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AMATEUR RADIO
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MARCH 1925
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But that's far too coarse!

Any modern, sharp-tuning set should be tuned to at least an eighth of a degree of accuracy. Yes! Tuned and logged!

That's what you can do with the Jewett Micro-Dial.

Here is a dial fifty times as accurate—a dial with which you can scientifically and thoroughly sweep the ether, without missing a single station your set can reach, and getting every one at its absolute maximum.

Best of all, you can install the Micro-Dial with only a screwdriver. Slip off the old, guessing type dials; slip on the new Micro-Dial equipment.

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THE AMERICAN RADIO RELAY LEAGUE

The American Radio Relay League, Inc., is a national non-commercial association of radio amateurs, bonded for the more effective relaying of friendly messages between their stations, for legislative protection, for orderly operating, and for the practical improvement of short-wave two-way radio telegraphic communication.

It is an incorporated association without capital stock, chartered under the laws of Connecticut. Its affairs are governed by a board of Directors, elected every two years by the general membership. The officers are elected or appointed by the Directors. The League is non-commercial and no one commercially engaged in the manufacture, sale or rental of radio apparatus is eligible to membership on its Board.

"Of, by and for the amateur," it numbers within its ranks practically every worth-while amateur in America and has a history of glorious achievement as the standard bearer in amateur affairs.

Inquiries regarding membership are solicited. Ownership of a transmitting station, while very desirable, is not a prerequisite to membership; a bona-fide interest in amateur radio is the only essential. Correspondence should be addressed to the Secretary.

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ALWAYS MENTION Q S T WHEN WRITING TO ADVERTISERS
Avoiding Trouble

THE regulations of the Department of Commerce state that amateur transmitting stations operating on waves below 85.6 meters need not observe the quiet hours that are specified for longer amateur waves "provided they do not interfere with other services." Conversely, when they do materially interfere with other services and it isn't the fault of the other services, they can expect to be closed down during quiet hours.

"Other services" of course means the listener to broadcasts, almost every time. It is a peculiarly difficult problem because we amateur transmitters and the B.C.L.'s live in the same block. We do not want to break up the reception of programs; they do not want to stop us in our useful work; both groups have their "rights", but neither to the exclusion of the other. Only a considerable measure of real cooperation can make the community situation wholly satisfactory. This co-operation must come from both parties. An amateur should not figure that the bare possession of a federal license to transmit is open authority to operate even if all broadcast reception in his locality is demoralized; nor should the concert-listener get the idea that radio was made for him and that all amateurs are nuisances of a very low order who should be ruled off the air to protect his own operation. Some dozen or so of amateur stations have thus been ordered to observe quiet hours on all waves. On the other hand, if the transmitter is able to operate without bothering ordinarily good broadcast receivers, the remaining listeners who insist upon using antennas upwards of 150 feet in length or ancient single-circuit tuners of obsolete design, neither deserve nor get any sympathy from the Supervisors.

Trouble of this nature is so easy to correct that no B.C.L. is entitled under these circumstances to claim that "other services" are being interfered with and that the hams should be piped down—he hasn't done his part yet.

We transmitting amateurs should start the co-operation that is necessary in these days of congested operation. House-cleaning, like charity, begins at home. It is possible to build a short-wave transmitter that won't interfere with anything except the rankest designs of phone receivers. The regulations require the use of loose coupling and a plate supply that is either D. C. or else full-wave rectified, either self-rectifying in the tubes or by means of a separate rectifier. Is your coupling loose? We have published all the dope we could lay our hands on. on filters and rectifiers, on methods of eliminating the keying impact, on good loose-coupled circuits. If you apply this knowledge to your station, it will solve your troubles. Are you using it? How about reducing power during the popular evening hours? That alone will go a long ways towards eliminating interference.

We think that every good ham these days ought to investigate conditions in his neighborhood and make it his business first, to bring his transmitter to the best possible stage, and then to help the individual listeners who still have trouble. And we think these listeners ought to welcome this co-operation and participate. It is easy for the transmitting amateur to spot the too-long aerial; easy to convert the single-circuit atrocity into a real tuner by adding an untuned antenna coil and connecting the tuning condenser across the secondary. And a simply-made wave trap, connected across the input of the tuner to act as a reflector will generally cure the worst cases without modifying the receiver—just an ordinary condenser and a few feet of wire! A little contact work among the few hard cases of interference,
after the transmitter itself is modernized, will make the amateur the most popular man in the neighborhood, will create a splendid public appreciation of amateur radio, and will prevent the possibility of a shut-down order during the early evening hours. It's a job that every transmitting amateur ought to undertake for his own sake.

—Kenneth Bryant Warner

"QRR" Re: Railroad Emergency

RAILROAD emergency work is rapidly assuming a prominent position in the traffic work of the League. The Principal activity so far has been confined to the Rocky Mountain Division, to the Pennsylvania Railroad and to the New York Central System. Emergency work has at times been performed on other systems, and the time has come when a standard emergency signal is a necessity.

It has been decided that we will create a new "Q" signal, "QRR".

Whenever a railroad calls on you for assistance, this signal will indicate to all stations hearing you that you have emergency traffic to clear. At the same time you should insert "east", "north", "west", etc., to indicate the direction you wish to clear. The name of the city you wish to clear may be inserted instead, if desired. A sample emergency call would run something like this: "QRR QRR QRR east east QRR east u 9XYZ 9XYZ 9XYZ." Or it might be "QRR QRR QRR Pittsburgh QRR Pittsburgh u 9XYZ 9XYZ, etc."

Emergency traffic will have precedence over all other forms of traffic. If you are located at, near or in line with the point it is desired to send the message, do everything you can to get in communication with the calling station, but if you hear that station hook up with somebody else, shut down and stand by. Other stations not located in the desired direction shall shut down and stand by.

"QRR" is, from now on, the League's "land SOS." Use it only when an actual emergency exists. Do NOT use it for tests.

—A. L. B.

Hudson Division Hams Attention!

ALL set for the big doings? March 4th to 7th will open the biggest and best Second District Convention yet. From the opening to the big Ham banquet on the 7th the Hudson Division will have four days in "Ham's Paradise" in the Pennsylvania Hotel.

Last call for reservations. Send your $5.00 admitting you to banquet, stunts, contests, etc. except R.O.W.H. to Executive Radio Council, Second District, 136 Liberty St., New York City.
Daylight Radio Communication Wins!
20-Meter Daylight Work Surpasses Results with Longer Waves at Night

We knew it was going to happen—now we have brilliant proof that 20 meters is one of the most useful waves we have. Reliable transcontinental daylight communication is being carried on at will between 1XAM at S. Manchester, Conn., and 6TS at Santa Monica, California.

It is being done with less than a kilowatt at each end and the sureness of contact is better than anything we have ever seen before over such distances with any power less than 20 or 30 kilowatts.

The most beautiful thing of all is this—it isn't an accident, it isn't a freak, it is engineering, and John L. Reinartz knew that 6TS would answer before he ever made the first attempt at noonday communication.

The Story

In our February issue we reported the 20 meter tests of the Experimenters Section and told how, in these tests, 1XAM and 9EK had worked together in broad daylight and been copied at Berkeley, California. Those tests were not blind accidents but were based on experimental work that had been going on for over a year. Many of us were absolutely sure that extremely long-distance 20-meter daylight work was possible, and we were also sure that 20-meter night-time work was good for nothing. Therefore the tests were planned to show both of these things—and they did.

Right on the heels of this 1XAM worked 4XE in broad daylight at 1200 miles. This is so important a happening that it must be recorded in detail.

The 4XE-1XAM Record

Under the leadership of Reinartz of 1XAM, much short-wave pioneer work has been done by a group of stations in which 4XE is prominent. The two stations, 1200 miles apart, had planned to work together on Sunday by daylight. At 10:20 A. M. Sunday, Jan. 11th, William Justice Lee, of 4XE, heard 1XAM testing at 20.5 meters, the signals being very strong. At 10:33 1XAM called 4XE and contact was immediately established, with 4XE working at 42.5 meters until 11:23 when that station shifted to 18.3 meters and maintained excellent two-way communication until 12:03 P. M. at which time they stopped voluntarily. This also was no freak—the two stations had been making one-way tests for quite a while.

In passing it is pleasant to note that 4XE heard both 8XC (Erie, Pa.) and 9AXX (St. Paul, Minn.) while working with 1XAM.

The Transcontinental Record

For a long time 1XAM has been sending tests with a group of sending sets operated by an Omnigraph. These sets were tuned to a variety of waves near 20 and 40 meters and with them information as to ranges
was gradually obtained. The nature of the theory worked out will be told in a later issue of QST but for the present it is absolutely sure that the thing could be done at noon with a 20-meter set using less than a kilowatt of power.

They arranged to try it at 11.30 A.M., C. S. T. on January 22nd.

The Test Succeeds

At 11.30 of the 22nd Reinartz held down the key until his tube was at a steady temperature, then he called 6TS three times, signed three times and said "K".

6TS replied at once!! Daylight amateur transcontinental communication was a fact.

Reliability

There was nothing spotty about the communication, no need to repeat words, no swinging or fading and when they stopped at 11.55 C. S. T. it was to enable Reinartz to get back to the Cheney Silk Mills in evening. The hours were from 5 to 8 C. S. T. and the waves used were mainly 40 and 20 meters.

The tests had made Reinartz and Willis time for his afternoon's work on the new substation. Meanwhile a message had been handled which read as follows:
MSG NO. 22, SOUTH MANCHESTER, CONN.,
JAN. 22, 12.38 P.M.
TO SUPERVISOR OF RADIO OF THE
6TH RDO. DISTRICT,
SAN FRANCISCO, CALIFORNIA.
GREETINGS OF THE EAST TO THE WEST VIA
AMATEUR RADIO AND 6TS ON 21 METERS AT
NOON E.S.T.
(SIGNED) 1XAM.

Since that time the contact has been perfectly reliable. 1XAM and 4XE work at will, 4XE and 8XC work at will and all three of them work 6TS whenever there is a schedule. Since most schedules have

CLOSEUP OF ONE OF THE 4 SEMI-PORTABLE SETS

This particular set has worked 9AXX at St. Paul, Minnesota, at 17 meters and at noon (E. S.T.) while the entire rig was in a room on the second floor of Mr. Reinartz's home. Good signal strength was reported. The distance is about 1000 miles. 

been run between 6TS and 1XAM it is interesting to note that for 14 consecutive days these stations have been in two-way communication, either by daylight or at sunset, missing only one day—and that was because 6TS had dismantled his set to get it photographed for QST. Proof of this is furnished by a message just received at the last minute by 1CKP which station worked 6TS on 21 meters from 3:20 P. M. to 4:26 P. M. E. S. T. on Feb. 1.

6TS, FEB. 1, 12.30 P.M. E.S.T.
TO S. KRIUSE.
IN DAYLIGHT HAVE WORKED ON 21 METERS
1XAM 3 TIMES, 1CKP ONCE, 8XC ONCE. THERE IS NO BREAK ABOUT THIS. BEST REGARDS.
WILLIS, 6TS.

Perhaps the reader will wonder why we say that 1XAM-6TS have worked 13 times

THE 50-WATT SERIES-HARTLEY TRANSMITTER
AT 4XE, ORLANDO, FLA.

This is the set that made the 1200 mile record. This set operates at 20 and 40 meters.

Just to show that there's nothing one-sided about 4XE, here's the 80 meter transmitter, a master oscillator rig whose voice is known in 5 continents.
when the message from 6TS says three. The answer lies in the fact that 6TS claims daylight work only for work done at NOON. In addition to this the two stations (1XAM and 6TS) have worked together at 40 meters for the 13 evenings mentioned. They shift from 40 to 20 and back again in a manner which will be understood when the

Radio and the Eclipse
By John L. Reinartz

"For a long time it has been known that radio waves could be reflected, just as light rays are reflected with the aid of a polished surface. In the case of radio the reflector can take the shape of a large screen bent in the shape of a half circle and of dimensions comparable to the size of the radiating system used by a short wave transmitter. Such reflection is man-made but there is a reflection of a different order which is entirely under the control of the sun and this type of reflection has only recently come to the attention of those who for the past year have been actively engaged in experimentation on radio waves of a length from 1 to 50 meters. It has been the writer's good fortune to be one of these, and he has been especially fortunate in that the work accomplished was of such value as to lead the Naval Research Laboratory at Bellevue, Washington, D. C., under the guidance of Dr. A. H. Taylor, to make proposals which led to active co-operation between them and the writer. This co-operation has extended over a period of a year and is not yet terminated.

"One of the problems of the past year has been the attempt to prove definitely the sun's control over short radio waves. It was generally known that the longer radio waves would travel a greater distance at night than during the daytime but it was not known that very short waves would travel further during the daytime than they would at night. The discovery that this was true was of course most important, but even more important was the other discovery that there is a definite relationship be-
ionization which determines the manner in which short radio waves will be reflected. As the radio wave is shortened its penetra-

CIRCUIT OF THE TUNER AT 4XE—
Range 9 to 23 meters
A—Single wire antenna 125 feet long.
L1—Loading coil with 30 turns No. 18 wire.
L2—Primary coil, 2½ turns No. 18 placed 1/16" from secondary.
L3—Secondary coil, 28 turns No. 18 D.C.C. wire wound on octagonal frame 4" in diameter. Frame made of thin wooden strips. Clips are used to short out unused part of coil.
C1—Cardwell variable condenser, originally had more plates but cut down to 7.
C2—Grid condenser, 250 micro-microfarads (0.00025).
C3—Cardwell variable condenser cut down to 5 plates.
Condenser shafts have 5 inch bakelite extensions to the dials.

Using 6 live turns in the plate and 3 live turns on the grid the tuning range is 9-30 meters. Using 6 live turns in the grid and 6 in the plate the tuning range is 23-60 meters. With the whole coil in circuit the range is up to 93 meters.

The tuner was built to specifications of Mr. Lee by 4TI of Jacksonville.

Signals from 1XAM are very strong at noon. During the eclipse 6TS was heard comfortably at 40 meters.

CIRCUIT OF THE 20 AND 40 METER TRANSMITTER AT 4XE
A—Antenna, single No. 12 solid copper wire 40' long.
C.P.—Single No. 14 solid copper wire 37' long, 8' above ground.
C2—Double spaced Coto-coil condenser—originally 500 micro-microfarads but now 125 micro-microfarads.
C1—Double spaced Coto-coil condenser, originally 250 micro-microfarads, now 62.
L1—Antenna coil, 4 turns No. 18 bell wire on 2" tube.
L2—Split ribbon helix, 4 turns on grid side and 18 turns on plate side.
L3—R.F. choke, 40 turns No. 26 wire on 2" pickle bottle.
C3 & 4—Mica condensers, .002 microfarads, rated at 6,000 volts.

When operating at 41 meters 3 grid turns and 6 plate turns are used with the antenna operating on its fundamental wave. 16 dead turns are left on the plate side and have been found to stabilize operation.

When operating at 18.3 the variable condensers, C1 and C2, are set at minimum, the grid turns are reduced to 2 and the plate turns to 4.

The coupling is fairly loose, the coils are spaced 1½ to 2½ inches, depending on the load that is wanted on the plate.

With the UV-203A tube shown the antenna current is 2 amperes at 40 meters and .9 amperes at 18.3 meters.

Much of this conversation was also copied by 6AJF at Berkeley, California.

"Additional proof was obtained during our recent eclipse of the sun. When the
sun’s rays were shut off by the moon, ionization of our atmosphere did not extend down to the earth’s surface as nearly as it did when the sun was shining, therefore the reflection of the short radio waves took place much higher in space and the distance at which they were reflected back to the earth was much greater in diameter. The short radio waves could not be received within that circle during this time. This was proven by the observer at the Naval Research Laboratory, Bellevue, Washington, D. C., who lost the 40 meter signals of 1XAM as the sun was being blotted out and who found them again when conditions had become normal once more. The same thing happened at 1XAM where 54.7 meter signals were being received from NKF. At the same time receiving stations who could not find the short wave signals before the eclipse began to hear them as the eclipse was coming into totality and lost them again shortly thereafter. This proved that the reflection occurred at higher altitude during totality and added to the conclusive evidence that the sun has a very great effect on radio, most especially on the short waves below 50 meters."

What Does It Mean

What does all of this mean to radio—and in particular to amateur radio?

First of all it may mean that our entire scheme of things will be upset and that long-distance stations will reduce both wave-length and power in daylight.

Secondly it will most certainly mean that there will be attempts on the part of commercial organizations to acquire the use of the wavelengths between 16 and 50 meters—and perhaps to attempt claims that the pioneering has been done by them, just as was the case of 100 meters.

How these things will come out we cannot say—but we are surer than ever that amateur radio is worthwhile, and we are surer than ever that the 5 meter band (like the 20, 40, 80, 100, 150 and 200 meter bands) will first be explored by non-commercial citizen radio men.

Let us not camp at 20 meters as so many did at 80—forward! Next month we will have an article on all sorts of 5 meter sets—that work.

The Circuits Used

Before turning to any apparatus descriptions it will be a good idea to think of one thing particularly—this has NOT been done by any tricky “new circuit”—it is done with the intelligent use of the straightforward circuits that have been available continually. Therefore we can’t possibly claim that luck had anything to do with it—nobody blun-
dered onto a circuit that happened to do it—nothing of the sort. In the stations described in this article and in the Experi­menter’s section of the last issue we have 6TS using a loose-coupled Hartley circuit with series feed, 4XE using the same thing with a slightly different arrangement of the parts, UEK used a loose-coupled Colpitts circuit and 1XAM used a circuit in which the concentrated capacities and inductances have been so reduced that it may be analyzed as either a Col­pitts or Hartley circuit, depending on which of the capacities are adjusted to be the smallest.

Very well—it wasn’t “a new circuit.”

The Stations

1XAM at S. Manchester, Connecticut, has been described in the Experimenter’s section for February, turn to that article for all details on the sending set and antenna. The receiving set is shown here and no ex-

so very thoroly described by the excellent photographs that there is not a great deal to say there either. 4XE is a station at

which a tremendous amount of test and experi­mental work has been done; therefore style is generally neglected in favor of immediate results. This isn’t the same thing as a junk station—far from it.

6TS, owned by Ed. Willis, is located one mile from the Pacific and about 18 miles west of Los Angeles. The sending set and the receiving set are described in connection with the diagrams but the antenna-and-

planation is required except that which appears under the circuit diagram.

4XE, Wm. Justice Lee’s station at Or­lando (or is it Winter Park?) Florida, is
counterpoise system is special and needs some comment. When operating at 20 me-

At 40 meters the set is switched to the larger antenna system which has a natural wave of 120 meters. Operation is again on the third harmonic.

At 75-80 meters the antenna series condenser is cut in and the large antenna system tuned down so that its fundamental is at the desired point. The two primary condensers are set nearly at maximum.

9EK is owned by the Burgess Laboratories at Madison, Wisconsin. The station was built by Radio Laboratorian W. H. Hoffman who is also the operator. Naturally enough a Burgess station operates on Burgess batteries—all the way thru, including the plate power.

The set uses a loose-coupled Colpitts cir-

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The set uses a loose-coupled Colpitts cir-
tion. Place the plate clip at opposite end of coil from the grid.

"Keep the two variable condensers at approximately the same setting. This gives a 1/1 capacity ratio across the elements of the tube and this is found to work well at the low waves. For 20 meters the settings at 9EK are approximately 70 and 70.

"When everything is working properly raise the plate voltage to normal and couple up the antenna circuit, tuning it to resonance by means of the antenna series condenser. Loosen coupling to the antenna circuit until resonance can be passed thru (by varying the antenna series condenser) without any evidence that the oscillations in the antenna circuit are breaking off. Key the circuit while making adjustments and make sure that the antenna ammeter always returns to the same maximum deflection. It will not if the coupling is too tight. (2" at 9EK).

"After proper coupling is found move the plate clip toward the center of the coil until maximum or desired plate current is taken by the tube."

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**Official Wavelength Stations**

The A.R.R.L. Official Wavelength Stations that have been appointed by Messrs. D. C. Wallace and C. M. Janovsky Jr. are as follows.

