5.00. While they last $3.00 each. Radio? You bet. Box 311, Warrenton, Mo.

R.C.A. 5 WATT GRIDLEAK—500 Ohms tapped in center. Price $1.10 postpaid. Philadelphia Wireless Sales Corporation, 1533 Pine Street, Philadelphia, Pa.

200-20,000 METER Receiver including Radiotron $35.00. Box 205, Williamsport, Pa.

534 CYCLE ICW apparatus, includes 270 W Telefunken generator-exciter; transformer, 1200 V secondary; motor: 60 cycle filament transformer rheostat, inductances etc. and Spark transmitter for same generator, mounted. Charging generator thrown in if taken prior to March 15th. Price $100. 2AHM

NEW JEWELL Voltmeter, 0-500 D.C., $12.75. 2AJC.

FOR SALE—2DI's ½ K.W. 500 cycle spark set complete with motor generator, $50.00. Write for particulars to 2DI.

THORDARSON one kilowatt fifteen dollars, 2HQ.

WANTED: High grade wavemeter; 250-500 watt 1000 volt D.C. motor generator A.C. drive. Give full particulars. "Two—Item—X-ray.

EVER HR 8ANB—C.W. and fone. Pse, QSL- CRD Tnx.

FOR SALE: 1 K.W. Thor. transf. kickbacks and magnetic key $25.00; oil cond. .007 $5; 3 Leyden jar $2 each; sink gap $30.00; Jewell thermo 0-10 meter $10.00. All letters answered. 8IL, 41 Beattie Ave., Lockport, N. Y.

PURE NICKEL WIRE for Edison B Battery Element Connectors 1½¢ foot. Hard Rubber Separators 1¢. Directions. Tubes. 8ML Cleveland.

FOR SALE: Complete fifty watt transmitter cheap. 8CWE.

9APS 100 WATT C.W. complete. Record 5500 miles $75. 1023 Russell Ave., Covington, Ky.

SELL OR SWAP: Reinartz, det. and 2 step with automatic filament control an' everything. Guaranteed a fine DX receiver, $50.00!!! or swap for C.W. equipment. Want filament voltmeter (hi) and power dope. What have u? 9CHF, Princeton, Ill.

QRA of 9GD now Box 5, St. Croix Falls, Wis.

BARGAINS: (Six) Klosner vernier rheostats, Postpaid at $0.60 each. Complete Quarter kilowatt spark transmitter—Thordarson special, Benwood disc, Roller-Smith meter, antenna switch, Key, Oscillation Transformer, cabinet and rubber panel. $25. Letters answered, other bargains. E. G. Baier, 253 Ninth St., Brooklyn, N. Y.

FOR SALE: All wave Reinartz Tuner with One step $70.00. Gibson Guitar in good condition with excellent tone $75.00. Set of Encyclopedia Britannica 15 Vol. $15. William Barnes, Station "B", Superior, Wis., R 22

A BLUEPRINT of your complete hookup is a mighty handy thing. Let us make you one, size twelve by eighteen inches suitable for framing, with your name, call letters, etc. Price dollar fifty and two dollars. Send rough sketch of hookup for estimate. D. Barnhart Co., Warren, Penna.

FOR SALE: Paragon RA-10 $52; Paragon 2 Step $46; Western Electric Power Amplifier $110; Baldwin Fones $12; J-Ray Gap $20; National Portable Typewriter $30; New W.E. VT-1 $8.00; 1 KW Amrad Quench Gap $15. Lawton Biddle, 442 Bosart Ave., Indianapolis, Indiana.

SELL CHEAP: New Apparatus, 3 Western Electric loud speakers, Baldwin phones, Brandes phones, Remler Panels. Used Apparatus, Assorted phones, Single circuit receivers, and many other things. John Bowman, 407 Indiana Avenue., Valparaiso, Indiana.

FOR SALE: ½ KW Clapp-Eastham Hytone Transmitter with Amrad quenched gap, General Radio Co.. Hot Wire Ammeter and Mesco Key. Above Apparatus in a cabinet. Price $45.. F.O.B. Hoboken, N. J. Address H. Breitmeyer, 108-8th St., Hoboken, N. J.

FOR SALE: 10 "E" Tubes, $5 each. 250 Watt "P" Tube $75; 500 Watt DeForset Tube $75; 100 Watt C.W. Set with Tubes $150; 10 Watt C.W. Set with Tubes $75; 10 Watt C.W. and Fone Set with Tubes $50. A. B. Brown 3MK, 1526 Moran Ave., Norfolk, Va.

FOR SALE: ½ KW transmitter on marble panel, Leyden jars, O. T., etc. Also 12 v 10 amp. D.C. generator. R. M. Browning, 221 Maple St., Norwich, Conn.