<table>
<thead>
<tr>
<th>O.W.L.S.</th>
<th>Call</th>
<th>Location and Ownership</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>NKF</td>
<td>Naval Research Laboratory, Bellevue, Wash., D.C.</td>
</tr>
<tr>
<td>2</td>
<td>1XAM</td>
<td>John L. Reinartz, 371 Hrdl. Road, G. Manchester, Conn.</td>
</tr>
<tr>
<td>3</td>
<td>6QB</td>
<td>A. A. Wahlender, 15th St., Sacramento, Cal.</td>
</tr>
<tr>
<td>5</td>
<td>5MN</td>
<td>Horace Biddy, San Antonio, Texas.</td>
</tr>
<tr>
<td>6</td>
<td>9AAL</td>
<td>Frank L. Wilcox, 4602-A Delmar St., St. Louis, Mo.</td>
</tr>
<tr>
<td>7 New Zealand</td>
<td>2AC</td>
<td>I. H. O'Mears, Gisborne, New Zealand</td>
</tr>
<tr>
<td>8</td>
<td>1XW</td>
<td>P. H. Schnell, 225 Fern St., West Hartford, Conn.</td>
</tr>
<tr>
<td>9</td>
<td>9ZT-9XAX</td>
<td>D. C. Wallace, 54 Penn. Ave., Minneapolis, Minn.</td>
</tr>
<tr>
<td>10</td>
<td>1MK</td>
<td>A.R.R.L. (Headquarters Station), Hartford, Conn.</td>
</tr>
<tr>
<td>11</td>
<td>9GU-8XC</td>
<td>Dawson Billey, 450 West 9th, Erie, Pa.</td>
</tr>
<tr>
<td>12</td>
<td>9XI</td>
<td>Engineering Department, University of Minnesota, Minneapolis, Minnesota.</td>
</tr>
<tr>
<td>13</td>
<td>1CK</td>
<td>Philip F. Robinson, 145 Hoils Ave., Brantree, Mass.</td>
</tr>
<tr>
<td>14</td>
<td>1AWW</td>
<td>T. F. Cushing, 78 College Street, Springfield, Mass.</td>
</tr>
</tbody>
</table>

The number is now so large that everyone can use these O.W.L. stations to spot calibration points on wavemeters and tuners. As we have explained before—there will be no schedules, the stations will simply carry on their regular work on the 5, 20, 40, 80 and 150 meter bands, announcing the wave they are using at the close of each sending. For instance, 9ZT will finish up "u 9ZT 76" or "u 9ZT 180" or "u 9ZT 42"

This is not the same thing as the Bureau of Standards system, since there are no regular schedules and there is no attempt to secure the extreme accuracy that is provided by WWV, 9XI and 6XBM. The O. W. L. S. can be depended on to 1% however in most cases and 9ZT-9XAX checks them up regularly to see that their waves are correct.

All correspondence regarding O.W.L.S. should go to D. C. Wallace at the address listed above.

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Photographs intended for publication in QST should be printed on glossy paper, should be large, and should preferably be taken by a commercial photographer. Snapshots are practically certain to be unfit for publication. Photographs that have too much of one general tone, such as gray, also fail to reproduce satisfactorily, so be certain that sufficient contrast in white and back are present. To get the kind of pictures that will reproduce really well, use a small lens opening and make a long exposure—the smaller the opening the better.

E. H. Giddings of 9GC says that someone is using his call illegally, as he has not been on the air in several months and yet is receiving stacks of cards. He would appreciate help in locating the offender; whether be someone with a bum fist or an actual law-breaker. If it is a law-breaker, he had better take warning for the inspector has been put on his trail.
The McCaa Anti-Static Devices

Part II

By S. Kruse, Tech. Editor, from notes by Dr. D. Galen McCaa

Last month we presented an analysis of the theory of McCaa Oscillator and Repeater Systems of static reduction. In this, the second part of the article, we give all constructional details that are essential the building of such a device. We have endeavored to give those specifications that are important—other dimensions and values may be changed to suit the facilities or apparatus which the reader may have available. It must be borne in mind that these devices are still in the experimental stage and require some degree of ingenuity on the part of the builder for their successful operation. A careful reading of both parts of this article will go far toward getting the understanding of the devices that will be necessary.

Of especial interest to the telegraphing amateur is the McCaa Band Selector also described in this part of the article. This device is out of the experimental stage, and one that will operate beautifully can be built directly from the detailed specifications that we give—Editor.

In part one of this article the statement was made that the signal/static ratio seems much better than 1/1, altho the theory calls for a 1/1 ratio.

Dr. McCaa suggests several possible reasons for this. To begin with, it is the peak values that should be the same, therefore the energy content of the static surge in the secondary will be less than that of the signals. In addition to this it seems plausible that both the detector tube and the headset are less responsive to the same amount of energy when it is in the form of impact than when it is in the form of a more nearly sinusoidal curve.

Constructional Dimensions

With that we will drop theoretical discussion of the tube-operated anti-static de-
This sort of construction will prevent direct pickup of static by the tube system so that the anti-static circuit will not be crippled by accidental inputs which it cannot be expected to control.

Operation

Begin by closing the switch Sw. Tune in a station by using the condensers C1 and C2. Now open the switch Sw. and change the coupling between both P1 and P2 until nothing is heard in the secondary, indicating that both the static and signal have been balanced out. If the static does not balance out one of several things may be wrong. Perhaps the ground connection is not good. (Very few receiving grounds are even fairly good. Waterpipe or steampipe grounds are practically never good enough.) Perhaps the trouble is a more simple one—the coils P1 and P2 may be too close to S. They should stay at least $\frac{1}{2}$" away from S. At this point it must be admitted that the simple circuit shown here cannot completely get rid of such things as violent static and street-car “plops” for the very reason just mentioned—there are some static couplings that are not guarded against. For the man that wants to do a complete job several more complex circuits have been developed and operated with complete success.

However, assuming that a fair static-balance has been secured, proceed by turning on the filament of the repeater tube and begin to tune its grid and plate circuits, trying various degrees of coupling between these circuits and the coils L1 and L2. The first attempt of this sort will be pretty tedious because one will not know what couplings are to be used. After the correct grid coupling is found it can be left alone, the whole device being adjusted by tuning the grid and plate circuits with a little final adjustment of the plate coupling.

This sounds pretty intricate, especially as the plate circuit must always be kept a little off tune to keep the repeater tube from oscillating. As a matter of fact the circuit as shown is too complex to handle with

- **PRINCIPLE OF MCCAA ‘BAND SELECTOR’**

1. S & 3, metal bridges over which band is stretched.
2. Ph1, first Baldwin ‘phone which acts as a motor.
3. Ph2, second Baldwin ‘phone which acts as a generator.
4. T1, input transformer.
5. T2, output transformer.
6. C, C tuning condenser for the transformers.
7. B, stretched metal band.

Dr. D. Galen McCaa

Dr. McCaa’s interest in radio began after several years’ work as Roentgenologist at the Lancaster (Pa.) General Hospital. He first turned to the development of a radiofone and, as has been reported in our February issue, operated probably the first radiofone in America. These tests were made in 1914 between the old New York Herald station at the Battery and the S.S. Tyler of the Old Dominion Line.

The famous Marconi suit on the use of coupled tuned circuits forced a change of direction of the work, and during the next few years there was devised a system of transmission that did not infringe that patent. The system was tested on the S.S. Tyler and was ready for the market when the war intervened.

Dr. McCaa then spent some time at the Radio Section of the Bureau of Standards, leaving that organization to work on anti-static devices. The first work was done with Colonel John Firth, and the device was sold to the Federal Telegraph Co. in 1920, at which time Dr. McCaa joined their staff.

The more recent work has been at the Radio Laboratory in Parkesburg, Pa., the organization fostered by Mr. Horace Beale of 3ZO, former Director A.R.R.L.
three-condenser broadcast receivers of other varieties. In any case, the three-handed broadcast receiver is gradually being gotten rid of, and the same amount of that put on the present circuit will also simplify the McCaa "repeater" control.

That has not been attempted as yet. The way that broadcast reception neither demands nor necessitates. For such work a "three-handed tuner" is hopeless, therefore the most important thing about the band device is that it does not add a single control altho greatly decreasing static.

A band of soft iron, 20 mils thick and 1/2" wide, is stretched across three bridges, 1, 2 and 3, so as to form two vibrating sections of the same length. Each section is 2 1/2" (or 3") long and as the two are of the same length and under the same tension they will be tuned to the same note.

The mass, tension, elasticity and length of the band have been chosen to put this tune inside the usual audio range—1000 cycles being a pitch to which the band can be tuned readily by means of the tension screw provided for that purpose.

The band presents the tonal properties of a tuning fork, in that it will respond readily to impulses corresponding to its natural period but is not at all sensitive to irregular impulses.

The section at the left acts as a primary section. This section is driven by a Baldwin receiver which has been removed from its headband, has had its diaphragm taken out and the little rod that usually drives the diaphragm connected to the middle of the left span of the band. When this phone receives currents of the pitch to which the band is tuned it will vibrate the band. The stiffness of the band is great enough so that the vibrations will be carried across the central bridge (2) into the right-hand, or secondary, section of the band. This secondary section being tuned to the same pitch will vibrate readily, thereby operating the armature of the second Baldwin 'phone (Ph. 2) and causing it to act as a small A.C. generator. The output of the second phone will be fed thru the output transformer T2 to an amplifier or a headset.

Static and signals of other pitches will not get thru the device at all well because they are required to pass thru the two mechanically tuned sections of the band—and get lost in the process.

The Tuned Transformers

When the band-selector was first put into
use it had one great weakness, just the same as all other mechanically tuned selectors and repeaters before it. This weakness was that the band insisted on vibrating after the signal had stopped coming in, thereby putting "tails" on all the dots and dashes so that they ran together and were hard to read.

To get rid of this difficulty the input and output transformers were tuned as shown. This had two effects. The lesser one was to give an additional increase in the signal/static ratio as the static now had 4 tuned circuits to go thru (2 electrical and two mechanical) but the main gain was to stop the band promptly when the signal stopped. The reason for this action is that the tuned circuits withdraw energy from the band just as soon as the signal stops, thereby giving a sort of "dynamic braking" action. The improvement is very great altho the tuning of the transformers is not at all exact.

Operation

One might think that the band needed tuning for each separate station but this is not correct. One simply sets the band at some convenient pitch that the operator happens to like and then heterodynes the received signal until its pitch falls from that of the band. For spark signals that is not possible and the band must be set to the spark pitch, making an extra adjustment. The band tunes very sharply and is a help in getting rid of interference. The horrible mush from stations using synchronous rectifiers for plate supply can he gotten rid of almost completely and the "purr" from A.C. plate supplies is much reduced.

In general it is well to use the band-selector between the detector and the first audio stage. Where signals are weak it may be used between a first and second audio stage.

Results

The improvement made by the band device is absolutely startling. The device has been tested out at the San Francisco station of the Federal Co. and gave the following results.

<table>
<thead>
<tr>
<th>Straight Receiver</th>
<th>Anti-Static System</th>
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<tbody>
<tr>
<td>Signal Static</td>
<td>Signal Static Audibility</td>
</tr>
<tr>
<td>1600</td>
<td>3867</td>
</tr>
<tr>
<td>Ratio 1/2.1</td>
<td>Ratio 246/1</td>
</tr>
</tbody>
</table>

The words "anti-static system" are used to indicate that a device was used with the band selector to protect it from the "bang" or "crash" variety of static. Where there was nothing but ordinary rumbling and hissing static (or power leaks) the results would be about the same without the extra device. In a demonstration at 320 it was shown that the band device would completely eliminate the noise made by a loose-jointed buzzer coupled to the antenna system and making a ragged noise like a bad

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**THE TRANSFORMER USED WITH THE BAND-SELECTOR**

*Note—Ordinary audio amplifying transformers will not work.*

Core section is ¾" x ¾" and is composed of 20 mil iron.

**Input transformer windings.**

Primary, wound on one long side of core, 2500 turns No. 40 enameled wound in layers as nearly as possible.

Secondary, wound on other long side of core, 2500 turns No. 24 silk-and-enameled covered wire separated from core by one layer of thin bristol board or other suitable 1/64" insulation. Wind in layers.

**Output transformer windings.**

Primary same as secondary of input transformer.

Secondary, 10,000 turns No. 40 enameled wire wound over 1/64" of insulation, layer winding as nearly as possible.

One layer of thin, but good, waxed paper is used between each 2 layers of wire allowing the windings to keep fairly even.

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The buzzer noise was strong enough to drown out all signals the band device removed the noise so that it became a faint murmur and easy reception of signals was possible. Tape record of signals were also made using a vibration-proof type of relay developed by Dr. McCaa. (In passing it is interesting to
say that the operation of this relay seemed perfectly satisfactory with signals of ordinary headroom strength, altho the whole affair is quite small and so rugged that it can be bounced on the table while working. It uses no tubes or complex circuits but is a straightforward relay and operates a standard A. T. & T. "pony" relay which in turn operates the recorder. All of this was done with no interference from the buzzer altho, as has been said before, it absolutely blanketed all signals when the band-device was taken out.

Tri-State Convention—Pittsburgh, Pa.,
By OYER

O

VER 150 amateurs attended the Tri-State Radio Amateurs Convention, the first one for Pittsburgh, which was held January 29th, 30th and 31st, and this in spite of the fact that only a few weeks were spent in preparation for the event. "Hams" from Ohio, West Virginia and Pennsylvania (the three States giving the name for the convention) were in attendance and one good "ham," GBRF, came from the West Coast.

The convention opened during one of the heaviest snowstorms in years and only a small number had registered up to noon Thursday. After lunch they began to arrive in great numbers and at 3:00 P. M. Chairman P. E. Wiggin, 8ZD, gave a speech of welcome to a fair-sized crowd. The bunch then proceeded to WCAE, the Kaufmann and Baer broadcasting station, where they were made welcome by Thomas McLane, 8BDI, and Al McChesney of the mighty WVQ.

The first night was open and advantage was taken of this to visit stations and friends.

On Friday morning a special street car took the crowd to Station KDKA, where the 63-meter transmitter was given especial attention. Mr. C. W. Horn and his assistants very kindly answered a million questions after explaining the layout.

On Friday afternoon an interesting technical meeting was held with papers and talks, before a good crowd.

Friday night an excellent entertainment program was furnished by the Committee. The music, etc., was broadcast from the Roof Garden of the Hotel Chatham by WCAE. Many telegrams were received from a distance from amateurs listening in on the program.

On Saturday morning examinations for licenses were held and an interesting trip to the A. T. and T. exchange was taken. (Every amateur should visit a telephone exchange. They would feel more kindly towards unavoidable delays after seeing what takes place when a call is put in.)

In the afternoon, contests, a traffic meeting and a technical meeting with several excellent papers, took up the entire time.

Saturday evening the banquet was given and the roof garden was crowded. Addresses were made by Mr. S. W. Edwards, 8th Dist. Supervisor, Mr. A. A. Hebert, Field Secretary-Treasurer of the A.R.R.L., Mr. C. W. Horn of the Westinghouse Company and Mr. John H. Miller of the Jewell Inst. Company. After the speaking the drawing of prizes took place. The first prize, a Grebe 13, was won by Thompson Baber of Swissvale, Pa., a young ham just starting out in the game, and he received the congratulations of all. Many other valuable prizes were distributed.

The convention concluded with the solemn rites of initiation into SOTA B.

This impressive ceremony, the last event of the convention, could scarcely fail to leave in the minds of those who had the privilege of witnessing the ritual, a sense of duty and obligation to amateur radio.

Congratulations to the committee.

And here's looking forward to the next one.

Raising the Ante

EFFECTIVE with the current issue, the newsstand price of QST is advanced to 25 cents per copy. The League has delayed this advance as long as possible but it is now necessary. Practically every other radio magazine of national reputation has long since sold at at least 25c per copy, many of them higher. We know that QST is worth it, and we trust our readers will agree with us. The few cents additional that each reader will expend are very little to him, but in the aggregate they will enable us to do a materially better job in the publication of QST and in carrying on the work of the A. R. R. L.

By the way, there is no increase in A. R. R. L. dues and the opportunity to save money by joining the League is bigger than ever. Have a look at the handy application blank on page 64, O.M.!
MODERN radio reception has changed radically in several ways in the last few years. First, in the almost universal use of radio frequency amplification for broadcast reception; and second, in the adoption of low-wave transmission and reception for amateur traffic, more particularly in continuous waves.

The vacuum tube I am about to describe was developed with the idea of meeting the needs of both these changes. The secret of efficiency in radio-frequency amplifications, oscillation and detection in the wave band of from 20 to 600 meters, lies in making a vacuum tube having a low internal capacity and yet being able to handle a fair amount of power.

Magnavox Type A Tubes are a radical departure from standard tube practice and have a low inter-element capacity without loss of other essential characteristics.

Referring to Figure 1, it will be seen that not counting the lead wires and filament, only three metal parts are involved—control electrode, anode and filament spring. These parts are all die stamped and are therefore, always alike. The control electrode is formed of a single piece of metal, slotted to receive the filament. This slot is provided on its edges with teeth, the teeth being bent laterally, away from the plane of the filament. This lateral bending not only gives increased electron control, but also widens the control field and makes it possible to secure uniformity in tube characteristics despite slight mechanical variations in manufacture. The writer has found that such teeth or serrations are necessary in order to obtain proper control action. The teeth alone control the electron stream and the remainder of the control electrode acts simply as a support for the teeth. By varying the number, size, shape and position of the teeth, tubes can be made to duplicate the characteristics of standard grid tubes, in much the same way as the number of grid wires control the characteristics of the grid tube.

After the control electrode is mounted the filament is placed within the slot as shown in Figure 2, the anodes are placed in position. The complete assembly is shown in Figure 3. It is to be noticed that the anodes are not parallel to the plane of the filament but are spread slightly at the bottom. The tube is then sealed and pumped by a new method which removes all undesirable gasses in about 80 seconds. The finished tube is shown in Figure 4, which also shows the method of insulating the prongs in the base.

Electrical Characteristics

The audio frequency characteristics of Type A tubes are practically identical with those of the Radio Corporation, Cummings-
ham, or DeForest Storage Battery Tubes, with the exception that the output impedance is slightly lower, with consequent greater mutual conductance. The characteristic curve of the tube is practically a straight line which gives wonderful tone quality when used in broadcast reception. The filament of special “no-boil-off” material burns duly at 900° with a current consumption of 0.22 to 0.23 amperes. Plate current is 2.5 to 3.5 milliamperes under load. Total filament emission with control electrode and plate tied together is from 40 to 50 milliamperes at 90 volts. The tube is designed so that 120 volts may be used on the plates if desired.

### Inter-element Capacity

For comparative figures a number of Type A tubes and a number of standard storage battery tubes were measured on a General Radio Precision Capacity Bridge, and the averages are given in the following table:

<table>
<thead>
<tr>
<th></th>
<th>Control Electrode to Filament µµfds.</th>
<th>Plate to Filament µµfds.</th>
<th>Control to Plate (Fil. Free) µµfds.</th>
<th>Control to Plate to plate (Fil. Ground) µµfds.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type “A” Tubes</td>
<td>5.0</td>
<td>5.0</td>
<td>5.0</td>
<td>2.4</td>
</tr>
<tr>
<td>Average</td>
<td>6.5</td>
<td>6.0</td>
<td>11.2</td>
<td>5.5</td>
</tr>
</tbody>
</table>

Thus it is seen that the highest internal capacity is not over 5 µµfds, and that the filament-grounded control-electrode-to-plate capacity is only 2.4 µµfds, and less than half that of standard tubes. There are two reasons for this low capacity. The control electrode is composed of just one flat piece of metal instead of a cylindrical grid. This alone reduces the control-electrode-plate capacity greatly. The other factor lies in the greater plate spacing employed in the Type A tube. The fact that electrons are free to pass to the anodes without obstruction, allows greater spacing for the same impedance. In practice I have found that the same impedance can be obtained with about double the spacing of the ordinary grid tube. The writer is now working on elimination of capacity to a still greater extent by reducing the actual amount of metal to practically the teeth only. This should bring the internal capacity of the tube to very close the capacity of the leading-in wires.