IF INTERESTED in two or three step regenerative outfit at lowest prices, write. These two sets working great. W. B. Butcher, Waynesfield, O.

RUBBER STAMP with large call letters 50¢; Radiogram and Relay Radiogram blanks 25¢ per hundred Post Cards 60¢ hundred. Send us your orders. Carolina Printing & Stamp Co., Wilmington, North Carolina.

BARGAINS: 1 New R-2 Magnavox $64.00; Moorhead detector tubes $4.50 ea.; A few A-P Moorhead amplifying tubes @ $7.00 ea.; DX radio frequency 150 to 500 meters $7.00 ea with mounting; Murad T-11 radio frequency transformers $4.50 ea.; Westinghouse M-22 storage "B" Batteries $5.50 ea. Chesaning Electric Co., Chesaning, Mich.

SPECIAL PRICES on Radio supplies, new and used receivers $25 and up. Two step amplifier $17. Magnavox $38. All apparatus at reduced prices prompt shipments. Send for list. The Cherokee Store, Colby, Wis.

FOR SALE: 1 KW transmitter complete. Also few Reg. tuners. Roy Conibear, Lee Center, Ill.

FOR SALE: Atlas C.W. Transformer and rectifier $12. Write Walter Conn, Race St., Dover, Ohio.

FOR SALE: Two type R3 Magnavox $38 each. Also one new $125. General Electric Receiving Set $10.00. K. Cooper, Williamson, N. Y.

FOR SALE: 20 watt C.W. and Fone, new panel mounted in cabinet. Radiates 3.7 T.C. includes 7 tubes, key, microphone, M. G. filter unit, fil. trans., Send for parts used and photo. A beauty and works either coast easily, $225.00. I want new Western Electric loud speaker outfit and Crosley X and $65.00 if trade. L. E. Crosman, Ogden, Iowa.

FOR SALE: One KW Acme transformer $25, Thordarson oil condenser, with oil $18, Bell Gap $25, Amrad quarter KW quenched gap $9, Amrad induction coil $15, Radio Corporation C.W. transformer, new, $20. All excellent. J. E. Cullen, Altamont, N. Y.

SEND STAMP FOR LIST new radio parts 40 to 70 off list. Cunningham, 280 East 155th St., New York City.

BARGAIN—Good electron relay $3.50, Navy type receiving tranformer $9.00, Murdock variable .001 condenser $2.50. Kenneth Dixon, Colorado Springs, Colorado. R.3.

FOR SALE: Receiving set regenerative two steps of amp. with A Batteries and B Batteries $65.00. First offer takes it. George Dunklau, 7230 Yates Ave., Chicago, Ill.

FOR SALE: Nine UV-201 tubes, one A-P amplifier tube, $3.50 each. None burned over 25 hours, all good amplifiers; 23 plate unmounted condenser, $1.25; Number of Viking vernier condensers, DeForest rheostats and tube socket, Paragon potentiometers, RCA tube sockets, potentiometers and rheostat, all dirt cheap at $0.50 each. Above apparatus guaranteed in good condition. Sent postpaid insured on receipt of price. Jack Dunham, 49 Overlook Circle, New Rochelle, N. Y.

500 Cycle GOVERNMENT APPARATUS and PARTS, cheap. Motor Generator $32.50. Must sell Quick. George W. Eaton, 1915 South Twelfth, Philadelphia, Pa.

FOR SALE: Two Telmaco Variometers, and one Variocoupler. Good condition. Frederic Ehringer, Washburn, Illinois.

STOP. LOOK. READ. C302 Cunningham 5 watt transmitting tubes, $6.75; 3 inch bakelite dials, $0.34; Molded condensite sockets, $0.34; Amplifier and detector tubes special, $4.25. Send for our price list and details of contest in which we are giving away a 50 watt Cunningham transmitting tube. F. &. S. Radio Company, 63 West Main Street, Salem, Ohio.

SELL: ½KW Thordarson, .007 Dubilier, rotary gap, O.T., key, ammeter, protective device, $50:00. Harold Koontz, Buffalo, Wyo.

GREBE RADIO FREQUENCY NEW never used cost $60. Quick sale $40. Dr. Gibson, 927 Eye St., Washington, D. C.

BURNT OUT TUBES repaired. Satisfaction guaranteed. The following makes only, Radiotron, Cunningham, A. P., Moorhead and Marconi Detectors $3.00, Amplifiers $3.50, W. D. 11 $3.50. Tubes returned Parcel Post C. O. D. D. E. Gillmore, 46 Thomas St., Newark, N. J.

EDISON STORAGE "B" Battery Elements, 5¢ per pair, 18 will make one 22.5 volt Battery. Gilman's Battery Shop, Chelsea Square, Chelsea, Mass.

9ZX and 9EE FOR SALE AT REAL BARGAIN PRICES! 1KW Acme Transformer; .01 Dubilier 25,000 volts; Benwood rotary; Thordarson O.T.; 2KW United Wireless "Coffin"; Homemade .01 plate glass oil condenser; T & H O.T.; Hy-rad disc for sinc gap; Jewell 0-10 T.C. Ammeter. H. J. Goddard, Ellendale, North Dakota.

GENUINE GERMAN TELEFUNKEN H.W. AMMETERS with scale reading 0-4 amps. Fitted with shunt for half scale reading and adjustment for temperature variations. Very accurate and sensitive. Brand new with original seals unbroken. Diameter 2 and 7/8 inches. While they last, $3.50 each. Robert E. Goll, 1342 East 22nd Street, Brooklyn, N. Y.

FOR SALE: 410-Gauge, Iver Johnson shotgun. Eight dollars. Wanted- Wavemeter. Must be reasonable and in good condition. Marion Graham, Angola, Ind.

FOR SALE: Like new ½KW spark set. Bargain. All letters answered. R. B. Greig, 1100 Wenonah Ave., Oak Park, Ill.

EDISON ELEMENTS for storage B batteries, six to ten cents per pair postpaid, depending entirely upon quantity ordered. A. J. Hanks, 608 Montgomery St., Jersey City, N. J.

FOR SALE: Detector and two-stage regenerative Set 75, Detector regenerative set $30, Two Crosley Variometers $2.75, One Cabinet 21x8x8 $2, Full wave rectifier, with tubes $20, C.W. Receiving set as described in Literary Digest for Nov. 4, 1922 with pn. tube $15, McTighe "B" battery $4. For further information, write L. G. Hess, 311 Allen St., San Angelo, Texas.

BARGAINS: ¼ KW Thordarson $6.00, Five Murdock Condensers $8.00, Eldredge 0-5 H.W. Ammeter $3.50, Benwood Super 12 Stud Gap $15.00, Robbins Myers 1/10 Horse D.C. Motor $12.00. Makes a good Generator. Ellwood Hoepfner, Palmyra, N. J.

WANTED: Weston Voltmeter type 301 mounting for plate voltage reading from 0-100 volts surface mounting only. Also DeForest honeycomb coils. Leroy Hoppe, Kenton, Ohio.

FOR SALE: Long and short wave set with detector and 2 step amplifier in same cabinet $100.00, Reinartz with detector and 1 step amplifier $30.00, 500 Volt, 100 watt Peerless generator $30.00 (or trade for good Magnavox), 40 volt 1200 watt Western Electric generator with rheostat $50.00. Satisfied or money refunded. J. P. Hyde, Markham, Va.

9VM has been reassigned to Albert Millington, Canton, Illinois.

FOR SALE: One R3 Magnavox. Excellent condition $35. Glen Jefferson, Washington, Nebr.

COMPLETE TELEFUNKEN 500 cycle sparks—1500 volt 500 watt self excited Crocker Wheeler generators $60; Western Electric Subchaser fone set complete. New. Henry Kienzle, 501 East 84th St., New York.

2CSQ-QRA John P. Kingman, 422 West 24th St., New York, N. Y. All cards answered.

WANTED 6 or 8 inch spark coil. Good condition. Reasonable price. Andrew Fiske, Warren, R. I.

DEFOREST HONEYCOMB COILS for sale complete set of 16 absolutely new. Bargain. Write offer. Louis Krieg, 26 Kent Street, Gloversville, N. Y.

SPECIAL: Clapp-Eastham H.R. Receivers and H.Z. 2 step Amplifiers $35 each. Cleartone 3 circuit receivers with 1 step R.F. detector and 2 step A.F. $60. Baldwin "C" Phones $15. Brandes "Superior" Phones $7.50. Allan Kroehnke, 913 Congress St., Ottawa, Ill.

SELL—Thordarson ¾ KW transformer; six sections Clapp-Eastham condenser. Westinghouse R.C. cabinet. Complete Radio Corporation filter-rectifier outfit for four 5 watt power tubes. Charles Laper, 116 Williams St., Greenville, Mich.

SELL: Two new Phillips (Holland) 250 watt transmitting tubes, filament nine volts five amperes, plate 2000 to 3000 volts. Price 45 dollars each, half cash with order. Levey, 233 Division St., New York.

WANTED: Accurate, cheap wave-meter and hotwire ammeter. State prices. William Levi, Wilmette, Ills.