This low internal capacity makes Type A tubes hard to oscillate in tuned plate circuits. This means that tuned R. F. amplifiers are practically self-neutralizing when Type A tubes are used. When using electromagnetic feedback, however, they become highly oscillatory and oscillate freely and steadily for C. W. reception down as low as 20 meters without the least trouble. I am inclined to believe that tubes used without the base can be made to oscillate at lower wavelengths, but no experiments have yet been made to determine the extreme bottom range.

In conclusion, I will say that Type A tubes in audio frequency circuits give a beautiful clarity of reproduction. Careful experiments have indicated that Type A tubes will operate with maximum efficiency as follows:

1. Detector using control-potential control-current characteristics for rectification.
2. Detector using control-potential plate-current characteristics for rectification.
3. Radio frequency amplifier at low wave lengths.
4. Intermediate frequency amplifier.
5. Oscillator both low and high wave lengths.
All Aboard For Paris
First Congress of International Amateur Radio Union April 16-20.
Are you going over?

The first international congress of amateur radio amateurs ever held will convene in Paris from April 16th to 20th, inclusive, having as its primary purpose the formation of an International Amateur Radio Union. It is expected that there will be representatives there from the amateurs of every land. The wonderful strides made in international amateur communication this winter have shown clearly the possibilities of international organization. A most important meeting is expected to result, one from which the spirit of Amateur Radio as we know it may echo all around the world, bringing into existence an association which will play the same role in international amateur affairs as our own A.R.R.L. does in North America.

It will be remembered that about a year ago our president was in Europe and established the preliminary contact that has resulted in the calling of the Congress. The three leading French amateur societies have banded to arrange the meeting and announcements have been mailed all over the world. A secretariat has been established at 2 Rue de l'Eschaude-Saint-Germaine, Paris (6e), and details are being worked out rapidly.

A preliminary list of topics slated for consideration at the Congress, received in this country about Christmas, lists (a) the organization of an I.A.R.U.; (b) methodical organization of technical tests by amateurs; (c) wavelengths for radiotelephone and amateur transmissions; (d) educational use of radiotelephony; (e) selection of an international auxiliary language. League Headquarters will be very glad to receive suggestions from the membership on additional subjects which should come before the Congress. The A.R.R.L. has been requested to submit a proposed constitution for the I.A.R.U. and is particularly interested in the first item on the agenda. At this writing we have not learned what plan of procedure will be followed at the sessions but because of the difficulty offered by diverse languages it seems probable that formal international diplomatic procedure will govern. Under this scheme a sub-committee would be formed to handle each item on the agenda, every nationality represented being invited to submit a written monograph to the sub-committee handling that subject. The decisions of the sub-committees would then be combined in a “draft convention” to go before the whole Congress for approval and signature by the representatives present. To the American mind, used to direct action and conference-table get-togethers, this may seem a very complicated and formal method of getting things done but something of this sort is necessary where many languages are spoken. We may feel certain that, in some fashion or other, there will be adequate opportunity for us to be heard on the various subjects under consideration.

The I.A.R.U. is going to be a federation of amateur societies chiefly national associations, with representatives to speak for them at the Congress. Although only these official delegates of national societies will have the right to vote, all amateurs are welcome. About a dozen A.R.R.L. Division organizations, convention organizations and clubs are raising funds to send one or more of their number to the meeting. The two official delegates which the League probably will have in attendance will be very glad to have the assistance and support of these representatives. It will be fine if we can get up a big A.R.R.L. party and sail over together, and show the rest of the world what American hams look like. In fact that is the idea of this unofficial representation—it is a “contact mission”. It will be worth a good deal to us Americans to have a considerable number of our fellows come to meet and know intimately the amateurs of other countries. It is worth the while of any club or similar organization that can afford it, to send one of its best amateurs to Paris, and home via London, to establish this contact and come back home and tell what he saw. Individual amateurs are very welcome, too. Now who’s going?

We want to get up an A.R.R.L. party to sail from New York on the S. S. “Mauretanis” on April 1st, returning to New York on the S. S. “Berengaria” on May 1st, providing thirteen days in Paris and three in London. We have arranged with the Davis Travel Service, 102 Pearl St., Hartford, Conn., to act as our booking agents. Mr. F. Irvin Davis, of that firm, can make every desired reservation and make all arrangements necessary for everybody that wants to go. We urge everybody who would like to go along with the gang to get in touch with Mr. Davis immediately. He has steamer plans, all the dope on passports,
etc., and can even make your hotel reservations abroad.

Our contemplated itinerary provides for sailing on the "Mauretania" on April 1st, arriving at Cherbourg on the 7th, thence by rail to Paris; in Paris from the 8th to the 20th; leave Paris 21st via Calais and Dover to London; the 22d to 24th in London; then to Southampton on the 25th and home on the "Berengaria", due to arrive in New York on May 1st. We are going to travel second class, which is good enough for any of us, and save money. The minimum cost of the trip, from New York and back to New York, will be right around $600. This covers steamer fare (with meals), taxes, passport expenses, hotels, transfers, meals, tips, etc. The steamer accommodations contemplated in this estimate are on the basis of four hams to a cabin, inside staterooms. If there are only three or two to a room, or if an outside room is secured, the fare is higher, running up to where about $175 will have to be added to these figures if the round-trip is made in outside stateroom two to a room. Mr. Davis will be glad to arrange to bunk hams together, and Headquarters will be glad to help. For just a little additional money all kinds of interesting extra things can be done. For instance, for $14 extra, one can fly from Paris to London; for $15 three long rubberneck-wagon trips can be had around Paris; two such around London for $12; we can have a heap of fun on the side.

Mr. Davis will need from each man registering on this trip the following information: Name, home and office address, whether you wish to travel first or second class, kind of accommodations desired, also a deposit to make steamship reservations positive, being 25% of the passage money if first-class, or $30 per berth (for each direction) if second class. Also the following information in connection with a government information blank which has to go with all steamship tickets.

Country of which a citizen or subject; by birth or naturalization; country where lived before coming to the U.S.; country where going to live; last arrival in the U. S. (date and port); race; occupation; married or single; born (date, city or town, county, state, country); if naturalized, the Court, date and number.

Passports are a mean problem, and as they take considerable time, they should be started at once. Apply to the clerk of the nearest State or Federal Court for information; the government also maintains passport agencies at Boston, New York, Chicago, Philadelphia and San Francisco. You are required to appear in person with documentary proof of citizenship and two photographs of yourself, plus a $10 fee. Visas of passports are required in France and England which Mr. Davis can arrange. When you have obtained your passport, it should be signed in the two spaces provided and mailed to him with a check for $21.00, whereupon he can obtain visas. Also, a Certificate of Compliance must be obtained from your District Collector of Internal Revenue, showing that you have complied with the Federal Income Tax Law, before you will be permitted to leave the country. Aliens should also obtain a re-entry permit on Form No. 631 of the Immigration Service, to re-enter the United States.

A lot of trouble, but it's going to be worth it all. Years ago, just as we started having conventions, there was a terrific "kick" in meeting the fellow you had worked so often on the air but had never seen. Here will be our chance to have the same experience with the amateurs of other lands whose signals we have heard or worked. In years to come, when the I. A. R. U. is a powerful world-known influence in amateurs affairs, we will look back on this First Congress in Paris and be proud and glad that we attended and helped to put the job over.

—K. B. W.
MOST of us own wavemeters that don't go down far enough. For the past year we have been nagging all wavemeter makers, trying to get from them something that will go below 10 meters—and they can't see it at all! They keep right on making things that stop at 30 or 40 meters. And that's right in the face of the fact that 20 meters has just put over the biggest thing since the audion—long range daylight work.

Very well—if they will not furnish us with meters we will have to make them ourselves.

Several ways of doing this have been described, the harmonic schemes described by the present writer, Bliley's method of transposing onto another scale, Reinartz's scheme shown last month—and now we have a still easier one, and it is due to Reinartz again.

The Resonance Coil

Most of us know that a coil has a natural wavelength—because it has inductance and capacity in its windings. Some of us know that it is perfectly easy to find that natural wavelength and its harmonics—but that didn't suggest anything useful to us. It did to Reinartz though—and the scheme followed.

He began by winding No. 30 D. C. C. wire on a 3½ inch tube. I don't know how he knew when to stop, probably he did it the way the rest of us do—"wind until you are sick of it and then put on that much more." At any rate the finished winding was 4½ inches long. It was then dropped into hot paraffine and picked out to drain. Then the receiving set was put into oscillation, the coil hung near it by a thread and the tuning controls worked back and forth until a click showed resonance with the coil. This happened at 160 meters, according to a General Radio wavemeter. Another coil made to the same dimensions would perhaps have resonated at 154 or at 163—but that isn't the point for it does not change the scheme a bit—one can start with any wave that can be reached with the wavemeter you have now.

The coil has a natural wave of 160 meters—what of it? If the natural wave is at 160, then the second harmonic is at 80, the third harmonic is at 53.3, the 4th harmonic is at 40, etc. Just keep on going down with the receiver and hunting for resonance clicks. Whenever you find one—stop right there, put your new small coil on your wavemeter condenser and spot that point on the wavemeter dial.

In this way it is possible to go down as far as the receiver will oscillate, and to find coil-harmonics as low as the 21st, although the ones after the 5th are rather hard to locate. It is much easier to do the whole thing if a small meter is used in the detector plate circuit instead of using the click method. This is more accurate and more sensitive. The meter can be a 0-10 milliammeter and if you don't have such a thing you can often make a voltmeter serve by disconnecting the series resistance. In the same way an ammeter will sometimes do if the shunt is taken off and some R. F. meters will do if the thermo-couple is disconnected.

However, it isn't overly easy to chase such a lot of harmonics, so it's better to make some smaller coils. Incidentally that also checks the work with the large coil and makes it a little safer from the accident of missing a harmonic—and that's something to be watched. Even if you make the other coils, don't depend on marking the wavemeter dial. Draw a regular wavemeter chart and then a kink in the line will warn you that something has happened—otherwise you may never discover that the 3rd and 4th harmonics have been mixed.

The other two coils are wound with the same wire on the same sort of tubing and treated in the same way. The only difference is that the medium coil has a winding 1½" long and a natural wave of 66 meters while the small coil has a winding ½" long and a natural wave of 80 meters.

Now then—that's the easiest wavemeter stunt we have ever heard about, there's no excuse at all for not knowing where 20 and 5 meters are—even if there isn't a single manufacturer that believes that there are such wavelengths.

—S. K.
New Regulations for Transmitting Stations

Amateurs having transmitting stations should take close note of the following regulations of the Department of Commerce, which went into effect January 5, 1925, as a result of studies made at and subsequent to the Third National Radio Conference.

Wave Lengths

150 to 200 meters, 75 to 85.7 meters, 37.5 to 42.8 meters, 18.7 to 21.4 meters, and 4.69 to 5.35 meters, are allocated to amateur stations.

Spark Transmitters

Amateur spark transmitters produce considerable interference and consequently are responsible for many complaints. Amateur owners of such transmitters should abandon their use as early as possible and adopt a system producing less interference. Until such change is made they will be permitted in the wave length band between 170 and 180 meters and should have a decrement not exceeding .1.

[Note 1.]

Phone and ICW Transmitters

Phone and ICW (Interrupted Continuous Wave) transmitters will be permitted in the band from 170 and 180 meters. ICW shall be defined as the type of wave produced by mechanically interrupting one or more of the radio frequency circuits or the type of wave produced by any transmitting set which produces an equivalent effect.

CW Transmitters

CW (Continuous Wave) transmitters will be permitted in all of the bands allocated for amateur use.

Coupled Circuits

Amateur stations must use circuits loosely coupled to the radiating system, or devices that will produce equivalent effects to minimize key impacts, harmonics and plate supply modulations, except in cases where loops are used as radiators. Conductive coupling, even though loose, will not be permitted. [Note 2.]

Power Supply

No restrictions will be imposed relative to the character of power supply, provided the emitted wave is sharply defined. [Note 3.]

Quiet Hours

Amateur stations when using wave lengths between 150 and 200 meters, are required to observe a silent period from 8 to 10:30 p. m. daily, standard time, and on Sundays, while church services are being broadcast. Such stations, when using wave lengths below 85 meters and having a pure continuous wave or where a full wave rectification is employed, are not required to observe a silent period, provided no interference is caused other service.

Station Licenses

Licenses issued for amateur stations will authorize the use of any or all of the wave lengths allocated for amateur use, provided the transmitter meets the requirements of the above regulations. No alteration in the apparatus will be permitted which results in changing the character of the emitted wave except under authority granted by the Supervisor of Radio.

Intercommunication

Amateur stations are not permitted to communicate with commercial or government stations unless authorized by the Secretary of Commerce, except in an emergency or for testing purposes. This restriction does not apply to communication with small pleasure craft such as yachts and motor boats, which may have difficulty in establishing communication with commercial or government stations.

Special Amateur Station Licenses

There being no further need for special amateur station licenses, owners of stations holding such licenses will be permitted to continue the use of their "Z" calls under regular amateur station licenses. No new "Z" calls will be issued. The privilege of using the wave lengths from 105 to 110 meters is withdrawn.

Our Notes

Note 1. The previous ruling was 0.2.
Note 2. Note that this applies to 150-200 meters also, and whether or not quiet hours are observed—a new ruling.
Note 3. There are no restrictions outside of quiet hours. If one wants to avoid quiet hours, the types of power supply specified in the paragraph "Quiet Hours" must be used between 8 and 10:30 p. m. and during Sunday church services.

3Z0, on 198 meters, worked N.Z. 4AG
Notes on Reflexing Receivers
By A. L. Budlong

Writing about something you don't believe in is always poor policy, so it is with mingled feelings that the author takes up the subject of reflex receivers.

Reflexing started with the French during the war, and has since attained a high pinnacle in the ranks of broadcast receivers. Under certain conditions the scheme possesses considerable merit, but, like everything else, the principle has been very much overdone, and certain types of reflex receivers, in my humble opinion, do not possess the advantages claimed for them.

Since space is limited, we will list rather briefly some of the various reflex combinations commonly resorted to, and an opinion of their desirability.

The One-Tube Reflex

1. When employing a single tube as R.F. and A.F. amplifier, a crystal for detection, and a "fixed" R.F. transformer, we do not believe this receiver is particularly valuable for any use. Our experience has been that it is "the bunk" for DX, and for local work several sets of this kind gave no noticeably greater volume than a straight crystal detector and single audio stage.

2. When a tuned transformer is used, as shown in Fig. 1, the set gains much in DX ability. The results on extreme distance are not better—or even as good—as the weaker signals that the crystal-detector set would not get. It is not strongly recommended with the untuned transformer, however.

Multi-Tube Reflexes

1. First of all, we will consider the two-tube reflex using a single amplifier tube and tube detector instead of a crystal. (See Fig. 2). Using an untuned transformer, the set performs fairly well—especially on some of the weaker signals that the crystal-detector set would not get. It is not strongly recommended with the untuned transformer, however.

2. Using a tuned R.F. transformer in this combination, the set is a mighty fine little receiver. Results can be very favorably compared to those obtained with a three-tube set employing one R.F. detector and one A.F.

3. Under this heading we will classify all reflex sets using two or more stages of radio frequency amplification. They are on the whole, very good performers, whether crystal or tube detector is used. Even with "fixed" R.F. transformers the results are worthwhile, although obviously better results can be obtained with tuned aircore transformers. A typical receiver of this type is shown in Fig. 2a.

Stabilizing Methods

The old reliable method of stabilization—i.e., prevention of oscillation in the R.F.
stages—is by the use of a potentiometer across the "A" battery, as shown in Fig. 3. Sometimes this is used only on the first stage; at other times the grid returns of

![Fig. 3](image)

All the R.F. tubes are brought down to the potentiometer arm. The former method is better for fixed transformers; the latter for tuned transformers. The method is not recommended for two reasons. First, the positive potential necessary for stabilization plays havoc with the life of the "B" battery; second, the positive potential doesn't help the audio quality in the reflexed audio stages. The series resistance shown in Fig. 4 is better. Our only objection to this is that it is critical to wavelength changes, and necessitates frequent adjustment.

Stabilization by reducing the number of turns in the primaries of the R.F. transformers is one of the easiest methods, but, in the opinion of the writer, not one of the least desirable. Amplification falls off at the higher waves if the number of turns is kept low enough to prevent oscillation at the lower end of the scale.

Neutralization by the Hazeltine method has been tried and proves fairly successful in a single-stage reflex. Reflexing has been adapted to multi-stage neutrodynes, but we are inclined to the belief that they owe their "neutralization" more to small primaries in the R.F. transformers than to actual capacity neutralization. It is the opinion of Wheeler, and others, that reflexing a real neutrodyne would have had effects on stabilization, probably resulting in an upsetting of the balance and a tendency to oscillate.

A variation of the neutradyned reflex is the Harkness neutroflex. This is simply a reflex in which neutralization is obtained by the Rice system instead of the Hazeltine system. See Fig. 5.

**Reflexing Standard Receivers**

This article started with the intention of telling how to adapt reflexing to some of the more common types of receivers. All his other talk about reflex sets has been incidental. Now let's get down to business.

*The Reinartz Receiver*

One of the most common types of receivers now in use is the Reinartz. This is shown in Fig. 6a. In Fig. 6b is shown how the first tube may be converted into an amplifier, a second tube added and used as a detector, and then the whole thing reflexed. Our Reinartz receiver isn't really a Reinartz any more, but it will work. For the 200-600 meter band the R.F. transformer is made by winding 60 turns of No. 22 D.S.C. wire on a four-inch tube for the secondary, and winding 25 turns of the same size wire over the "low" end for the primary. Tuning of the secondary is effected by a .00025 μfd. variable condenser. The audio transformer may be any ratio. Use a high ratio for code work, where quality is not an essential. For phone work use a transformer of not more than 5:1 ratio.
Reverse the connections to the feedback coil. Your feedback coil will not have a stabilizing effect, and may entirely prevent oscillation if properly adjusted. If it won't effect complete neutralization, you can avoid oscillation by keeping the R.F. tuning condenser below the oscillation point.

The grid condenser in the first tube must be removed, or short-circuited. While it is desirable also to bring the grid-return of the first tube back to the “negative” of the

in Figs. 7a and 7b. As stated before, we don't think much of one-tube reflexes with crystal detectors, but that is about all you can do with the variometer receiver. Of course, you can try a tube detector if you want to, but we don't want to mislead you into thinking that all is going to be love and roses when it comes to making it work. Better stick to the crystal.

A way in which a tube detector can be added fairly satisfactorily is shown in Fig.

“A” battery instead of to the “positive,” it is not absolutely essential to do so.

Variometer Regenerator

We don't like this one so much, because it is hard to make it work with a tube de-
tector. The thing has a beautiful tendency to howl. The only thing to do is to use a crystal detector. The changes are shown

in Figs. 8a and 8b. The circuit has to be torn to pieces to do it, however. The variometer becomes the tuned secondary of a radio frequency transformer “T.” The primary consists of 12 turns of wire in a 3½-inch circle. These turns are tied together, and then the whole winding is stuck against the variometer as shown in Fig. 8b. This winding is “P” in Fig. 8a.

Tickler Regenerator

The tickler type of regenerator is not particularly difficult to adapt to reflexing. Probably the best way of doing this would be to use a tuned transformer in the plate circuit in addition to the tickler, as shown in Figs. 9a and 9b. “A” shows the original circuit, and “b” the reflex. The tickler is connected up as a “reverse” tickler, and is used, as in the Miner superdyne, for an oscillation control.

A Neutrodyned Reflex

We now come to the last circuit, probably one of the best—a neutrodyned reflex.
Only one stage of R.F. amplification is used. In both this circuit and the tickler reflex previously mentioned the R.F. transformer is made up as follows: Primary, 25 turns of No. 22 D.S.C. wire wound over a secondary of 60 turns of the same size wire on a four-inch tube. The secondary is tuned with a 00025 μfd. variable condenser. The tap for the neutrodon connection in Fig. 10 is taken off the 30th turn of the secondary, the turns being counted from the "low," or filament, end of the coil.

With the large primary the neutrodon adjustment will be critical, but the results will be worth the trouble. Browning and Drake have shown by recent experiments that a large-primary transformer gives noticeably greater amplification than a transformer with a small primary.