FOR SALE: One 3201 Universal Colin B. Kennedy Receiving Set, 180 to 25,000 meter, absolutely new and unused, cost $250. Will take $175. A. J. Manning, 18 Ohio Ave., Salem, Ohio.

MOTOR GENERATOR WANTED: High voltage, D.C. Give description and price in replying. The following for sale or exchange—Dubilier Navy type transmitting condenser sacrifice thirteen dollars. Simon open core coffin, one half K.W. Navy transformer ten dollars. Telefunken quenched gap ten dollars. New Mesco 1½ inch spark coil. Bargain, eight fifty. Menier, 536 East 88th St., New York. City.

FOR SALE: Brand new 20 watt C.W. and Phone set, all Benwood parts, copied after Benwood set. All letters answered. Complete $250.00. Stanley F. Northcott, 1204 Birney St., Bay City, Mich.

SACRIFICE FOR CASH: 3 step R.F. Detector and 2 step A.F. in beautiful cabinet. Uses "Miller" all wave R.F. transformers. Good for 180 to 20,000 meters. Complete with 6 new Myers tubes. Take $125. Reinartz with detector and 2 step, heard Havana and California $35. Small variometer set (Estru) $15. Sent C.O.D. H. Oge, Box 32, Boonville, Ind.

SELL OR TRADE: 250 W.P. tube $70; Navy E tubes $7; Navy Moorheads $6; 1000 v. 300 w. Esco generator $70; RA-10, $50; Murdock regenerator, $15; P501 Navy tuner with detector, listed $595, $150; Parts 100 w. transmitter—everything in 500 cycle apparatus—want Navy and WE apparatus. Edw. Page, Cazenovia, N. Y. 8AQO & 9XH.

FOR SALE: 8CP's C.W. transmitter, also 1 K.W. spark. Orlo Palmer, 233 E. 11 St., Holland, Mich.

3 Y. Q. AMPLIFYING TRANSFORMERS suitable for power amplification. Will stand 300 volts. Price $6.00 Postpaid. Philadelphia Wireless Sales Corporation, 1533 Pine Street, Philadelphia, Pa.

COMPLETE HALF KILOWATT TRANSMITTER including Dubilier, $12. Roland Place, 350 Sprague Street, Fall River, Mass.

BROWN PHONES Adjustable Diaphragm 4,000 ohm Headsets. Now, as for the past eight years, standard Radio receiver of the British Army and Navy and conceded by experts to be the most sensitive and efficient receiver in existence. Unexcelled as a loud speaking unit due to the adjustable feature. Cannot rattle under extreme power and voltage. Clearness unmatched. Excellent for DX reception. Original price in U. S. A., $20.00. Our price, Singles, $5.50; Headset, $10.00. The Radio Import Sales Co., Temporary Address, Box P, c/o QST, Hartford, Conn.

BIG THIRTY DAY CLEANUP SALE. $45 R-3 Magnavox, $29.95; $85 R-2 Magnavox, $49.95; $80 Magnavox two-stage power amplifier, $49.95; $110 Magnavox 3 stage power amplifier, $64.95; latest type with goose neck horns in original cartons. Order at once from this ad. Terms cash with order. Other bargains in proportion; write. Radio Exchange, Sioux City, Iowa.

WHILE THEY LAST—$45.00 Receiving Sets including Radiotron Detector $32.00, Two step amplifiers, $22.00; $12.00 Tran-Atlantic Phones, $8.00; Loudspeakers, $12.00; Homchargers $15.75; 43 plate Variable Condensers with three plate vernier and dial $5.50; Radiotron Detectors, $4.25; Amplifiers $5.75. OTHER BARGAINS. QST Radio Service, Williamsport, Pa.

RADIO REPAIRING—anything but tubes. Send us your apparatus that won't work. We'll make it "percolate" or charge you nothing. Prices quoted for your approval before we begin work. Rates reasonable and satisfaction guaranteed. Only shop in the U. S. doing guaranteed general radio repairing and wiring. Repair Dept., Radio Panel Shop, Junction City, Kansas.

FOR SALE: Practically new Paragon RA-10 Tuner Detector and 2 stages $100. 3 UV 1716 radio frequency transformers $5.00 each. H. Rabezzana, 2002 Francis Avenue, Flint, Mich.

FOR SALE: Must sacrifice Brand New Westinghouse R.C. receiving set with B. Batteries, Tubes and Baldwin Phones $120.00. M. O. Reese, Melbourne, Iowa.

NEW WILLARD all rubber thread 6 volt, 80 ampere Storage Battery, $12.00; Chelsea Variable Grid Leak, $1.00; Grebe CR3, 150 to 680 meters, $25.00; Grebe Detector and two step amplifier, $25.00. All guaranteed good condition. Wesley Robinson, Jr., St. Mary's, Georgia.

Astonishing Results ROKAY SINGLE CONTROL HOOK-UP. No Variometers—Variocouplers—Taps or switches. Complicated Sets rebuilt cheaply. Don't buy or build until you get particulars. Rokay Electric Company, Ingomar, Ohio.

WIRE YOUR SET WITH COPPER BRAID instead of solid wire. Has extremely low resistance at radio frequencies. Makes "cushion" contacts that never work loose. Never breaks, easy to work with, does not require soldering. Air dielectric has no distributed capacity. No. 16 contains 96 No. 36 bare copper wires. Six feet for 25¢. Radio Panel Shop, Junction City, Kansas.

WE NEVER WON a beauty prize but 4GL Radio Frequency Transformers sure do the work. $3.15 each, postpaid, from factory to you. Range 200-600 meters. Circuit with each transformer. Savannah Radio Shop, 1223 East Duffy Street, Savannah, Georgia.

NEW CLAPP-EASTHAM three circuit tuner with detector and two step. Excellent results obtained. $65. M. J. Samuelson, Wakefield, Nebr.

EDGEWISE WOUND COPPER Ribbon $\frac{3}{8}$"x$\frac{1}{32}$"x8$\frac{1}{2}$" also 9$\frac{1}{2}$" for Oscillation Transformers 14 and 15 cents per turn any number of turns in one piece. 7 turns of each $2.00. George Schulz, Calumet, Mich.

AMATEURS:—Ask your dealer for the SERCO WD11 Audio Frequency Amplifying Transformers. Mounted $4.50 each, or write to F. J. Scheib & Sons, 6243 Station St., Pittsburgh, Pa.

FOR SALE: Grebe Pattern Tuner and Two Stage Amplifier, complete with phones batteries, bulbs. All working fine. A bargain at $75. Frank Schnepper, Cresco, Iowa.

BARGAINS in Radio Apparatus. Send stamp for list. Ernest Schwarze, Brownton, Minn.

FOR SALE: Dayton Motorbike in good condition. Price $45. Write what you have to trade for it. John Shope, 65 West Main Street, Salem, Ohio.

$115—FOR NEATEST honeycomb detector and two step receiver ever seen. All in small cabinet. Many exclusive features. Great results. Stamp for picture and description. Not homemade. Also Paragon RA-6, $35. Prescott Smith, Box 68, Amherst, Mass.

SLAUGHTER—$\frac{1}{2}$KW Complete. Write. Alva Smith, Caledonia, Minn.

BARGAIN: Variocoupler, two variometers and condenser hooked up in wooden cabinet for $25. Write Nat Smith, Taft School, Watertown, Conn.

TRADE: Set Watchmakers tools, for spark transmitter or other radio apparatus. Write. H. N. Stenen, Stenen, Saskatchewan, Canada.

ITS NOT VOLUME you want but DX and clarity. 4GL Radio Frequency Transformers do the trick. Made right; priced right. Savannah Radio Shop, 1223 East Duffy Street, Savannah, Georgia.

BARGAINS: 1/10 Horsepower Universal Motor 110 Volts, Aluminum case $7.50. Used Direct Current Motors $\frac{1}{4}$, $\frac{1}{2}$, 1 and 2 horsepower 115 volts can be used for generators. 25 amp. adjustable arc lamp, Pony Relay Giant Sounder and Key. Stamp for particulars. George Schulz, Calumet, Mich.

FOR SALE: One 3 step Magnavox power amplifier used slightly @ ninety dollars. 6 Myers tubes @$4.50 each; 6 Myers tube sockets @ 75¢ each; 4 R.F. Myers chokes @$4.00 each; 6Myers A.F. chokes @$3.00 each; All new. 1 DeForest geared H.C. coil mounting with base and following coils; one 1500, two 500, one 400, one 150, one 100, three 35, one 50, used slightly, all for fifteen dollars. One Grebe CR-3, $55. One Grebe Rord unit $65. First M.O. received takes all or any part. Jos. R. Tate, Dorrisville, Illinois.

FOR SALE: My 20 watt radio phone and C.W. $159.00. Grebe CR-3 $45.00. Exceptional loud 2 stage receiver $70.00. J. C. Thomas, David City, Nebraska.

LOOK: Remler panel, $6.00; new variocoupler $4.00. Eugene Traber, 9DUE, 2117 South 41 St., Omaha, Nebraska.

MAGNAVOX—A few R-3 Magnavox at sacrifice. Regular $45.00 R-3 at $25.00 while they last. All in original packages. RECTIGON Battery Chargers—complete with tubes, $13.00. WESTERN Electric 1002-C Headsets, 2200 Ohms. Regular $15.00 list at $9.00. Send Money Order for 10% of account, balance C.O.D. Tucker & Laxton, Inc., Charlotte, N. C.