How Much "B" Battery

Some day, manufacturers, and the dear radio public also, are going to wake up to the fact that high plate voltage on R.F. amplifiers are the bunk. High voltages give better results on the strong signals, but not on the weak ones, which are the ones you want to get. A superheterodyne recently tested out gave best results on weak signals when but 22½ volts were used on the plates of the R.F. tubes. Higher than 45 volts is not recommended under any circumstances.

But in a reflex set, we use the tubes both as R.F. and A.F. amplifiers, and A.F. amplifiers must have higher voltages to make noise. This, of course, means that the R.F. end of the argument is at a disadvantage, which is another reason why we are not in love with this reflex business. However, we will concede some additional volts to the reflex amplifier tubes, solely and simply for the sake of the audio end.

Go ahead and use as high as 67½ volts on the reflex amplifier tubes—darn it!

Reflexing on Short Waves

The writer does not take reflexing on short waves particularly seriously for the reason that reflexing involves R.F. amplification, and R.F. amplification on short waves is of doubtful value. Lately this particular phase of reception has received considerable impetus by the work of Magner, 6BCP, who worked two-way with Australia using the Roberts' reflex as adapted to short waves by Zeh Bouck. The Roberts' circuit is simply a neutrodyned one-stage R.F. amplifier, a regenerative detector, and a reflected audio stage. Its principal value would seem to be that it results in a non-radiating receiver, and increased selectivity through the introduction of additional tuned circuits.

Since reflexing involves complications, the advantages of the receiver could more easily be incorporated in a set employing a neutrodyned amplifier, regenerative de-
than a single oscillating-detector-and-one-stage-audio low loss tuner. Signals are brought in louder; we get more noise, perhaps—but the DX ability of the simple oscillating detector is yet to be improved upon.

To be sure occasional impassioned articles are written on some new super-sensitive low-wave R.F. amplifier set that has been developed, but it is significant that a few months later, in the majority of cases, the R.F. set is lying in the corner, and a low-loss regenerator is doing the work on the operating table.

New England Division Convention

APRIL 3rd and 4th, Friday and Saturday, are the dates of the New England Division A.R.R.L. Convention in Worcester, Mass. Headquarters will be at the Bancroft Hotel. There will be many worthwhile events and among these we might mention: Technical Meetings on Friday afternoon and Saturday morning; Operator's License examinations Saturday morning; Banquet at the Bancroft Saturday at 6:30 P.M., followed by speeches, notably one by Prof. Hobart Newell of Worcester Polytechnic Institute on "Radio from the Standpoint of the Broadcast Listener," movies and R.O.W.H. Initiation.

Special thought has been given to making this convention attractive to the radio experimenter or broadcast listener, even though he may not own a ham transmitter. He will find much of value and interest awaiting him.

For reservations or further information address N. E. Division A.R.R.L. Convention, 274 Main St., Worcester, Mass.

All out, Gang! This is going to be a bang-up convention.

WWV and 6XBM Schedules

For the past two years the Bureau of Standards has been transmitting at stated times, radio signals of standard frequency from Bureau of Standards radio laboratory at Washington, D. C. These signals are transmitted approximately twice a month and have been utilized throughout the eastern half of the country. In order to extend the territory covered, transmitting equipment and standards have been installed at Stanford University, California, with the cooperation of that institution. The station thus established at Stanford University on September 5 inaugurated the transmission of similar signals of standard frequency, thus duplicating in the West the service rendered by the Bureau of Standards in the East.

The frequencies included in the past transmission have been from 125 to 2000 kilocycles (2400 to 150 meters). In order to make the transmissions of still greater service, they will be extended to include frequencies up to 6000 kilocycles. The future transmitting schedules which have been definitely arranged are given below.

These special signals of standard frequency are of use to testing laboratories, transmitting station operators and others in standardizing wave meters and adjusting transmitting and receiving apparatus. The accuracy of the frequencies is better than three-tenths of 1 per cent. Information on how to receive and utilize them is given in Bureau of Standards Letter Circular No. 92, which may be obtained on application from the Bureau.

All transmissions are by unmodulated continuous-wave telegraphy. A complete frequency transmission includes a "general call," a "standard frequency signal," and "announcements." The "general call" is given at the beginning of the 8-minute period and continues for about 2 minutes. This includes a statement of the frequency. The "standard frequency signal" is a series of very long dashes with the call letters (WWV or 6XBM) intervening. This signal continues for about 4 minutes. The "announcements" are on the same frequency as the "standard frequency signal" just transmitted and contain a statement of the measured frequency. An announcement of the next frequency to be transmitted is then given. There is then a 4-minute interval while the transmitting set is adjusted for the next frequency.

The schedule of standard frequency signals from both the Bureau of Standards and Stanford University is as follows:

Schedule of Frequencies in Kilocycles
(Approximate wave lengths in meters in parenthesis)

<table>
<thead>
<tr>
<th>Time</th>
<th>Mar. 5</th>
<th>Mar. 20</th>
<th>Apr. 6</th>
<th>Apr. 20</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:00 to 10:08 p.m.</td>
<td>300</td>
<td>550</td>
<td>1500</td>
<td>3000</td>
</tr>
<tr>
<td>10:12 to 10:20 p.m.</td>
<td>315</td>
<td>480</td>
<td>1650</td>
<td>3300</td>
</tr>
<tr>
<td>10:24 to 10:32 p.m.</td>
<td>345</td>
<td>730</td>
<td>1900</td>
<td>3600</td>
</tr>
<tr>
<td>10:36 to 10:44 p.m.</td>
<td>375</td>
<td>860</td>
<td>2000</td>
<td>4000</td>
</tr>
<tr>
<td>10:48 to 10:56 p.m.</td>
<td>435</td>
<td>980</td>
<td>2200</td>
<td>4400</td>
</tr>
<tr>
<td>11:00 to 11:08 p.m.</td>
<td>500</td>
<td>1150</td>
<td>2450**</td>
<td>4900</td>
</tr>
<tr>
<td>11:12 to 11:20 p.m.</td>
<td>600</td>
<td>1400</td>
<td>2700*</td>
<td>5400</td>
</tr>
<tr>
<td>11:24 to 11:32 p.m.</td>
<td>666</td>
<td>1550</td>
<td>3000*</td>
<td>6000</td>
</tr>
</tbody>
</table>

*Eastern standard time for WWV, Washington, D. C.
Pacific standard time for 6XBM, Stanford University, California.
6TS and 2MU First Across on 40 Meters

On the evening of Friday Jan. 2nd, William H. Schick of 2MU at Brooklyn, New York, heard 6TS at 40 meters. Having put in many hours in logging harmonics and tracing their causes, Shick did not suppose that this was 6TS's main wave. However the next evening 6TS was again heard calling and saying "40 meters". 2MU thereupon went after him and at 7.00 P. M. (E. S. T.) received an answer.

Good two-way communication followed at once. Details are lacking at this time but it doesn't really matter—we know the main fact, that 40 meters got across and that these two did it.

That isn't all, the power at 2MU was only about 95 watts!! That isn't so bad when one considers that it was 4 P. M. in Santa Monica.

2MU has worked every district except the 7th with the same set and the same power, therefore the station will be described briefly.

The Transmitter

The set uses the good old reliable Hartley circuit—the thing that works anywhere from 1 meter wavelength to 1 cycle per second. There isn't anything new about it and that is just the beauty of the thing—it shows the difference between the man who does his best with what he has—and the rest of us that camp up on 80 meters and don't try to do anything new.

The antenna is fully explained by the drawing. Notice that it is in anything but a good location, the counterpoise of necessity being very short. These things do not discourage an amateur that amounts to something.

We hope to describe 6TS a bit later—perhaps we can make it in this issue, the pictures are coming by airplane.

COMING—A. R. R. L.
NATIONAL CONVENTION

The Third National A.R.R.L. Convention will be held in Chicago, under the auspices of the Chicago Radio Traffic Association, on August 19th to 22d inclusive, 1925. Everybody who attended earlier national conventions knows what a good time this means. This one will be bigger and better than ever. Mr. W. E. Schweitzer, 9AAW, the president of the C.R.T.A., at 4264 Hazel Ave., Chicago, is again Convention Chairman, to whom correspondence should be addressed. Full particulars will appear in QST as plans develop. Save your money and plan on attending!
The Deresnadyne
By E. F. Andrews and E. A. Beane

It is realized that there have already been many classifications of radio frequency amplifiers but in view of the fact that we only understand by comparison, another may not be out of place. At any rate, the public should not be allowed to continue in the error that any set which can blow our five tubes once must necessarily be a neutraline. It is the purpose of this article to suggest another classification of tuned radio frequency amplifiers and to show in what respect they differ.

Preventing Self-Oscillation

There are three main methods of preventing self-oscillation. The oldest is the use of the so-called "looser" which is simply a device to absorb energy from the grid circuit. The second is the neutralization of the feed-back energy by an equal and opposite energy. In the third class come those methods which depend on preventing the building up of voltages which will cause self-oscillation. These schemes are used in the "Deresnadyne" receiver.

Cause of Self-Oscillation

Before taking up the three methods we shall briefly consider the cause of self-oscillation. Figure 1 shows a vacuum tube connected in the fundamental circuit of all transformer-coupled tuned radio-frequency amplifiers. The signal to be amplified is impressed on the grid circuit GL-GC, causing a potential difference between G1 and G2. This energy is amplified by the tube in the well-known way, resulting in a greater energy in the plate circuit PC-PL and a greater potential difference between P1 and P2.

This would be a very simple, effective and stable process, were it not for the very strong tendency for some of the energy in the plate circuit to be transferred back to the grid circuit through the capacity between the grid and the plate. The condenser MC represents the natural capacity between the grid and the plate of the tube. The voltage at P1 forces a flow of current through this capacity to G1, thereby tending to make the tube oscillate.

Magnetic coupling may also exist between the plate circuit and the grid circuit. It is not impossible to prevent this magnetic coupling but it is very difficult. In the circuit as shown, oscillations once started have nothing to stop them and self-oscillation is present continuously until the tubes are shut off.

Self-Oscillation and Relay Amplification

If the grid circuit and the plate circuits are tuned so that they are resonant to the same frequency, the tendency to oscillate is much greater because the instantaneous potential difference between P1 and G1 is greater and more energy is transferred to the grid circuit.

By tuning the plate circuit and grid circuit both to the frequency of the signal being received, we would get the maxi-
mum radio frequency relay amplification were it not for the fact that self-oscillation commences considerably before exact resonance and maximum amplification are obtained. This makes it necessary for us to sacrifice some of the amplification which we would otherwise obtain in order to prevent self-oscillation, which, when it occurs, destroys the tone quality of our signal entirely. No matter what method we use for preventing oscillation, it has the effect of limiting the radio frequency relay amplification. The tendency to oscillate constitutes the limiting factor of radio frequency amplification. If tubes could be made without grid-plate capacity much higher amplification could be obtained. More tubes might be required but the amplification and stability would be well worth it.

The First Method of Stopping Oscillation

Now that we have considered self-oscillation in general, we may take up the first method of preventing it which consists of increasing the losses in the grid circuit. This scheme is usually known as a "losser". The losses can be introduced in many ways; by a potentiometer to change the bias of the grid; by a variable resistance in the grid circuit (either shunt or series) or by an absorption circuit coupled to the grid circuit. Each of these systems produces the desired effect by increasing the losses. This prevents oscillation even though considerable energy is being transferred back to the grid circuit from the plate circuit as has been explained. The resistance used in one of these methods is indicated by R in Figure 2. The losser method has the pronounced disadvantage that its adjustment is critical and changes with wavelength, also that in some forms it causes the tuning to become much broader.

Neutralization Methods

The most popular form of the second method is the neutrodyne circuit popularized by Professor Hazeltine. There are other methods of neutralization, such as the Rice circuit and the reversed tickler employed in the commercial superdyne set. However we will confine ourselves to the neutrodyne as the most important representative of this class. In Figure 3 the fundamental circuit of one stage of a commercial neutrodyne is shown in heavy line, while the dotted line represents the second stage. Neutralization is accomplished by the coil XL and the condenser XC. It should be noted that the coil XL in the com-
commercial set constitutes the secondary of the radio frequency transformer whose primary is the coil PL. XL is the grid coil of the succeeding tube which is shown (together with its circuit) in dotted line. In commercial neutralodynes the connection A is absent, this connection being made through the A battery bus B which connects all stages together. In this circuit, as in those previously described, the voltage difference between P1 and P2 is allowed to become great enough so that the transfer of energy through NC to the grid circuit would produce oscillation if not checked. This checking is accomplished by the coil XL which is coupled to the coil PL in such a way that a voltage is built up across it opposite to that across PL. By varying the capacity of XC an amount of energy is transferred through it just sufficient to neutralize that transferred through NC. If there are more turns in XL than in PL then XC must be smaller than NC and vice versa. When properly adjusted this receiver does not oscillate over a band of wavelengths. In the opinion of the writers, circuits previously described in that means are provided to limit the voltage which will be built up between P-1 and P-2. This purpose is accomplished by reducing the number of turns in the primary of the coupling transformers and by another method which will be described later.

It would seem at first thought that the method of reducing the plate turns is so very simple that it cannot present any intricate problem. All that need be done is to determine the proper number of turns to put in the primary of the transformer and oscillation troubles are over. Unfortunately this is not the whole story for the tendency to oscillate changes with the wavelength of the signal being received for several reasons.

First, at low wavelengths more energy is transferred at a given voltage from the plate circuit to the grid circuit through any coupling which may exist between them. Second, since the number of plate turns is small, the plate circuit will approach resonance only at the short wavelengths. The closer to resonance, the higher the voltage across the plate circuit and the greater the tendency to oscillate.

Third, there is more transfer of electromagnetic energy through a given coupling at higher frequencies therefore the secondary is more effective in increasing the inductance of the primary and in bringing it near to resonance.

The Third Method

This brings us to the consideration of the third method of preventing oscillation in tuned radio-frequency circuits. This third method includes the various means which can be used to limit the radio-frequency voltage which can be built up in the plate circuit and thereby to avoid an amount of feed-back through the tube capacity which will be sufficient to cause oscillation.

The fundamental circuit is shown in Fig. 4. Its operation differs from that of the opposing the increase in tendency toward oscillation when passing to a lower wavelength is the principal merit of the neutralodyne.

1. There is room for argument here. It is exceedingly hard to prove that the oscillatory condition depends on actual resonance. It is equally hard to prove that when one prevents oscillation by reducing the primary turns, that this is because one has detuned the plate circuit. It is entirely likely that the reason is merely a reduction of coupling between the primary and the secondary circuit, which is known to be effective in such cases.
There are several ways of equalizing conditions so as to secure maximum amplification without oscillation over a wavelength band. In fact, the circuit can be made to oscillate at the high wavelengths and not at the low wavelengths if that is desired. One means of securing this effect is to so place the transformers that there is a slight negative electro magnetic feedback from the plate circuit to the grid circuit of the radio frequency tube. This transfer of energy increases at lower wavelengths and can be made to offset, in a measure, the increase in tendency toward oscillation at low wavelengths. In this way fairly uniform amplification over the entire wavelength band may be obtained. Another possible method is to reduce the number of turns in the primary of the transformer still lower when tuning in low wavelength stations. This may be done by a double arm tap switch changing simultaneously the number of turns in the primaries of the two radio frequency transformers but this scheme unfortunately causes a "jog" in the tuning scale. Still another way of accomplishing this is by changing the position of part of the primary turns with relation to the other parts. A further method of controlling the primary inductance is by varying the effect of the secondary inductance upon it by varying the coupling between the primary and the secondary.

We have found it convenient to refer to such controls as "deresonators". Their purpose is to secure maximum amplification without oscillation over the wavelength band to be covered. Some types of deresonator control are suitable for attachment directly to the shaft of the tuning condenser so that the circuit is controlled automatically as the tuning is changed.

Another very effective way of controlling the tendency toward oscillation is by adjusting the B battery voltage by means of a series resistance control. The circuit is shown in Figure 5. The resistance R has a maximum value of about 200,000 ohms and is continuously variable to a zero resistance. The resistance may consist of a fibrous strip impregnated with a graphite compound. A disc rocking over this makes good contact at any desired point. The effect of this resistance is to vary the voltage applied to the plates of the two radio frequency amplifying tubes. Lowering the direct plate voltage reduces the instantaneous voltage differences between the plate and the grid, thereby preventing oscillation. It is important to notice that this resistance is not in the radio frequency circuit and therefore does not increase the damping of the surface, in other words it does not broaden the tuning. The two large by-pass condensers lead radio frequency current from the primary of the transformer directly back to the negative filament of each tube respectively. The resistance also is a very nice volume control.

The general principles herein outlined are the subject of several patent applications.

Regarding NKF

WE HAVE the following in the form of a notice from the U. S. Naval Research Laboratory at Bellevue, D. C. "All regular test schedules from NKF will be temporarily suspended. NKF will be on the air until 2 a.m., handling traffic with London, San Francisco (NFG), Balboa (NBA), San Diego (NPL) and Pearl Harbor (NPM) on 71.5 meters. "Special tests may be arranged on request to NKF, before 8 p.m. or after 2 a.m. "New schedules will be started before long on a different set of wavelengths. When these schedules are started, you will be notified. "You will be interested to know that the 54.3 meter set has been converted into a crystal controlled set on 54.7 meters and will be sent to the Pacific Fleet; it is expected that it will go with a portion of the Battle Fleet to New Zealand and Australia. During this trip it will be available for work with amateurs at practically all times. It is sincerely hoped that a representative of the A.R.R.L. who is also a Naval Reserve Officer, will make the trip in charge of the set."

2. This is the scheme used in the "Super-Zenith" which was described in QST for November, page 28.
3. This is the scheme used in the "TRF" set.
4. It seems reasonable that this effect is due to the change in the plate-grid impedance which occurs when the plate voltage is changed. This change is in the right direction to account for the decreased tendency to oscillate when the plate voltage is reduced.
THE requirements of a wavemeter are accuracy and ruggedness. A wavemeter consists of a tuned circuit containing a variable condenser, a fixed coil and an indicating device. The goodness of your wavemeter, then, depends on the condenser and the coil—the indicating device does not matter so much.

The variable condenser must, first, be well built and, second, low-loss. The plates should be heavy, well spaced, and very firmly bound together with large-surfaced separators and husky supporting rods. The bearings must be metal, should have no play in any direction, and should be substantial and smooth-running. Cone bearings, in particular, are good. A geared vernier becomes a necessity on the shorter waves or with high capacity condensers.

The coil must be non-changing in its constants which are inductance, resistance, and distributed capacity. The last two named should be kept low. To accomplish these things the coil form should be strongly built, the coil tightly wound and the wire bound so that the position of the turns can no vary; and the coil terminals firm and non-changeable in their relation to each other.

Since the wavemeter was built to use more than one coil, all wavelengths from about 15 meters up can be covered. It is ruggedly enough built to withstand the abuse of ordinary use without much damage to its calibration. Despite the inaccuracy of buzzer excitation, the buzzer on the meter has proved its value for rough checking numberless times. However, the buzzer can be left out.

The tuning condenser used in this meter is a General Radio type 239 of 1000 µf. capacity. The critical tuning on the short waves due to the capacity of the condenser can be taken care of by substituting a dial for the small knob usually on the vernier control. In fact, for precision, it will be difficult to get a better arrangement than obtainable with the extra dial on the vernier; particularly if this dial is one of the 300 degree type of which there are a number on the market at present. The 1000 µf. condenser's advantage is that it required if a smaller condenser were used.

For accuracy of measurements, shielding the inside of the wavemeter box and the back of the supporting panel, is practically a necessity—especially at the short waves. It is surprising the amount of detuning which will occur through body capacity if the meter is not shielded carefully. The shielding in this case being made of 25 gauge sheet copper in the form of a box with soldered seams for the inside of the case of the wavemeter, and a flat sheet for the panel. The panel shielding is held on by mounting screws of the meter, etc. The edges of the copper box are bent over the shoulder to which the panel is screwed, and to these edges the panel shielding makes contact when the panel is in place. This shielding is connected to a binding post, on
the panel, which is connected to ground when the meter is in use. Thus the instruments in the meter are completely shielded so that there is no capacity effect to the hand, and no pickup of energy by the wiring or instruments of the meter.