FOR SALE: One 1500 volt .27 Ampere 3500 RPM motor-generator. Motor 60 cycle single phase 110 volt. Made by Electric Specialty Company. Am installing larger outfit. Also one Tuska tuner 150 to 850 meters and S. Cohen detector and two step amplifier. Floyd L. Vanderpoel, Litchfield, Conn. Radio 1BEP.

SELL: three circuit tuner and detector with engraved bakelite panel, Remler dials, oak cabinet, vernier rheostat, $30. Victor Vogel, Glenrock, Wyoming.

MUST SELL—Grebe CR9 complete with tubes, Manhattan phones, 100 amp. "A" battery, B batteries, R3 Magnavox, $175.00; 10 watt phone set, complete with microphone and two UV202 tubes, $50.00; Oliver typewriter, $15. First money order takes same. B. M. Walker, Roseville, Ohio.

EXCHANGE $150 DX Spark Transmitter for typewriter, small lathe or cash. Other equipment all like new. All answered. H. M. Walleze, Danville, Pa.

SELL One Packard 1 KW 16,500 volt transformer $18.00; One new R-3 Magnavox $37.50; One universal tuner consisting of three circuit short wave set and honey comb high wave with change over switch, verniers, two condensers, and in beautiful cabinet. Write for further description, sell cheap. Arthur Walser, Chesaning, Mich.

BARGAIN—50 watt complete CW transmitter used by 8ZX. DX record 5000 miles. Also 500 watt 1500 volt Acme plate transformer and 500 volt D.C. motor-generator set. Harry S. Weber, 1113 Walnut St., Dover, Ohio.

PHONES, TRANSFORMERS rewound. L. Werts, 409 Saint Julian St., Pekin, Ill.

GENERATOR 500-850 volt 200 watt Robbins-Myers, NEW, $45.00. Complete 30 watt CW and Fone Transmitter, with Motor-Generator tubes etc. $175.00 BARGAIN. DX 3,500 miles. Must sell quickly. C. L. White, Stockdale, Ohio.

MOTOR GENERATOR. 100 watt 500 volt externally excited. Belt connected, $29.00. Radio Corporation 750 watt C.W. transformers, never used, $28.00. Russell Widenor, Alpha Sigma Phi, State College, Pa.

Edison "B" BATTERY UNITS one positive and one negative plate for 10¢. 18 sets will make a 24 volt battery. Wilkinsburg Wireless Shop, 711 Penn Avenue, Wilkinsburg, Pa.

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efficient, expert, confidential service. Skilled in Radio-Electrical, Chemical, and Mechanical fields. Our latest illustrated Patent Book, giving much necessary and very useful information which every inventor should know, will be sent free upon request. Prompt and careful attention. Highest references. Moderate fees. Send sketch or model for our careful opinion and preliminary advice. Write today to A. M. Wilson, Inc., (Radio 3ARH) 310-16 Victor Building, Washington, D. C.

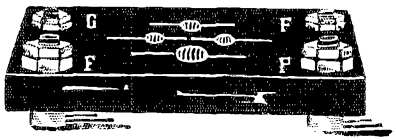
LISTEN IN ON HALF A CONTINENT: Two complete radio frequency receiving outfits with tubes, phones, storage batteries, and Tungar rectifier. One with two steps and tuner for $200 and the second with three steps of audio frequency besides, and a loud speaker for $350. Money Order or Certified Checks only. William T. Wintringham, 56 Boylston St., Cambridge, Mass.

FIRST DRAFT FOR $98.50 takes this regenerative and 2 step. Cotoco Ant condenser, equipped with verniers and in solid mahogany cabinet tubes included, ITS A BARGAIN. Brewster Woodburn, Hampton, Iowa.

TERMNAPANELS—Drawer shelf back-connection terminal panels of correct design and attractive finish. A unique idea of particular merit, providing the ULTIMATE in terminal efficiency and flexibility for all types of modern receiving apparatus. Radion panel with polished nickeled binding posts equipped with SPECIAL tinned lugs for #14 bus wire. Furnished complete with nickeled mounting screws and printed connection template—a sure method of FOOL-PROOFING ur connections. Type R Receiving Cabinet $1.10; A Amplifier $1.05; T Tuning Cabinet $0.80; DA Detector-Amplifier $1.35; AG Aerial-Ground $0.60. Postpaid. A. L. Woody (TERMNAPANELS) Homewood, Illinois.