The indicating instrument is a 100-milliampere full-scale-reading hot-wire galvanometer. A thermo-galvanometer would be preferable because of its greater sensitivity, and because it would stand a much greater overload without burning out. With a hot-wire instrument it was found possible to read to the 9th harmonic of an oscillator, whereas with the thermo-couple it was found possible to read to the 15th harmonic of the same oscillator wave at the same power.

The window used for viewing the back-of-panel dial is made by drilling a hole in the panel and backing it with a piece of mica or celluloid with an indicating line scratched on the back and filled with india ink. The window in the panel should be larger than the one shown.

The back-of-panel dial is a General Radio 4" diameter one without the knob and fitted with a special bushing according to Fig. 5. Care must be used in centering this bushing. The shaft of the condenser was cut-off enough to avoid touching the panel. The knob removed from the dial is large and an excellent one to use on the vernier with a bushing to make it fit the 3/16" shaft.

The coils for this meter are made according to Fig. 1. A six inch diameter would be better because of the larger field of that size of coil which permits you to get a greater distance from the oscillator or other source of energy whose wavelength is being measured. Also it would undoubtedly be convenient to have a plug mounting on the coil that would permit of its rotation without the necessity of having to move the entire wavemeter. The position of the wavemeter coil in relation to the source to which it is coupled has a direct bearing on the energy being picked up. A manner in which a plug mounting might be constructed is shown in Fig. 4. While it is true that such a method of mounting is not low-loss, we believe its convenience.
overshadows that objection. Another advantage is that Fig. 4 only requires standard parts and is easy to construct for that reason. The winding of the coils themselves may be done easily and conveniently by using wire of a size to completely fill the form width with the number of turns to be used. The article entitled "Amateur Wavemeters" in the Feb., 1924, issue of QST, on page 22, gives a great deal more useful information on wavemeters and their coils, so be sure and read or re-read it.* After the wire is wound on the coil form it should be covered with a thick layer of waxed shoemaker's thread to exclude moisture and to make a permanent coil.

The coils used with this meter are as follows: A single turn of $\frac{1}{4}$ inch copper tubing eight inches in diameter, which gives a wavelength range of 15 to 62 meters; a coil of 5 turns of No. 12 D.C.C. with a range of 40 to 110 meters; a coil of 13 turns of No. 14 D.C.C. wire with a range of 65 to 264 meters; a coil of 31 turns of No. 22 D.C.C. with a range of 140 to 650 meters.

On a 100 degree condenser scale, the useful portion is from 10 to 40, and on a 180 degree scale, from 15 to 165.

You will notice from the wiring diagram in Fig. 3 that any instrument in the meter can be taken off from some pair of binding posts, independent of the others. The variable condenser off of posts B and C. The Galvanometer off of A and C. The buzzer off of A and E. You should preserve this feature in the wavemeter you build, merely as a matter of convenience.

The top of the wavemeter box could have a handle in place of the webbed strap used. The hinges are the type with removable pins so that the top can be completely removed when the instrument is being used—this is really convenient feature. The corners of the box should be protected with metal, as shown in the photographs.

It has been suggested by a number of the gang that the small Pyrex pudding cups make excellent lead-in insulators when a couple of them are used with a brass rod passed through holes in the bottoms.

To change micromicrofarads into microfarads divide by $1,000,000$; e.g., 500 micromicrofarads is .0005 microfarad. In other words, put enough naughts to the left of the figure to go left six places with the decimal point; e.g., 1000 micromicrofarads is .001000 microfarad; and the last three naughts can be erased. To reverse the process you add naughts after the figure sufficient to allow you to point off six places to the right; e.g., .002 microfarad is 002000 micromicrofarads and you erase the first two naughts.

Please do not ask us to send QST or any League supplies unless you enclose cash, check or money order. The League would lose money if it was compelled to send bills—hence a cash business. This, of course, means that radio orders will not be accepted.

While we are on the subject—the Information Service will not pay any attention to radiograms and telegrams except when they contain a request for reply by collect telegram. The Information Service rules require a stamped and addressed return envelope. Other wires and radiograms will land in the wastebasket. Sorry—but isn't it fair?
A Tuned Audio Transformer

THROUGH the courtesy of Mr. R. A. Braden we present herewith a tuned amplifying transformer for C. W. receivers. The work was done in the radio communication laboratory, Engineering Dept., Univ. of Minnesota as a part of the course conducted by Prof. C. M. Jan sky, Jr. Further work is being done.

First of all one might as well review the needs of an audio amplifier used in C. W. work for the purpose of making clear just why a sharply tuned transformer is wanted.

Good for Phone, Rotten for Code

Here of late all the labor of audio transformer designers has been toward getting a transformer that would amplify all frequencies equally because in broadcast reception it is desirable that the base drum be reproduced as faithfully as the piccolo. Putting it differently, they are working for a transformer that is as good at 18 cycles per second as it is at 1000 or 6000 cycles. The result of such work is illustrated in Figure 1. The peaked curve represents the old General Electric Company amplifying transformer which had a ratio of 9 secondary turns to one primary turn. This transformer was designed to work on ship receiving sets that were copying 500-cycle spark which make a 1000-cycle tone in the receiving operator's headset. It is a good transformer for the purpose, in fact one of the very best that has ever been generally available. It goes without saying that this transformer was also good for C. W. reception, where the beat note is usually set somewhere near 1000 cycles.

The lower curve represents the new General Electric Company transformer known as the "Star". This transformer does not amplify nearly so much at 1000 cycles but it is much better at the low frequencies and has a beautifully flat curve — — — if one is interested in amplifying music. A most unfortunate blunder has been made by the Radio Corporation in marketing this transformer under the same catalogue number as the old one. This has led to much confusion, misunderstanding and hard feelings. Let us therefore repeat, the first transformer is excellent for code and rotten for music, the second one is excellent for music and absolutely putrid for code work. The new type is marked with a star stamped on the case. If you are a code man look for this and avoid it.

Amplification Without Noise

The old type of transformer not only amplified better at 1000 cycles where code work is done but in addition was much more quiet and did not let so much static through. The reason for this is that static is mostly low-pitched and comes in where the amplifying transformer is not good. Interference from 60-cycle plate supply, much caused by boiling rectifiers and sparking "sinks" doesn't come through nearly as well. Therefore this "peaky" sort of transformer is a good thing and the idea can be carried further. This is what is done in Mr. Braden's transformer.

The Braden Transformer

The Braden transformer is made as shown in Figure 2. The primary consists of 35,000 turns of No. 36 S.S.C. copper wire. The secondary winding of 50,000 turns of No. 36 S.S.C copper wire. There is no insulation between the layers of the windings but a certain amount of care should be taken not to have some turns get badly below where they belong. A single layer of Empire cloth between the primary and secondary will prevent trouble. The core is of iron wires 6 to 7 inches long and of 20 or 22 guage. Enough are used to fill the insulating tube on which the primary is wound and the transformer is tuned to the desired audio frequency by sliding the core in and out, also by reversing the secondary connections.
Performance

The performance of the transformer is shown by the curves in Figure 8. The curve marked F is that of an ordinary 10 to 1 amplifying transformer and is seen to be much like the one shown in Figure 1 for the old General Electric transformer. The numbered curves show the performance of the Braden transformer. Curves 1, 2 and 3 show the tuning effect gotten by moving the core out gradually. Curve 4 shows the effect of putting the core clear in and reversing the secondary connections (inside end of secondary to grid). Mr. Braden modestly says "Although the tuning of this transformer is quite sharp, it is not sharp enough to be of much benefit in a C. W. receiver". However, we are much more hopeful about the transformer. The difference between it and the ordinary 9 to 1 is fully as big as that between the old and new General Electric types. Without doubt the new transformer is very much more quiet which is an extremely desirable thing.

Mr. Braden says: "Two stages of amplification using two of these transformers should be used (to get increased sharpness). There is no danger of "ringing" or of fuzzy signals. The phone may be shunted to reduce the signal strength to the desired value."

The Experimenters' Section will be very glad to hear of results secured with these transformers. One warning should be made however, they are of open core construction and will need to be well spaced apart inside the set.

American amateurs should see to it that they have sufficient postage on postcards and letters that they send to the foreign amateurs. If they don't, the foreign amateur has to pay the postage due which is certainly an injustice. This is occurring often at the present.

Pacific Division Cops

Two Trophies

As previously reported in our columns, 6BCP won the boomerang offered by the A.R.R.L. to the first North American amateur to connect with Australasia, and 6CGO, Glen A. Litten, of Orange, Calif., won the Chilean hat offered by Major R. Raven-Hart, of Los Andes, Chile, to the first North American to work Chile. Both prizes have now been forwarded to the winners and it is our privilege to present photos and a brief description of each.

6BCP’s boomerang is made of polished three-ply mahogany, 22 inches across the tips, 32 inches wide at the center, bearing an inlaid silver plate 3 by 5 inches on which is engraved:

TO W. B. MAGNER, 6BCP, SAN PEDRO, CALIFORNIA
IN COMMEMORATION OF THE FIRST TWO-WAY AMATEUR RADIO COMMUNICATION WITH AUS­TRALASIA, WHEN 6BCP WORKED 4AA, F. D. BELL OF WAIHEMO, NEW ZEALAND, ON THE 20-21 OF SEPTEMBER, 1924.
AMERICAN RADIO RELAY LEAGUE

6CGO’s hat is woven of native Chilean grass in two colors, cream and a chocolate brown. It has a fore-and-aft length of about 14 inches, a beam of about 13, and a crown about 4½ inches high. The ribbon and cord have dark reds and blues as the predominating colors. It is a beauty.

Renewed congratulations to the west-coast gang are in order, and we offer ours.

As a momento of the Dakota Division Convention, the Twin City Radio Club presented Don C. Wallace of 9ZT with an A.R.R.L. emblem for his watch chain.
Learning the Code by Listening
A Long-Wave Tuner For the Broadcast Listener

HAVE you ever wondered what “this code stuff” was about? It isn’t hard to find out and there’s endless interest in it after that. There are plenty of times when radiophone broadcasts get monotonous, but there’s never a time when there isn’t endless variety and entertainment in the dots and dashes.

Where the Charm Comes In
Have you ever noticed that after a while even a 7-tube broadcast receiving set has reached its limit—there isn’t anything more to accomplish? When you have logged stations all over the United States—Canada, Cuba—perhaps a few in Europe—that’s all, there isn’t any more.

Not so with the telegraphic signals, you can log them with a single receiving tube and yet never come to the end of the possibilities. Up at 17,000 meters there’s the steady whistle that wavers up and down in the form of dots and dashes, that’s NSS, the naval station at Annapolis, Maryland. A bit further down is a fainter signal from YN at Lyon, France, which works at 15,100 meters, and still a bit below that are KET at Bolinas, California, (13,345), WII at Chatham, Mass. (13,600), NPM at Honolulu (11,490), WSO at Marion, Mass. (11,600), POZ at Nauen, Germany (12,000)—but why go through the long wave-band? They are scattered all over the world and can all be heard over amazing distances, for these stations are built for daily transoceanic work and the talk that goes between them is of national and international interest. Some of them speak slowly and dromingly—as if designed for the beginner—others race along with machine-sending at such furious speeds that the words become bursts of sound and sentences are mere buzzes. No man can copy such matter, but there are machines that attend to it and make tape records. These are the stations above 5,000 meters.

Next below that there are great groups of somewhat smaller stations; the Federal Telegraph string that handles messages up and down our western coast, the United Fruit string that furnishes gilt-edge communication over Central America and the Gulf of Mexico, our Navy Yards that mostly sign calls beginning with NA, NP, or NG (depending on their location on the Atlantic, Pacific or Gulf Coast), the Postal and Army stations that sign a variety of calls and handle much of their traffic in weird cryptic terms that the rest of us cannot understand. These stations are in general between 5,000 and 1,200 meters.

Then comes the biggest group of all—the almost countless shipboard stations and the great system of shore stations that work with them. If these stations are American they will be working above 600 meters, usually between there and 2600 meters. If they are foreign they are likely to be working anywhere—including the 450-meter wave right in the center of the broadcast band. Many a time American stations are damned for horrible noises that actually come from an ancient spark set on board a British, Spanish, Italian or French ship that is just off our coast. Here again—wouldn’t it be interesting to be able to make sure who he was and where he was?

Then there’s a blank—600 to 200 meters contains practically no radio telegraphy, but below that there are signals aplenty, all the way down to 5 meters—and they come from every civilized country and from a few others to boot.

But—
Yes—that’s pretty fine—but what good is it unless I know the code?
Oh pshaw—the world is full of folks from 15 to 75 who have learned it—why can’t you?
The answer is—you can learn it, and here’s how.

How to Learn
There are several ways to learn. Possibly the best way of all is to start in with someone that can send well with a key and buzzer, and have that person spend a lot of
time teaching you. This is all right if he has nothing else to do but to wait until you happen to feel like taking a lesson—but there's the rub.

The next best way is to listen to the slow-moving long-wave transatlantic stations, for they are ALWAYS sending, and you can take a lesson when you want it.

The listening can be done with the simplest set in the world, and now we will discuss that.

The Simple Long-Wave Receiver

The set is (we hate to admit it) a "single circuit" affair. It isn't single circuit for any reason except that such an affair is cheap and easy to make and plenty good enough for code practice. The diagram, photograph and list of materials explains the whole business, nothing more is needed, hook up the set, turn on the filament and tune in NPL or WSO—then start spoiling paper and pencils.

If you keep at it the dots and dashes will begin to make words and sentences after a few nights, and after that you can start listening to the talk of the World instead of the United States alone.

And That Isn't All, Either

Of course you needn't stay on the long waves any longer than it takes to learn the code, after that you can drop down and listen to the crisp, laconic, ship-to-shore conversations that go on at every port of any importance, you can hear the cryptic letter-group code of the Naval stations, and finally you can drop down and hear 9ZT at Minneapolis working other amateurs in 8 or 9 countries, or you can go clear down to 21 meters and hear the only John Reinartz working across the continent in broad daylight to Willis at Santa Monica, California, with a power that makes broadcast stations seem enormous.

Of course, the simple tuner shown here will not go down to 21 meters—but it will go down to the Navy-yard stations (1200-2600 meters) if you use a 300 turn honeycomb coil and it will get down to the ship-and-shore stations with a 100 or 150 turn coil. After that you are in Citizen radio, and that changes every 30 days, so we can't tell you what you will need by the time you have learned the code.

Come along and let's see that part of it together.

List of Materials

9 feet of tinned No. 14 tinned "bus" wire.
1 good variable condenser, having capacity of 1000 micro-microfarads (.0001 microfarad). This set used a type 247-B General Radio Condenser, but the make does not matter.
4 brass angles to hold the condenser to the baseboard. 1/2" x 1/4 angles may be obtained at the hardware store.
1 good socket, the set used General Radio type 156.
1.33 Ohm rheostat, the one shown is General Radio Condenser, but the make does not matter.
4 brass angles to hold the condenser to the baseboard. 1/2" x 1/4; angles may be obtained at the hardware store.
1 good socket, the set used General Radio type 301.
130 Ohm rheostat, the one shown is General Radio type 301.
One mica bypass condenser, capacity 1000 micro-microfarads (.001 microfarad), the one shown being Dubilier type 600.
One mica (do not use paper) grid condenser with gridleak mounting. The one shown is Dubilier type 601, capacity 250 micro-microfarads (.00025 microfarads).
One grid leak, resistance 2 megohms. Electrad or Durham leak recommended.
Electrad or Durham Leak Recommended

6-1 General Radio 138-W Binding posts or 6 8-32 roundhead brass machine screws with 2 hexagon nuts each.

One baseboard, 1 inch thick by 7½" x 12".

One rubber or bakelite strip 2" x 4¾" x ¾".

One single jack, open circuit type, Carter or Federal can be obtained anywhere.

One single coil-mounting not pivoted.

One 1500 turn coil (5,000 to 15,000 meters). Other coils listed below. Screws, solder, etc.

The coil mounting and the coil can be obtained from Sears, Roebuck & Co., Montgomery Ward & Co., Charles Branston, Inc., Buffalo, New York; The Coto Coil Co., Providence, R. I., or Remler Radio Mfg. Co., San Francisco. For the commercial ship and shore stations a 100 or 150 turn coil may be used, for the 1200-2600 meter stations a 300 or 400 turn coil is correct. A 750 turn coil will bridge the gap from 2600 to 5,000 meters, thus including the high-power shore stations.

A Neat Tuner Unit

An especially neat tuner-unit has just appeared under the name of "Supercoil". The unit differs from most of those on the market in having the primary and secondary coils mounted, so that they will slide along two 1" bakelite tubes. This does not add any controls to the panel but it does permit changing the primary-secondary and the secondary-tickler coupling so as to suit any antenna and any tube. We cannot enough stress the importance of such adjustments—they make the difference between a smooth-working set and a miserable, cranky thing that howls at some wavelengths and is "dead" at others. "Supercoil" takes care of this difficulty without adding controls to the panel—one "sets and forgets" the couplings.

Lorenz-type coils have been used. This may worry some of us a trifle but the designers have used the self-supporting feature of the Lorenz coil to permit the use of a most beautifully simple mounting in which there are no losses other than those in the coil itself. Furthermore they have provided a two-screw mounting so built that it is impossible to ruin a good tuner by jamming it against the panel of the set. Of course if a metal shield or panel is used one can still spoil things if one does not provide a 3 inch space, but the coil designer can hardly be expected to take care of that.

"Supercoil" is made by the Perfection Radio Manufacturing Co., of Philadelphia. Normally it is built for the broadcast range of 200-600 meters but the construction permits the easy removal of turns if one wishes to drop to lower waves.

Rules Governing the A. R. R. L. Information Service

1. Before writing, search your files of QST. The answer is probably there.

2. Do not ask for comparisons between advertised products.

3. Be reasonable in the number and kind of questions you ask.

4. Put your questions in the following form:

   A. A Standard Business Size stamped, self-addressed envelope MUST be enclosed. No stamp required from foreign countries.

   B. Write with typewriter or legible ink on one side of sheet only.

   C. Make diagrams on separate sheets and fasten ALL sheets together.

   D. Number each paragraph and put only one question in a paragraph.

   E. Keep a copy of your letter and diagrams.

   F. Put your name and address (NOT merely call letters) on each sheet.

   G. Please don't go off in a tantrum if we refer you to a back issue of QST which contains the information you want. Quite obviously we cannot typewrite reprints of articles which appeared in issues which are obtainable from the circulation dept.

5. Address all questions to Information Service American Radio Relay League, 1045 Main Street, Hartford, Conn.
Circumventing the Locals

By Philip G. Schermerhorn

At a radio dealer's recently two ardent BCLs were engaged in an animated conversation. They were both evidently of the type who "roll their own", and they were comparing the merits of their pet receivers. One boasted to the other, with rather carefully modulated pride—considering how manifestly pleased he was—that his latest set was "so extremely sensitive that it could bring in all the locals without any aerial or ground whatsoever".

If we will be honest with ourselves, most of us will admit that we have been guilty of the same brag, or at least experienced a pleasant thrill of satisfaction when his own receiver has continued to bring in the locals after both antenna and ground leads had been disconnected.

It was a brag of this sort however which set the writer thinking and which finally led him to the conclusion that a receiver which does bring in the locals, without the use of aerial or ground is in the same class with a leaky roof. In either case we are getting something in a way not under our control and pretty certain to spoil something.

Consider for a moment what we have to contend with in attempting to bring in a DX station with a receiver which is normally capable of rendering local programs with ample volume, without either aerial or ground. In the first place, if we are angling for DX, it is to be presumed a conventional antenna of some sort is connected. In that case such antenna is responsive to both local and distant signals. Coincidentally, the various inductances, wires, etc., inside the receiver are acting as collectors of energy, yet while they are highly responsive to local signals, they are as to all practical purposes, quite unresponsive to the distant ones.