1BKQ's Westinghouse R.C. receiver, $100. Has Western Electric grid condenser and leak, one of first models, little used, works F.B. Worcester County Radio Assn., 766 Main St., Worcester, Mass.

FRANKLIN SOCKET



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Holds tube firmly.
Makes Perfect Contact

PRICE $0.50

We also make an Adapter that fits Standard Sockets. Price $1.00.—Dealers Write for Discounts.

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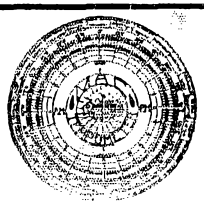

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An accurate, easily operated device by which you can instantly compare the Standard Time used in all points of the World. An absolute necessity for all radio operators who are receiving either telegraph or phone station schedules throughout the World. IT TELLS YOU WHEN TO LISTEN FOR THAT CONCERT OR MESSAGE. FOR A LIMITED TIME ONLY with each tempometer we will include FREE OF CHARGE our folder giving: Standard Time Meridians of the World, also U.S. time zones and time sending stations, Broadcasting stations of U.S. and Canada with time used by each. Radio Tempometer Price $1.00. Delivery return mail. Dealers write for discounts.

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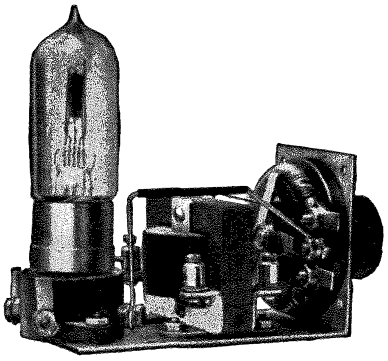
QST'S INDEX OF ADVERTISERS

IN THIS ISSUE

WHAT IS THE REASON?

In January QST we announced five new instruments, some of which are mentioned below. Just one month later finds us rushing to keep abreast of orders. What is the reason? Business here is good. There must be a reason.



Type 300 Amplifier Unit

This is one of the instruments that keeps our factory hustling. A compact unit, built around our Quality Amplifying Transformer, wired ready for external connections. Can be used for table or panel mounting.

TYPE 300-A AMPLIFIER UNIT for WD-11 Tube $7.50

TYPE 300-B AMPLIFIER UNIT for Standard Tube 8.00

In this unit is a

Type 231-A Amplifying Transformer

This is THE transformer for the WD-11 tube. We are selling thousands of these each month, many of which are used to satisfactorily replace distorting transformers of other makes. Read "Vacuum Tube Amplification" on page 15, Jan. QST, then buy an audio transformer whose design incorporates the good engineering principles mentioned in this article.

TYPE 231-A AMPLIFYING TRANSFORMER $5.00

Type 255 Rheostat

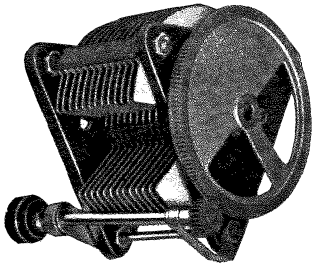
A real moulded bakelite base rheostat used for either table of panel mounting. Regular size, 6 ohms, 1.25 amps. Can be supplied in size suitable for one power tube, 3.5 ohms, 2.5 amps.

TYPE 255 RHEOSTAT (Either resistance) $1.00

Type 282 WD-11 Tube Socket

A socket with positive side-contact springs and moulded bakelite base. Terminals plainly marked. This is not an adaptor.

TYPE 282 WD-11 SOCKET $0.80



Single-Circuit Users—LOOK!

A .0005M F. variable antenna condenser will give you better results than a .001 MF. (or 43 plate) condenser.

Our TYPE 247-G or H, low-loss Condenser is especially suited for this use. It is fitted with reduction gearing and a small knob for fine capacity adjustment. This is much more satisfactory than the usual complicated types of vernier and since the slow-motion shaft is insulated from the plates, the tuning is not disturbed by the presence of the operator's hand.

TYPE 247-G 500 MMF. Mounted with gear $7.25

TYPE 247-H 500 MMF. Unmounted with gear 5.00

Send for NEW RADIO BULLETIN 912-Q, telling about these and other instruments. It's FREE. Ask your dealer for our Educational Folders—"QUALITY AMPLIFICATION" and "QUALITY CONDENSERS."

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Do not confuse the products of the GENERAL RADIO CO. with those of other concerns using the words "General Radio." The General Radio Co. has ben manufacturing radio and scientific instruments for many years. It has no affiliation with any other company.

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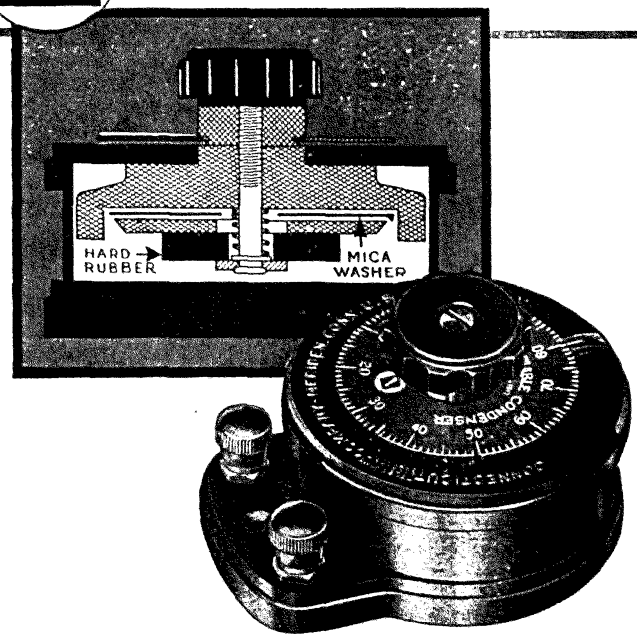


The Secret of its Efficiency

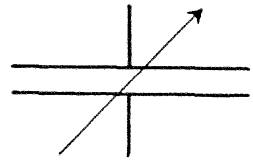
It is a well-known fact that losses in Radio condensers take place in the solid insulating material used in their construction.
And it is equally true that a condenser increases in efficiency of signal reproduction as its losses decrease.

The Connecticut Variable Condenser not only employs the two best insulating materials known—mica and hard rubber—but the smallest possible amount of each. This, then, is the reason for its extremely low resistance—0.2 ohm—as well also the secret of its high efficiency at short wave lengths.

Panel type J-108—$5.50. Portable type J-107—$6.50.

Descriptive bulletin 100-G upon request.

Finer adjustments
Better selectivity
Greater signal strength



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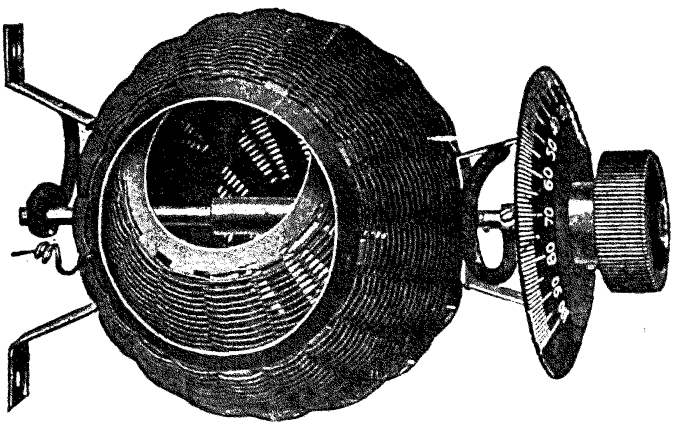
$3.75



Vario-Coupler 2614
(Less Knob and Dials)
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FIRST IN VARIOMETERS

In every comparative test by recognized testing laboratories, prominent engineers and expert amateurs, the AMRAD BASKETBALL VARIOMETER has been awarded first place—without exception, without reservation.

Such unanimous recognition did not come about all at once. It has been a slow, continuous building-up of acknowledged superiority resulting from outside tests and the experience of users for the past 18 months—since the first AMRAD BASKETBALL was actually developed and put on the market.

Why This Universal Recognition?

As every amateur knows, the ideal variometer should be

1. **Free from distributive capacity, i.e. condenser effect between the turns; and**
2. **Have the lowest possible dielectric loss.**

In the AMRAD BASKETBALL, condenser effect, inherent in the conventional flat-layer type of winding, is practically eliminated. The turns do not closely parallel each other due to the patented "wavy-weave" form of winding and the special method of inter-connecting the four inductance sections.

Wood, moulded composition, or other dense materials permit loss of high frequency energy. But in the AMRAD BASKETBALL foreign matter is reduced to a minimum. Light, spherical forms punched from Egyptian Fibre are utilized to confine the high frequency energy to the conductors—where it belongs.

In addition to these electrical points of superiority, the AMRAD BASKETBALL enjoys important mechanical features which alone would account for its popularity in receiving set construction.

Moreover the price is exceptionally low—only $3.75 for Variometer less Knob and Dial. This is the result of recent development by us of special automatic machinery for its production.

Shaft is ¼" dia. to take knob with that size hole. Fasten small piece of sleeving over end for knob with larger hole.

Order AMRAD BASKETBALLS from your Dealer. Insist on the best. Described in Bulletin C sent free on request. Complete Amrad Catalog listing over 80 items, 10 cents.

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