A good aerial is much like an active puppy; it brings in everything it can pick up. Fortunately however, the numerous signals reaching our aerial are of different frequencies, else the Tower of Babel would be outdone; and because modern broadcast tuners are designed to differentiate between frequencies differing by 10 or 20 kc., it is usually possible to select whichever we desire. The engineers who have developed our modern tuners have doubtless based their calculations upon theoretical circuits and conditions wherein the electrical energy transmitted from a distant or nearby station would be collected only by a conventional antenna and thence led to, and throughout the receiving circuit, in a perfectly definite course and orderly manner. Excellent examples of such efficient circuits may be found in any back number of QST. Upon examining such a diagram, the first symbol to meet our eye is the familiar inverted triangle which indicates the aerial which receives and conveys the radio frequency impulses to the receiver. Everything which follows the aerial circuit, receives its energy from it, and from nowhere else. It isn't customary to sprinkle several other little triangles, indicating other, or supplementary sources from which energy is intended to be received; nor show connections from them directly to inductances, transformers, or other places, because no energy is supposed to enter the circuit, except at the input end.

It is perhaps just here that the engineers are at fault for actual operating conditions are not usually so ideal. In practice a great deal of energy does reach our re-

the service pipe and can be turned on and off at will at the several outlets, that is perfectly satisfactory—but if it just pours in through the roof every time it rains... well at least we do not brag about it!

It seems to the writer that reception without the use of aerial or ground is in the same class with a leaky roof. In either case we are getting something in a way not under our control and pretty certain to spoil something.
receivers by uncharted paths. Since no provision has been made to handle such outlaw currents they run riot in the set, create chaos, and cause a lot of trouble generally. This brings us back to our BCL's boast, for it is obviously just such outlaw reception which he impulsively regards as an accomplishment!

It would seem therefore that our chances of bringing in any particular DX station, would be decidedly better if we could entirely eliminate "stray" reception.

Before any success can be expected in this direction considerable laboratory research work must be undertaken. Up to the present the main line of attack has been rather centered upon eliminating losses and, although much valuable data have been tabulated concerning efficient coil and condenser design, which of course is very necessary since we wish to conserve every scrap of the millionth-of-a-fly-power (or whatever it is) that our antennas pick up, little or nothing has been done which contributes to our knowledge of the ways and means of preventing interference which enters the receiver by other means than via the aerial.

This opens up a new field for serious investigation and, paradoxical as is sounds, if we knew more about keeping strong signals OUT, we would doubtless be better able to bring weak ones IN. Perhaps the so-called "binocular coils" introduced by A. H. Grebe & Co. is a step in the right direction. At any rate it is certain that ordinary inductances, such as conventional secondary coils, function excellently as miniature loop antennas; and there would be no need of any other type of collector if broadcasting stations were more powerful. Hence it naturally suggests itself if broadcasting stations were more powerful, that attention should first be directed to the coils of our receivers, with the object of developing a type which would respond efficiently to conducted energy, yet remain practically unresponsive to heller skelter, broadside, bombardment.

It would be absurd for the writer to attempt to suggest offhand how this problem should be approached, much less solved; but the idea of a coil which is responsive to currents entering at one point yet remains unresponsive to other currents traversing it is not new. The special relays used in duplex telegraphy are examples of this principle, although the problems involved are very different from those encountered in radio.

All that can be said, however, is that certain preliminary experiments conducted by the writer seem to indicate the successful solution of this problem would result in much greater selectivity and that success is to be looked for along the lines of specially designed coils rather than by means of any conventional metallic shielding.

Aside from laboratory developments, this problem should provide a new interest to those who delight in experimenting with receiving circuits and, as a novelty, what can compare with trying to develop a set which would bring in DX with the best, yet become as silent as the Sphinx the moment aerial and ground are disconnected? Success is well worth trying for since, if attained, most of the difficulty of circumventing the locals might be solved.

Florida Convention

THE Florida A.R.R.L. amateurs held their first get-together in Orlando, Jan. 1st, 1925, with the Chamber of Commerce as their headquarters. Hams from all parts of the state responded and made the convention a big success, although it was planned but one week in advance. This is an example of what a live bunch of hams can do in a short time.

The morning was devoted to the annual rag-chewing, registering and receiving delegate badges.

The afternoon program included contests, a visit to 4XE, where the delegates' pictures were taken and refreshments served.

After taking in 4XE's various short wave sets and antennas, the gang assembled at the private dining room of the Hotel San Juan for the banquet. Over twenty active amateurs from all parts of Florida were present. A good feed was had, then talks on various traffic subjects were given by 4XE, 4IZ, 4UA, 4FS, 4QY and 4EZ. The president of the Orlando Radio Club gave an address of welcome on behalf of the Club and the City of Orlando. A.D.M. 4EZ brought up the CQ question and was promised the support of every ham present in upholding the League's CQ regulations. A sum of money was also raised and turned over to A.D.M. 4EZ toward the I.A.R.U. delegate fund.

After the banquet, many valuable prizes, donated by local dealers and enthusiasts, were awarded to the contest winners. Every one had a real time and went home with new enthusiasm for Ham Radio.—4EZ.
Experimenters

Our 20-meter tests served to make a striking public demonstration of the value of 20-meter waves for daylight work and also of their utter worthlessness at night.

The 5-meter tests were not so successful, because everyone depended on someone else to do the sending, therefore all hands were listening for signals that were not being sent. The few sets that were in operation were of too low power to be heard very far. We shall therefore have to run more tests on this same wavelength. If space is available in this issue of QST for an article on 5-Meter Sending Sets the tests will also be announced in this issue, otherwise they will be carried over. Meanwhile all members of this section are urged to put together a 50-watt oscillator (at least) which will operate at 5 meters and below. It is not at all difficult to do this if one will only leave off the needless things and make the circuit simple. Almost any standard circuit will serve.

The Eclipse Tests

Few returns have arrived for the eclipse tests which were arranged for this section by Dr. Greenleaf W. Pickard, hence the main report must be made in the next issue. In general it seems that the 75-meter signals of 2XI were weaker and steadier during the eclipse, but that many remote 75-meter stations came through with almost night-time intensity. No reports are as yet available on the 240 meter special broadcasts nor the higher wave broadcasts.

Problems Needing Attention

Problem T-18, "Filtering Synchronous rectifier output" is in urgent need of attention. Most of the synchronous rectifiers now in use are absolutely criminal and should be taken out of service immediately. We have in mind 15 stations whose plate supply is so truly awful that they can be heard for distances up to 1000 miles with a non-oscillating detector tube, the tone being that of a very rough spark. The local interference with broadcast reception can be imagined. Most of the offenders are located in the 2nd, 3rd and 6th Radio districts.

At this writing this department has investigated 9 stations which were claimed to have a "perfectly filtered" synchronous rectifier, and so far but one has been found that would stand scrutiny. The other 8 were all going on evidence from distant stations using oscillating detectors.

Problem T-11, "Harmonics of tube transmitters" needs attention almost as badly. Most amateur stations today can be copied as well on their half-wave and almost as well on their third-wave as on the fundamental. They are not as bad as radiophone stations (most of whom have beautiful har-
monies down to the 5th) but they are bad enough.

Problem T-8 “Effect of different plate supply on the Range” is being neglected by the men that have signed up for it. This is important as we must soon improve the plate supplies of all sending stations if a general shut-down from 6 P. M. to Midnight is to be avoided.

Problem S-1, “Battery Substitutes for Receivers” should be gone into by all members of the section who can investigate any of the devices now on the market. Laboratory work is not essential—the results in actual reception are as important. However—use a headset, not a loud speaker. Prompt reports to this section will be greatly appreciated.

The Static Problem

With the appearance of the McCaa anti-static devices we should see renewed activity amongst the men working on problem G-4. Reports on both the tube devices and the band-device are wanted.

Correspondence

For the tenth time it becomes necessary to remind members of this section that letters MUST be addressed “Experimenters Section, American Radio Relay League, 1043 Main Street, Hartford, Conn.” Please do not address them to any particular person.

Letters asking for information that has nothing to do with the problems you are working on should go to the Information Service—and of course must follow the rules of that service; they are printed in each issue of QST.

New Problems

Suggestions are invited as to new problems for the section. They must have general interest—there is no point to listing something that only one person is interested in. Therefore problems will not be added unless several write about the same thing.

Dead Problems

Several of the problems now on the list will probably be dropped because they have been worked out or because radio has changed so as to make them needless.

New Membership and Problem Lists

A new membership and problem list is being prepared at this time (Beginning of February) and will be mailed soon. It will be differently arranged so as to be shorter than the old list and just as useful.

Please Write More Carefully

We have just had to wastebasket 6 requests for admission to this section. Two of them were sent in unsigned, one was on a postal card and had been smudged until it was unreadable. Two others gave no address and the remaining one was too badly written for even “D.M.S.” to unravel—and she is the puzzle expert of this office. If the Experimenters’ Section is worth working on isn’t it worth a letter and a bit of care? Thanks.

6CNC—A Beautiful 5-Meter Station

Although only a small set, the transmitter at 6CNC owned by Harry J. Lyman of Venice, Cal., is so constructed as to give a variety of excellent suggestions for 5 meter work.

The photograph has arrived too late for the required retouching, hence the diagram

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three ammeters. The one farthest to the left is the plate voltmeter, the series resistance for it being inside the tubular "shell" at the right of the picture. At the center is the filament voltmeter and to the right is the plate-circuit milliammeter.

The 4 small R.F. chokes will be recognized as being similar to those described in Beekley's 1XAJQ-1AEL 5-meter set which appeared in QST for October. The coils have 35 turns of No. 28 D.C.C. wire. The telegraph sounder is used as a magnetic key, cutting the common lead in the usual fashion.

The circuit is either a series-feed Hartley or else a Meissner circuit—depending on the importance of the tube capacities in tuning the primary circuit. Since the variable bypass condenser tunes the primary it is probable that the action is that of a true tuned Hartley primary, rather than the shock-excitation that we associate with the Meissner system.

The antenna system is suspended between two glass rods and is vertical. When the plate voltage is 550 and the plate current a trifle above normal the antenna current is ½ ampere.

Since such an antenna system gains a great deal by being in the open away from wiring and house walls it has been suggested that an untuned "link circuit" be used between the primary and the antenna. Frank C. Jones of 6AJF has operated such a line successfully, on various waves as low as 1.5 meters. The transmission line (link circuit) consisted of a pair of No. 18 wires spaced 4" and provided with a single coupling turn at each end. One end of the line was coupled to the set, the other to the antenna system. Details will be given in the next issue.

Returning to 6CNC—the set shown has worked to 6TS at 2 miles but at that distance fading was very severe although the signal strength was excellent. Mr. Lyman was unfortunate enough to make the discovery that a Weston thermo-galvanometer should not be left near a 5-meter set—not even when there is nothing connected to it.

The receiving set did not work immediately as did the sending set, but took 3 weeks of work. The circuit is a descendant of the old DeForest "Ultraudion". The use of a variable gridleak has been found necessary. The set will operate at very low waves (below 1 meter) if the coil is reduced to a single turn. For 5-meter work a 3-turn coil is used with two of the turns shunted by the Remler variable condenser which has been "operated on" to increase the spacing, the two sets of plates now being 1" apart when set at the position of lowest capacity.

India 2BG is the station of G. W. G. Benzie, Urununamb Tea Estate, Udarpand P. 0., Cachar, India. Mr. Benzie has heard 1AAC and 2BRB. This makes another new country on the air.
6DD is the station of Phil Keast at Grass Valley, Calif. It has been heard in Mexico, Cuba, Alaska, Hawaii, Australia, New Zealand, in addition to all over the U. S. and Canada. It is also an O. R. S.

The transmitter uses the inductively-coupled reversed-feedback circuit with two fifty-watt tubes. The plate voltage is supplied from a 1000-volt motor-generator and the filaments from the usual transformer. A chopper is used for I. C. W. and a magnetic modulator for phone. The key is in the grid circuit shunted by a one "mike" condenser. The set is used on the 75- to 80-meter band at present.

The receiver is a Radio Shop 100- to 24000-meter tuner. A conventional type of low-loss receiver is being constructed for the shorter waves.

The aerial is a 12-wire vertical cage 63 feet high. The counterpoise is 90 feet long and 50 feet wide, 8 feet above the ground. The ground system is of the buried wire type, using about 7000 feet of No. 9 copper wire. Porcelain insulation is used throughout the antenna system.

6DD says that he does considerable reception on the long waves listening to European and U. S. transatlantic stations. This proves to be both interesting and good code practice.
9BMX is the station of Leonard Still who holds an O.R.S. certificate and is City Manager of St. Paul.

The antenna is a four-wire semi-vertical cage sixty feet long used in conjunction with a five-wire fan counterpoise that is forty feet long.

The receiver is of K. E. Hassell's design as described in QST with the secondary mounted on small plugs so that it might be changed. A step of audio amplification is used.

The transmitter uses the three coil Meissner circuit with a condenser tuned plate circuit. A so-called five-watt tube is used with sixty watts input.

2SZ, London, England

2SZ of London will be remembered as the first British station to connect with New Zealand. It is the station of C. W. Goyder at Mill Hill School, London, N.W.7.

The receiver is a low-loss tickler regenerative of the usual type, with one-step of audio amplification, the combination usually used in DX work.

The aerial is a five-wire inverted L type on twelve-foot spreaders. The lead-in is a cage 45 feet long. The transmitter uses the inductively coupled Hartley circuit and a 250-watt input Mullard tube. The plate voltage is the essential difficulty because the British tubes are of such high impedance that 2500 volts are required to get an input of 250 watts. Originally a "sink" rectifier was used alone but now it is used in conjunction with a rectifier tube as shown in the accompanying diagram. The "sink" by itself could not be successfully filtered, but once the tube was used it was possible to filter the output of the combination and obtain a good note. The plate and filament voltages are supplied from transformers and a 240-volt A.C. supply.
The Canadian Section

Edited by A. H. K. Russel, 9AL, A. R. R. L. Canadian General Manager

Inauguration of Canadian Section

With this issue of our magazine, we are starting what is known as a Canadian section and through the kindness of the editor of QST we are enabled to have three pages of the magazine for our own use every month. Naturally the material to fill this section must come in from the members and if the material is not forthcoming the section must be abandoned. It therefore, is up to everyone of you to get busy and write to the Canadian General Manager a report of all Canadian news of interest, stories of any useful experiments, or in fact anything of a similar nature to those articles which have made QST what it is today.

Under the arrangement at present being carried out the Canadian General Manager is to act as editor of the material for this section so that you are hereby requested to send all stories or articles for this section to him. The more he gets, the better our section will be and if it is sufficiently successful, we will in time be able to occupy more space in our magazine.


Easter of 1925 will mark the time of the first international amateur conference. At this conference we Canadians wish to be represented by one or more men. The great problem of course is one of finance and while we have hopes of obtaining elsewhere than among the membership a certain amount of financial assistance in forwarding our men, the more money we have the more representatives we can send.

Th Canadian General Manager therefore hereby appeals to the Canadian members of the League for subscriptions to be sent him by League members to assist in the forwarding of one or more Canadians to Paris for this conference in April. The C. G. M. will act as the trustee of such funds and due credit will be given to every subscriber to this fund.

The Canadians will go in company with the United States' representatives and we wish to make the representation from Canada sufficiently strong so that we will form a valuable body at this conference. Come on fellows, kick in!

Station 1EB, Halifax, N. S.

A Well-Known Member of the ROTAB's of the Maritime Division, A.R.R.L.

By Richard Binns, Owner & Operator

While there is nothing unusual in the circuits or operation of 1EB at Halifax, N. S., it may be of interest to some to see a layout which has given excellent satisfaction at this station. The familiar loose-coupled Hartley circuit is used with a tuned plate coil. The antenna coil is composed of one turn wound around the closed-circuit helix and connects directly to a six-wire cage spaced with home-made wooden hexagonal hoops. The antenna is 40 ft. on the flat-top with a 20 ft. lead-in. Ordinary glazed porcelain electric light cleats were found to be a good and inexpensive means of breaking up the guy wires which support the 50-ft. wooden mast at the far end of the antenna. These were used in strings of three at every 12 ft. and were found to have sufficient tensile strength, besides affording a break of some 12 in. in the wire. The counterpoise is a six-wire fan.

Four Northern Electric 5-watt tubes are used in the transmitter. These tubes are being operated at 650 volts on the plates and have been found to safely stand 800 as long as the plate current is kept down to about 50 m. a. p. per tube. They are very economical on filament current, a toy transformer being used to supply current to four tubes. The four sockets are arranged in a square with the grid connections in the center, the grid binding posts being all connected to a point in the center of the square and a lead taken off this point. The
filament leads are two heavy bare copper wires surrounding the squares on three sides and just at the level of the base of the sockets. The wires are \( \frac{1}{4} \) in. apart and are bound together with tape in three places, around small wooden spacing blocks. The wires are run around the square in opposite directions so that the potential across each filament will be the same. Short taps from the binding-posts on the sockets are soldered to these feeders. The plate connection completely encircles the square at the level of the top of sockets and is supported by the stiff connections coming up from each socket and soldered to the ring. It is well worth your while to wire your tubes in some such arrangement as this, as a very neat job can be made with little extra trouble and will greatly simplify the wiring of the completed set and usually make the apparatus more accessible. Sets using a number of tubes in parallel very often have a mass of tangled wires in the vicinity of the sockets for which there is no excuse, as these connections are permanent and never need to be changed.

A very efficient and easily constructed change-over switch of the rotary type is shown in the drawing; which can be made up from junk lying around any amateur station. There are two contacts on each side composed of slot-contacts from old knife switches, and the three blades on the rotor are also parts of old knife switches.

All chokes, transformers, rectifiers, etc., are mounted on a separate panel several feet from the transmitter (with the exception of the radio-frequency chokes). The sketch shows the layout at the back of the panel. Flexible leads are taken over from the power panel to the set, for the key, plate supply, filament, and change-over switch. It will be seen from the wiring diagram that as soon as the change-over switch is thrown to the transmitting side, the filaments will light and the key will be ready to close the primaries of the plate transformers. Two small plate transformers are used in series at this station. Every time it is desired to change the voltage, two connections must be changed instead of the customary one tap on a single transformer.

This is conveniently done by bringing out the different leads to sets of two binding posts on the front of the panel. A small handle with two copper prongs, con-

(Concluded on page 59)
Notices

1. Make the list in numerical order according to districts and arrange each district alphabetically. Exactly as the lists herewith.

2. Use commas between calls and print or type with double spacing—skip a line between lines.

3. The list must be in our hands on the first of the month after month of reception. State period of reception.

4. Leave out all stations worked except the one which represents your best dx worked, and insert in the proper place with an asterisk on either side; viz, a"PQ*.

5. Please include your call, name, and complete address, indicating how much of it you desire to be published.

F. White, 8BL.
46 Ellice St., Wellington, N. Z.
1925 March, 1ST

R. J. Scott, 68 Fisher St.,
Beckenham, Christchurch, New Zealand.
1925 March, 1ST

Ralph Slade, 2AFG
15 Hanson Terrace, Dunedin, N. Z.
1925 March, 1ST

F. N. Leverrier, a2BK, "Lorette"
Wentworth Rd., Vaucoules, Sydney, N.S.W., Australia.
1925 March, 1ST

C. A. Cullinan, Diggers Rest,
Victoria, Australia.
1925 March, 1ST

Rene Burdet, 68CS, this Rue Tarbe,
Reims, Marne, France.
1925 March, 1ST

Edouard C. A. Coupep,
23 Rue Eise, L.X., Brussels, Belgium.
1925 March, 1ST

Radio P2, Conrene, Villa Marthe,
Watermill, Brussels, Belgium.
1925 March, 1ST

Rudolph G. J. R. van der Wiel,
Kasteel Shrinerham, Christchurch, New Zealand.
1925 March, 1ST

Radio P2, Conrene, Villa Marthe,
Watermill, Brussels, Belgium.
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1925 March, 1ST

Edouard C. A. Coupep,
23 Rue Eise, L.X., Brussels, Belgium.
THE CANADIAN SECTION

(Continued from page 56)

QST, the publishers have just written us that the present edition is exhausted, and that revision will be made before another printing. We cannot, therefore, guarantee immediate delivery on Ballantine. If you are willing to wait for your copy, all right; just so note in your letter for their work we have made arrangements. This work is available as Ballantine, revised edition, to be sent later.

NOTICE

In reference to the offer on page 100 of February QST, in which we offered a copy of Ballantine's "Radio Telephony for Amateurs" to each man sending in six subscriptions to QST, the publishers have just written us that the offer is opened when only the first transformers and the chokes are connected to the wire by clips at these places. Each filter condenser is equipped with a wire hook soldered to each lug, by means of which they may be hung across the line at any place on either side of each choke coil. Thus any place of the chokes and condensers may be obtained without tearing out connections, and it may be seen at a glance just what the filter system is.

The switch B short-circuits the leads to the key, when the key is taken out and used in some other part of the circuit. It seems to the writer that the scheme of keeping all this apparatus separate, greatly simplifies the adjustment and operation of the transmitter, and affords a better chance for experimenting with the set, besides making a neat and attractive station.
Let's Continue To Deserve This

149 Lowther Parade,
Barnes, London, S. W. B., Eng.

Editor, QST:

Having worked transatlantic about 50 times and connected with 40 of your men so far this winter, I feel that I have gained sufficient experience to pass on my views to you thereon.

Firstly with regard to bum fists, bug keys and CQing! I have not the slightest doubt in saying that the improvement is tremendous. You men are now sending beautifully. Whether it has to do with your repeated “jabs” in QST or whether it has been found to answer best to send better, I do not know; but the fact remains there has been an immediate response to our prayer for better sending and the removal of “bugs.”

With regard to CQing: this still exists with certain stations and no doubt their DX lists suffer sufficiently for their folly.

There is another type of station which CQ’s and calls Europe continually all night and every night, but does not appear to listen. I have little doubt that you know pretty well which stations are the offenders in this class. It may be that they are troubled with rotten receiving conditions due to QRM of various natures, but we notice that in each case their transmitters are among the highest powered and their signals romp in here with an earsplitting crack.

A wonderful change is noticed in the quality of note transmitted from your side. It was very seldom indeed last year that one listened to a pure D.C. or well rectified note from your men; but now the notes are all beautifully rectified and a huge number are pure D.C. This is particularly interesting in view of the writings we have had in QST and elsewhere regarding D.C. notes and the very low waves. I wonder if your men have observed a similar improvement at your end? Nearly all of our men are using A.C. with the exception of 2KF and myself who use D.C. generators.

—Kenyon Secretan.

The Ham in a New Role

Merrick,
Nassau County, N. Y.

Editor, QST:

Something occurred the other nite that I that was rather amusing. It is this:

My phone has a reputation around town that can be called good or bad. Anyway it comes in all over the dial of receiving sets that are not very selective.

Now, as it happened, one evening about 7:30 P. M. I was calling CQ on the phone, when a BCL called up and said: “My kids are listening to the bedtime stories.” I said “All right, old man, I’ll quit.” But he said, “No. I don’t want you to quit, I want you to tell my kids, (he gave me their names) that you are Santa Claus and that if they are good that you will stop at their house and leave them something very nice.”

This I did, very much to his satisfaction. Rather odd part for an amateur “program Buster” to take. Is it not?

—N. D. Chasnoff, 9BVK.

Thanks, OM

Shag Valley Station
Walhemo, Palmerston South Otago, N. Z.

Editor, QST:

I had hardly parted with my last letter which was grumbling at the QSB of most of the Yanks on 80 meters, when there seemed to be a marked improvement. Consequently I have been very much more successful in working them and have worked over two dozen yanks since my last letter. Yanks from every district save the seventh and fourth.

Another thing—we out here want to take off our hats to you fellows as regards reception. Whatever we may have said or thought about your abilities in this line in the past is rubbed out now. The usual amateur over here has a single 208—nuf sed.

—F. D. Bell, z4AA.

Welcome, Brother!

Mr. Hiram Percy Maxim:

I should be proud to wear the golden earmuffs of the A.R.R.L., if I am found worthy. My qualifications are as follows:

1. My brother-in-law lives in Hartford. He threatens to introduce me the next time I go there.

2. Although I have no sending outfit, my receiver is a wonder. It took the Grand Prix at the Exposition de Junk in 1901. The geographical co-ordinates of its centre of oscillation are Lat. 40° 40' 40" N., Long.
1. 73° 33' 00" W., although its divers parts are scattered over the whole table.

2. I derive much comfort from the communications from NAA, 1AW and other stations of that class. I am an applicant for the rating of Eavesdropper, 1st Class, as my station log shows that I can get GE OM FB QRK? from four stations simultaneously with one ear tied behind my back.

3. Perhaps my most impressive qualification is that I have two dollars. I am parting with it affectionately, and enclosing it in a check.

—Harold Bunker.

To Get a Good Note With Self-Rectification

Editor, QST:

Some few months ago I wrote you a letter with regard to the use of kenotron tubes for use in amateur radio telegraphy. Several letters have come to my attention since that time complaining that there are quite a few amateurs who are not able to afford the installation of kenotron tube rectification. I am inclosing a circuit which will, when used with the self rectifying system, enable the station owners to secure nearly pure DC without the additional expense of installing kenotron tubes and further circuits.

Experiments over the past five months have developed some rather surprising results. In addition to the regular grid choke coils, a small variometer of standard make was connected in series between the grid condenser and the grid choke, and a large audio-frequency choke was introduced into the negative lead of the plate transformer, to avoid disturbing those in the near vicinity. While the signals emitted from a set of this character do not sound as though they were D.C. to one close to the transmitter; I am sure that those who are located near those who try this will find that fully 50% or 60% of their trouble from the 60-cycle growl will have been eliminated. One should not expect reports of your note being absolutely pure D.C. from those who

![Diagram of circuit](image-url)
are located too close. Relying upon some well-known amateur who is located some distance, say 50 or more miles away, for a report; have him assist you in the tuning of the grid variometer by reports, until the note approaches its best point. This adjustment is very critical and it will be necessary that close cooperation from some other amateur located some distance away be obtained. Preferably 100 or so miles away,

in order to get an accurate adjustment which will permit ready keying; and the note which is so much desired by those who cannot afford the cost of the installation of kenotron tubes for a direct current supply to their set.

It is my sincere hope that those who cannot afford the installation of kenotron tubes will divert their attention to this type of circuit; thus eliminating the messy chemical rectifier and still securing the same degree of satisfaction in being able to get through without disturbing those located close to them. So, boys, hop to it, and let's see just how much can be developed along this line. There is nothing that will ever compare with pure D.C. as far as getting through consistently is concerned. However, in view of the fact that some of our most prominent amateur and commercial men do not favor pure D.C. due to the fact that it is so wearisome to copy, I am sure that they will welcome this solution of the problem with open arms. This circuit really works. If you don't believe it, all I ask is that you give it a fair trial. Address any communications regarding this circuit to QST who will forward same to me, and I will endeavor to help all that I possibly can to clear up any points which are not absolutely clear.

—M. B. Lowe.

A Chance, Chicago

2638 Mulligan Ave.
Chicago, Ill.

Editor, QST:

Please slip this request in your top-hole magazine, any corner will do. I am only a B.C.L. but I hope you will take pity on me.

I have a detector and two-stage amplifier which tunes 'way down as well as on regular B.C. wavelengths, and your gang are so friendly that I want to get in the swim, so to speak.

What I want is to have some amateur, who lives, and does his stuff in Chicago, take me under his wing, let me paw over his junk and give me what tips he can. I can handle as many answers as I get, I am sure. I want to get a start at the game and this is the best way I can think of. Your boys are so friendly to listen to, that I am sure someone will Q.S.L. my S.O.S. So, "come in," Chicago. I will pay it back to someone else when I can do my stuff.

Thank you, Mr. Editor, your magazine and whoever answers my call. I remain, but not for long, I hope, a B.C.L.

L. C. Whitaker, Jr.
Phone Columbus 9777.

The Chart tells the story

High amplification over entire band of sound frequencies. Undistorted reproduction at all frequencies, with no one high peak of amplification at any point of the band. Brass rounded case, with satin nickel finish. Ratio 3⅓ to 1. Location of binding posts permit short leads. The better class dealers carry Pacent Radio Essentials. Send for complete catalog.

PACENT ELECTRIC COMPANY, Inc.
91 Seventh Avenue, New York City
Washington, Minneapolis, Boston, San Francisco
Chicago, Birmingham, Philadelphia, St. Louis
Buffalo, Jacksonville, Detroit

Pacent
Radio Essentials

DON'T IMPROVISE — PACENTIZE.
THAT Burgess Radio Batteries were chosen for this inspiring achievement is a pleasing indication of the confidence placed in them by experienced radio engineers.

Ask Any Radio Engineer

BURGESS BATTERY COMPANY
Engineers DRY BATTERIES Manufacturers
Flashlight - Radio - Ignition - Telephone
General Sales Office: Harris Trust Bldg., Chicago
Laboratories and Works: Madison, Wis.

in Canada: Niagara Falls and Winnipeg
To Our Readers Who Are Not A. R. R. L. Members

Wouldn't you like to become a member of the American Radio Relay League? We need you in this big organization of radio amateurs, the only amateur association that does things. From your reading of QST you have gained a knowledge of the nature of the League and what it does, and you have read its purposes as set forth on page 6 of every issue. We would like to have you become a full-fledged member and add your strength to ours in the things we are undertaking for Amateur Radio, and incidentally you will have the membership edition of QST delivered at your door each month. A convenient application form is printed below—clip it out and mail it today.

American Radio Relay League,
Hartford, Conn.

Being genuinely interested in Amateur Radio, I hereby apply for membership in the American Radio Relay League, and enclose $2 ($2.50 in foreign countries) in payment of one year's dues. This entitles me to receive QST for the same period. Please begin my subscription with the ....................... issue. Mail my Certificate of Membership and send QST to the following name and address.

Station call, if any ..................................................
Grade Operator's license, if any ..................................
Radio Clubs of which a member ............................... 
Do you know a friend who is also interested in Amateur Radio, whose name you might give us so we may write him about the League? .................................................. Thanks?

Morse Handy Radio
Set No. 3

Morse for Quality & Service

MORSE MEANS THE BEST

If you desire a more complete assortment ask for our No. 4 Radio Set. This Set will simplify your radio panel construction. 1 Straight Shank Drill each No. 10, 16, 23, 30, 38, and 45. 1 Plug Tap and Round Die each 2-36, 4-36, 5-36, 9-42, 12-42, 18-36 and 14-20, 1 Die Stock No. 22 and 1 Tap Wrench No. 0.

Every man who likes to build things should own this Set.

Send for our folder No. 3-A.

Morse TWIST DRILL & MACHINE CO.
NEW BEDFORD, MASS., U.S.A.

ALWAYS MENTION Q S T WHEN WRITING TO ADVERTISERS
A Wonderful Radio Achievement!

The First All-Glass Socket

Countless tests have proven glass to be the most effective insulation available to radio. After exhaustive research, our engineers have developed a new-idea Socket made entirely of VIRALON — a special glass processed for 100% electrical efficiency.

VIRALON Glass is heat resisting and moisture proof, and unaffected by those influences that commonly make rubber, rubber derivatives, porcelain and vitreous products so inefficient.

Duray All-Glass Sockets eliminate most of the so-called "tube noises" — cut down power losses — prevent short circuits — and eliminate radio frequency leakage.

DURAY RADIO CORPORATION
Dept. 21, 263 Washington Ave., Newark, N. J.

You'll like all the exclusive Duray features — the all-glass construction — the one-piece contact springs — the knurled contact spots (corrosion-proof) — the handy soldering terminals.

Price $1.25 (standard size)
Packed in attractive carton

Until all dealers have been stocked, you can be supplied direct from the factory at the retail price, plus 10c each for packing and postage.

ALWAYS MENTION QST WHEN WRITING TO ADVERTISERS
Dear Sirs:

I am sending herewith the photo that I promised. The show at which this set was awarded first prize was run by the 2nd District Executive Council, March 3rd to 7th, at the Hotel Pennsylvania, New York. The prize was awarded for the best appearing, best designed and best constructed amateur transmitter. Judging from the number of sets that were entered in this contest I feel sure that your attractive looking meters had a good deal to do with the choice of the judges.

The meters on this transmitter have been in service for the past three or four years and at no time have I had any trouble with any of them. They have given most exceptional service under severe working conditions. This set has been reported heard in Los Angeles, California, and Porto Rico and also many other distant points.

Very truly yours,

CC/DS CARLOS CLARK (2-ABD)

P. S. Second prize was won by Mr. Van Duyne (2-AVU) with a 15 watt transmitter fitted up with all Roller-Smith meters.

Bulletin AG-10 tells about Roller-Smith 3½" instruments for radio sets, both transmitting and receiving. A copy is yours for the asking. Address

ROLLER-SMITH COMPANY
16 Park Place
NEW YORK, N. Y.

Offices in principal Cities in U. S. A. and Canada, also in Havana, Cuba.

The Prize Winner

Roller-Smith Company,
New York, N. Y.
August 25, 1924.

The Prize Winner

Rockville Center, N. Y.

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16 Park Place
NEW YORK, N. Y.

Offices in principal Cities in U. S. A. and Canada, also in Havana, Cuba.
What size batteries will work best in your set?

The Prest-O-Lite Radio Chart makes it easy for you to select the right storage battery for best reception, and also arrange the time between chargings to suit your convenience. Illustrated above is a section of the master chart showing Prest-O-Lite "A" Batteries for 5-volt tube sets. If your set has these tubes, you will find, in this chart, the Prest-O-Lite "A" Battery that fits it exactly. Two sizes are recommended, but the larger capacity battery will be found more desirable unless facilities for frequent and easy charging are provided. (The days between chargings are based on an average use of your set of three hours a day.)

Thousands of radio dealers have the complete chart, showing you also how to select "B" Batteries, as well as "A" Batteries for peanut tube sets. You'll prefer Prest-O-Lite Batteries because of their special features designed for better radio reception. Improved separators and plates insure steady, unvarying current and years of life. They're easy to recharge and priced to offer you remarkable savings at from $4.75 up.

See the Prest-O-Lite Chart at your dealer's—or write for booklet, "How to fit a storage battery to your set—and how to charge it."

THE PREST-O-LITE CO., INC., INDIANAPOLIS, IND.

New York
San Francisco

In Canada: Prest-O-Lite Company of Canada, Ltd., Toronto, Ont.
GOOD READING MATTER
At Low Cost

This month we offer you twenty-four issues of QST at an unusually low price. In them you are sure to find circuits, new kinks, constructional dope or advertisements which will be just what you've been looking for, and which will be worth many times the price of the QSTs to you.

Here Are the Issues
1917—June, July, August
1919—June
1921—June
1922—May, July, October
1923—February, May, July, August, September, October, November
1924—April, May, June, July, August, September, October, November, December.

Here Is the Price
The above 24 issues sent postpaid, only $2.50. (add $1.00 for postage if you live outside the American Postal Union.)

We are low on many valuable issues, so get your order in NOW and be sure of getting the full set, as substitutions of other issues may have to be made on orders received after some numbers are exhausted.

QST CIRCULATION DEPARTMENT
1045 Main St., Hartford, Conn.
The original low loss condenser was introduced in 1915 by the General Radio Company. This instrument heralded an era of rapid advancement in the science of radio.

Today the design and performance of the General Radio Type 247 Condensers merit their distinction as the standards of excellence.

Eight different models are now available for various radio requirements. All of these models incorporate the following features, which contribute to lower losses and greater efficiency:

- Low resistance losses, because of soldered plates.
- Straight line plates, which give a uniform wave-length variation.
- Plates always in perfect alignment, being individually straightened before assembly in a jig, and firmly soldered while in position.
- Rotor plates counterbalanced to permit greater precision of adjustment.
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- Tight and smooth running spring bearings, adjusted to compensate for wear.
- Popular prices, made possible by large-scale production and efficient methods.

Ask your dealer or write for instructive folder “Quality Condensers,” containing complete information on all 8 models of General Radio Condensers.

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Low Power is O.K. if Conditions are Right

2CRQ, Robert L. Koerner, is one of the best low powered amateur stations in New York City. This Reinartz 10 watt transmitter has been heard in forty-five states, Porto Rico and Buenos Aires. Leading amateurs everywhere know that if conditions are right—the results will be good. There is a Weston Indicating Instrument to meet every Radio need whether it be for Reception or Transmission. Voltmeters, Ammeters, Milliammeters, Thermo-Ammeters and Thermo-Galvanometers, in low or high range or in small or large size are available for the amateur, advanced experimenter or commercial station. Whatever your special requirement or problem may be, get in touch with us and let us send you full particulars and prices on the instrument or instruments exactly suitable to your needs.

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47 stations in one night

Mr. T. A. Keen, of Temple, Texas writes us as follows: "We have set up our Deresnadyne and logged 47 stations in one night. They range from Havana to Calgary and from Springfield, Mass. to Portland, Oregon. You can see from this that the Deresnadyne is all that is claimed for it."

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8. Takes any size dial.
9. The product of 14 years' experience, making precision instruments.

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No Leads! Low Loss!
The only perfect mica grid condenser

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Fits right on the Binding Post of the Detector Tube.
It is both a grid condenser and a perfect grid leak mounting, made in .00015, .00025, .0005.

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*Important Links between the Shenandoah and Land!*

Communication with land—under all conditions—at all times—this was the imperative need of the Shenandoah on its experimental flight across the continent. Impressed with this need, army and navy engineers equipped both transmitting and receiving sets with Dubilier mica condensers—not specially designed condensers but the regular standard product. Only complete confidence in the supreme reliability and efficiency of Dubilier condensers can explain their use in the important and daring adventure.
Notice the rich finish on this panel built to order for radio

A SURFACE that is good-looking and useful too. That was one of the demands we made of the engineers who developed Radion especially to order for radio purposes. The high-polished, satin-like finish of Radion Panels does more than add to the beauty of your set. It keeps out dirt and moisture, thus preventing the possibility of causing short circuits from this source and reducing good reception.

Lowest losses and greater efficiency

BUT THE worth of Radion is not just on the surface. Authoritative laboratory tests give it the highest rating as radio-frequency insulation. It reduces surface leakage and leakage noises. This means lowest losses and greater efficiency, especially noticeable in super-sensitive circuits.

Radion Panels resist warping. It’s the easiest material to cut, saw or drill. It comes in eighteen stock sizes and two kinds, Black and Mahogany. Better performance will make it worth your while to ask for Radion by name and to look for the stamp on the panel and the name on the envelope. Radio dealers have the exact size you want for your set.

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AmerTran is the product of over twenty-four years' specialized experience in transformer building.

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The New Model Tungar charges radio A and B storage batteries, and auto batteries. Two ampere size (East of the Rockies) $18.00

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60 cycles—110 volts

On the back of the Tungar, there are three terminals. Slip the wire into one and charge your radio "A" battery, 2 or 4 volt size. Use the second to charge your radio "B" battery, 24 to 96 volt size. Or the third will charge a 6 volt "A" battery or 6 to 12 volt auto battery.

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The BARRETT & PADEN is the only condenser made that makes use of this principle and divides the adjustment of the movable plates into 1/1000 readable positions.

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Rich Tone and Volume

The Stromberg-Carlson No. 2-A Loud Speaker reproduces programs with naturalness of tone while its volume is sufficient to fill a large room on distant station reception.

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The Last word in Radio Re-Creation

Embraces all proved principles of reproduction. Delicate shading, inflection and modulation of voice—this and the musical instrument re-created with remarkable volume and clarity of tone, with astounding purity and faithfulness, even when sending is weak. Fills room with beauty that's in you. Horn acoustically perfect. No battery needed—just telephone line terminals. Handsome crystalline finish horn horn approx. 22" high; heavy base prevents tipping. Four indicator connecting cords included.

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It generates an Electro-motive-force—0.853 volt. Simply attach to cord tip of your receiver. No danger burning out tubes. For testing through anything from dead short circuit to 1,000,000 ohms. Internal resistance 70,000 ohms. Last for years. Sent C.O.D. to any address in U.S. for $1.25. Your money back if not all we claim.

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Simplicity is a distinctive characteristic of the Cardwell. There is no excessive bulk or weight—no intricate parts or complicated assembly.

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Cardwell condensers are rugged, free from play, noiseless and remarkably smooth in action. And there is nothing to work loose or get out of adjustment.

Cardwell invented the first "low-loss" condensers—a name originally applied only to Cardwells to distinguish them from ordinary varieties. Cardwell now makes seventy-six different types—a condenser for every requirement. Ask your dealer to show you his assortment.

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SERIES AND PARALLEL RESONANCE. Inductance or capacity when used separately as outlined in No. 2 and 3 of this series are indiscriminate in their action with the exception of the general rule, the higher the frequency the more effective. The combined use of them will result in a filter that will either stop, or pass, one or several frequencies or bands of frequencies. The two basic forms for such combinations are Series Resonance and Parallel Resonance.

SERIES RESONANCE. A choke and a condenser connected in series as shown in B will offer high impedance to all frequencies except one, i.e. resonant frequency (F'). This frequency, practically speaking, will pass with an impedance of the resistance of the choke only, i.e. better than condenser alone if R is small, but the impedance will be high for frequencies above and below resonance.

PARALLEL RESONANCE. When inductance and capacities are connected in parallel as in A the reverse characteristic of B will prevail. It will pass all frequencies except those near resonance. For resonance frequency it will be a dead stop except to supply the losses which are, practically speaking, negligible.

The effective application of these resonant circuits in their basic forms to generators is rather limited. One for slot ripple and one for commutator ripple will be required, neither one of which will be very effective in reducing moving contact disturbances. Also they are so very discriminate that slight variation in speed, such as caused by varying the load, would require readjustments.

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Makers of Motor Generators and Dynamotors with the least ripple and the most miles per watt.

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Transmits perfect signals at any desired speed. Easy to learn and operate. Send continuously for hours without fatigue. Used and recommended by more than 85,000 wireless and commercial operators.

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Equipped with 3-16 inch contact points to break high current without use of relay .... $25.
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Twenty-five They Don't
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Royal amplifies with Thordarsons!

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Thermiodyne amplifies with Thordarsons!

THEY SAY OF THE PATHE:
"Pure tone — remarkably clear and sweet reproduction."

Pathe amplifies with Thordarsons!

THEY SAY OF THE MICHIGAN:
"Gives any degree of volume desired — without distortion. Exceptionally mellow tone quality — a tone charm that eliminates harsh or mechanical notes."

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Follow the Lead of the Leaders!
Build or replace with Thordarsons

Leading set builders have scientific laboratory apparatus to test, compare and prove the facts about transformers. They continue to use more Thordarsons than all competitive transformers combined. Doesn't this answer the amplification question?

Daily we hear from fans who paid high prices for musically named, fancy-looking transformers only to discover that their old standbys — Thordarsons — were the real musical instruments. For the benefit of others we therefore repeat “when better transformers can be bought they will be Thordarsons.” Few, if any, transformers actually cost as much to make as Thordarsons. Why, then, pay more? Any store can supply you. If dealer is sold out, order from us.

THORDARSON ELECTRIC MANUFACTURING CO.
WORLD'S OLDEST AND LARGEST EXCLUSIVE TRANSFORMER MAKERS
Chicago, U.S.A.

Unconditionally Guaranteed

THORDARSON Super Amplifying Transformers
Standard on the majority of quality sets

TYPES AND PRICES: Thordarson “Super” Audio Frequency Transformers are now to be had in three ratios: 2:1, $5; 3:2.5:1, $4; 4:1, $4.50. Thordarson Power Amplifying Transformers are $15 the pair. Thordarson Interstage Power Amplifying Transformers, $5.

Write for latest hook-up bulletins—free!

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A Wrench Set That is Right

This compact socket wrench set consists of a strong screw driver type handle with hex shank and six high grade steel, machined, sockets, five to fit the hex nuts and one taper knurled socket for battery nuts. All packed in a durable, hinged box with a place for each socket and the handle.

Radio Fans—"This set will set the nut" quickly and easily and is as handy as your right hand.

Send in the coupon and your dollar today for the set that's worth much more.

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Price $1
Postage Paid.

FINDLAY
Stand-Off Insulators
"For Perfect Reception"

Designed especially for radio purposes. Will hold lead-in wire six inches from building. Corrugated so that it will drain quickly. Will not deteriorate. Made entirely of porcelain, the dependable insulation. Easy to install. Packed in cartons with padded screws ready for installation.

Price, 50c
ON SALE at all leading radio stores. Mail orders accepted at factory when accompanied by cash or money orders.

All types of porcelain radio insulators and insulated screw hooks. Send for circular.

MANUFACTURED BY
The Findlay Electric Porcelain Co.
FINDLAY, OHIO

Imported Transformers

Transformers with a kick. 40-1 Ratio. Especially designed in the D.T.W. Berlin Laboratory by a well known American amateur.

Price $6.00 by Parcel Post

Sole American Distributor
Tobe C. Deutschmann
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When the “Daughter of the Stars” talks with the children of earth

YOU remember the dramatic night last winter when the giant Navy dirigible Shenandoah went adrift in a raging gale.

“You are over Newark,” said radio station WOR. “What can we do to help you?”

Thousands of people sitting by radio sets in their cozy homes heard the plucky lieutenant-commander on the Shenandoah send back the reply: “Thanks, old man, everything’s O.K.”

In the air, as on the sea, radio equipment must be the most reliable it is possible to get. That is why the Shenandoah, the huge ship Leviathan — in fact, many government and commercial radio plants — were equipped with Exide Batteries.

For your own set

When you use Exide Radio Batteries in your home you get the clearest reception, for Exides give uniform current through a long period of discharge.

There is an Exide type for every tube and a size for every set: “A” batteries for 2-volt, 4-volt and 6-volt tubes; “B” batteries, 24 and 48 volt, of 6000 millampere hour capacity. They are efficient, dependable, long-lasting — and right in price. Exide Batteries are made by the largest manufacturers of storage batteries in the world.

You can get Exides at Radio Dealers and at all Exide Service Stations. If your dealer should be out of booklets describing Exide Radio Batteries, send us your name and we will mail them to you.

THE ELECTRIC STORAGE BATTERY COMPANY
Philadelphia
Exide Batteries of Canada, Limited
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Exide RADIO BATTERIES

FOR BETTER RADIO RECEPTION USE STORAGE BATTERIES
ALWAYS MENTION Q S T WHEN WRITING TO ADVERTISERS
"Master of Every Note in the Orchestral range" is the proven claim of the Federal No. 65 Audio Frequency Transformer:—Volume without distortion is the basis for the beauty of Federal Tone.

From its oversize locking nuts to its heavy brass mounting feet the Federal No. 65 Transformer incorporates the same engineering skill that has made Federal the recognized leader in electrical communication apparatus since 1890. Insist upon Federal parts for your "pet" hook-up. There are over 130 standard parts bearing the Federal iron-clad performance guarantee.

FEDERAL TELEPHONE MANUFACTURING CORP.,
Buffalo, N. Y.
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Federal
Standard RADIO Products

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The Andrews Paddlewheel-Coil

Pats. Pend

Price $3.00

A new low loss coil of ideal characteristics for use with many different types of circuits. Embodying, as it does, an extremely high ratio of inductance to resistance it constitutes a marked advance in radio design.

Your results will be greatly improved by using this superior piece of apparatus. Its exclusive construction assures maximum amplification, minimum distortion, and much greater selectivity.

Write for full information regarding this wonderful new coil, its characteristics, and its uses.

Duo-Spiral Folding Loop

Handsomely finished in silver and mahogany, a special model for every circuit. Rotates on base, which has slotted dial graduated for calibration. Handle permits adjustment without body strain effect. A finer and more convenient loop for portable and non-portable sets. Write direct, if your dealer cannot supply you.

Price $3.50

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Send for printed matter concerning

THE GOODMAN

the niftiest short-wave tuner on the market. Made by L. W. GOODMAN, Drexel Hill, Pa. Gene Hummer Sta. 41A, pictured on page 50, December QST had KGO as early as Sept., at Dundee, Fla., on his GOODMAN tuner. Get that—Sept.—Fla.—Calif. Not so bad!
Bakelite - Faultless servant of Radio's invisible audience

BAKELITE combines properties which make it unique among insulating materials. It has high insulation value and great strength, resists both heat and cold, and is immune to moisture, oil and fumes. Bakelite is unaffected by time and use, and its color and finish are permanent.

Radio has banished isolation. It has brought the music of opera and orchestra, the voices of statesmen and teachers into the cabin of the woodsman, the home of the farmer and to people everywhere.

Bakelite is playing a vital part in this universal radio reception. It is used by over ninety-five per cent of the manufacturers of radio sets and parts, for they know that Bakelite insulation can always be depended upon to give superior results in service, in any climate and at any time of year.

Some of the many radio applications of Bakelite are shown in the adjoining column. When buying a radio set or part make sure it is Bakelite insulated, for this is a definite indication of quality.

Write for Booklet 27

BAKELITE CORPORATION
247 Park Avenue, New York, N. Y.
Chicago Office: 636 West 22d Street

Bakelite is an exclusive trade mark and can be used only on products made from materials manufactured by the Bakelite Corporation. It is the only material which may bear this famous mark of excellence.

BAKELITE
THE MATERIAL OF A THOUSAND USES

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Red Seal Condensers
make good sets better

In one of the well-known laboratories in New York City there is a special condenser, designed for making electrical measurements. It is a precision instrument in which every precaution and every known device have been employed to secure maximum efficiency. Its electrical losses are so low that they are negligible and to intents and purposes it is a perfect condenser.

Recently a Red Seal Condenser—right out of stock—was tested against this instrument in a measuring circuit. The difference between the losses of the two condensers was so low as to be practically immeasurable!

The cost of the laboratory condenser was probably $1.50—the 23 plate Red Seal Condenser costs $6! It, too, is a precision instrument for critical sets—but its price is easily within the reach of every radio enthusiast desirous of making a good set better.

Because of the difficulty in securing delicate adjustment you, probably, have often tuned your condenser plates right through the sharp peak of an incoming signal wave. The Friction Vernier of the Red Seal permits adjustment to a hairline. It is the ideal control for this precision condenser.

Made in four sizes:
- 13 plate 0.0038 M.F.
- 23 plate 0.0065 M.F.
- 17 plate 0.0057 M.F.
- 45 plate 0.001 M.F.

The most distant stations are heard

With Myers Tubes you can get virtually every station on this continent and elsewhere. England, France, Cuba, Hawaii, Porto Rico, Japan are being heard daily with one, two or three Myers Tubes.

They are noise free—locate stations easily—clear reception—and are interchangeable. Each Myers Tube passes 49 separate and individual tests. Each is actually tested for reception. Three types for dry and storage batteries. All ready to mount. At your dealer's or sent postpaid for $4.

246 Craig Street, Montreal

Myers Tubes
Practically Unbreakable

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Volume and Clarity

with Kellogg Transformers

A Radio Frequency Transformer of the aperiodic type suitable for all sets with which tuned radio frequency is desired. Also used for one stage of radio frequency amplification ahead of regenerative sets to prevent re-radiation.

Consider these points of superiority:
- No dope to hold windings in place.
- Soldered connections.
- Mounting bracket holds coil at correct angle.
- Minimum rubber used in form.
- Lowest possible loss, with greatest transfer of energy.
- Works with any .0005 condenser.
- Secondary arranged with suitable taps for biasing features.

This transformer makes the construction of a radio frequency set an easy matter, assuring best possible reception with widely varying types of circuits, including reflex.

Built and guaranteed by Kellogg Switchboard and Supply Co.

- No. 602 Radio Frequency Transformer at your dealers for $2.35 each.
- Kellogg Audio Frequency Transformers are the "stepping stones" of modern amplification.
- Clear, accurate reproduction assured over the entire range of the musical scale.
- Plainly marked, accessible terminals.
- It is acclaimed by test to be the best.

No. 501 Audio Frequency Transformer
Ratio 4½ to 1—
No. 502 Audio Frequency Transformer
Ratio 3 to 1—
$4.50 each

KELLOGG SWITCHBOARD & SUPPLY CO.
1066 WEST ADAMS STREET, CHICAGO
175 to 600 METERS
No. 3
P. S. T.
BROADCAST COUPLER
$6.75

LOW LOSS COUPLERS
50 to 150
70 to 200 METERS
HAM SPECIAL
SHORTWAVE COUPLERS
$6.00

DESIGNED BY A HAM FOR HAMS
Government specifications for short wave low loss tuner are No. 10 D.C.C. wire wound single layer.
The "CARCO" Ham Special using two No. 18 D.C.C. wires in parallel (equal to a No. 12) is the nearest approach to these specifications of any on the market. A compact unit in a space of only 3" x 8¼".
Antenna Rotor and secondary Stator designed for "Low Loss" and "Low Resistance."
Our special single layer, multiple strand inductance does the trick. Low loss tubing used.

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A Real Man-Size Emblem!
For League Members Only

We’re glad to announce that you can now get a durable, weatherproof, brilliant A.R.R.L. Emblem. Just the thing for the inside or outside of your shack, for your mast, for decoration in Radio Club Rooms, at Conventions,—wherever A.R.R.L. men get together.

19 x 8¼", sheet steel base, heavily enameled in golden yellow and black, with holes top and bottom for hanging.
These emblems sure are FB, gang, and we’ll send them anywhere postpaid for only $1.25 apiece.

THE AMERICAN RADIO RELAY LEAGUE, HARTFORD, CONN.

Yes—our new Amateur Catalog
the HAMALOG
is ready at last

Some Leaders—see our Ham Ads for more
No. 12 solid copper enameled wire, 1000 ft. $6.90. Less at 75c per 100 ft. Any length in one piece.
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Ballantine’s “Radio Telephony,” the “amateur’s bible,” in stock at $2.00
4001-1 S tubes $10.00, sockets 90c.
Order early, gang, they’re scarce.
Include postage, please
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Our experimental laboratory is developing instruments for short wave transmitting and receiving.
A real Wave Meter will be ready soon. We know that all hams will be interested.

Send us your name for our mailing list

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FOR THE LAYMAN

The dyed-in-the-wool ham wouldn't think of buying a complete set. He prefers to build his own. But here—in this AMRAD Neutrodyne—is a real power plant he can recommend without hesitation to his layman friend.

5 Tubes delivering tremendous power, but only 2 Tuning Dials. Wonderful tone quality, high selectivity. A LICENSED Neutrodyne. Yet the price is reasonable.

Write for Folder 220 for complete details, if your dealer is not stocked with this latest AMRAD.

JUST THE SET FOR THE LAYMAN

A Genuine Licensed 5-Tube NEUTRODYNE Only $85

AMRAD NEUTRODYNE

"The Voice of the Air"

AMERICAN RADIO AND RESEARCH CORPORATION

Dept. Q Medford Hillside, Mass.
Panels That Produce Results

A superior panel will increase the efficiency of your reception through reducing surface leakage. You can be certain of this if your set is built with

Electrasote Panels

These beautifully finished panels will neither warp nor change color. They are scientifically constructed to reduce surface leakage to a minimum, hence assure increased efficiency of the set.

One of the famous "sote" products introduced by The Fantasote Company, Inc., Electrasote Radio Panels are sold strictly on their merits—yet are

Lower Priced

than other standard panels

Make your Set an "Electrasote Panel Set"—and get results!

On Sale at good Radio Dealers

M. M. FLERON & SON, Inc.
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Is it distance that you want in a radio? A Crosley will put it—the smaller models with earphones, the three tube 54 and T Shure on a loud speaker.

Do you desire ease of tuning? You have it with a Crosley. It is child’s play to locate new stations. After they are logged, you can immediately bring them in.

Do you wish economy of operation? Because they use the famous Armstrong Regenerative principle, Crosley Radios require fewer tubes. Because of the fewer tubes, they consume less battery current. Is price a factor with you? Crosley Radios, each in its class, are the least expensive ever offered. Quality production allows these low prices without sacrificing in any way the very great efficiency of the sets.

No Matter What Appeals to You Most In Radio, You Will Find That Point Outstanding in a Crosley.

Tridyn Regular

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Your choice will be a Crosley
For Sale by Good Dealers Everywhere
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Established over 60 years

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Best for Reflex

and Crystal Sets

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Double Adjustable
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No more searching for the sensitive spot. Merely turn the knob as you would a dial.
For base or panel mounting complete with Freshman Tube-Oscillator $1.50.
At your dealer's, otherwise send purchase price and you will be supplied post-paid.

CHAS. FRESHMAN CO., Inc., Freshman Bldg.,
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DE FOREST
Leads again
Another jump ahead!
Just out—First in 1925

DE FOREST'S greatest triumph.
A truly remarkable advance in ease of operation—beauty of tone—selectivity—distance range.
It uses tube detector instead of crystal.

You should see and test this instrument before you buy any set. Its refinements and improvements are too many to tell here.

Ask your nearest De Forest dealer to bring it to your home and show you how simply and perfectly it operates. It will be hard for you to let him take it away.

Price range, $125 to $200
Minnesota Man Claims 2-Tube Reception Record with Lopez Low-Loss Tuner

"Edward C. Connelly of Breckenridge, Minn., claims the greatest reception record in the Northwest during International Radio week with a two-tube set. His reception record is as follows: Madrid, Aberdeen, Birmingham, Lyons, Newcastle, Rome and stations in Porto Rico and Mexico City. Mr. Connelly assembled the set himself."

—Reprint from Minneapolis Tribune

As he used dry cell tubes, which give about 75% of the signal strength secured with 6 volt tubes, he attributes his record to the

LOPEZ LOW-LOSS TUNER

Exceptionally well made
Rigid Inspection
Minimum Insulation
Broadcast Type, 200 to 600 meters
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Circuit diagram, panel drilling template and instructions with each tuner

PRICE $10 each At your dealer’s or sent direct, postpaid

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We Repair All Standard Makes of Tubes, Including
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RADIO TUBE EXCHANGE, 200 Broadway, New York
All Mail Orders Given Prompt Attention
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Less QRM
More DX
No More
"Break-Down"

TRANSMISSION CONDENSERS
For Radio Filter Circuits

Are you tired of "break-downs"? Here is a special, high-dielectric, low-loss condenser that will end your troubles. Under test at double their rated voltage, their phase angle does not exceed 20 minutes—which means a loss of not over 1/2 of 1%—or an efficiency so close to 100% as to be negligible. With National Electric Condensers you send out less QRM and gain the good will of every BCL around you. And you get more DX because a properly designed filter circuit gives a clearer, more understandable note.

No. 1, 1,000 V. DC Service, per 2.5 mfd. condenser ... $7.00
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Order direct by letter or use the coupon.

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Gentlemen: Ship C. O. D. the following:

No. 1 Condensers at $7 each.
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Write your name and address plainly in space above.

Imported Insulators from Germany

Germany has been famous for the production of high-grade porcelain. These insulators are pure white glazed 5 inches long.

25c Each
Sent Parcel Post upon receipt of price.
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Rugged construction fine screw adjustment Very heavy ribbon.
Just the thing for short waves.
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Rauland-Lyric is a laboratory grade audio transformer specially designed for music lovers. The price is nine dollars. Descriptive circular with amplification curve will be mailed on request. All-American Radio Corporation, 2842 Coyne St., Chicago.

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TRANSFORMER

The Choice of Noted Music Critics

NOW $3.50
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Direct from factory to you.

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4000 MIL. AMPS. CAPACITY

FOR A LIMITED TIME ONLY
The new purchase for $3.50 a 12 cell 4 volt RABAT SENIOR BATTERY. Saving $1.00 through direct shipping.

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220 vat, powerful magnets and will harmonize with our Radio Set. Develops cells and a pure sound. Also greatly reduces storage and normal losses. A standard for all battery needs.

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A compact and efficient method of storing the energy of your battery. Shipped complete ready to connect within your set. When empty, simply plug in the Super-Charger and it is charged.$1.00 in cash.

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Transmitter and Receiver Complete


MERSHON Electrolytic Condenser
36 Mfd.

METER TESTED
radio crystals

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The Only Tuner That Can Be Mounted Into Any Previously Wired Set

Without Changes — or can be substituted for the coupler you are now using. These Lorenz System basket weave Radio Low-Loss Tuners are the most efficient yet devised.

Type A - Single or Double Circuit ................ $6.00
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A new departure in radio apparatus. Designed for radio circuits exclusively with advantageous features possessed by no other jack on the market. Their infinite low capacity merits their use. Wiping contact is of extremely large area under a maximum tension. Radjo Jacks are small and compact, requiring very little space.

The Line Consists of Five Jacks and Three Switches. Write today for interesting literature giving complete information regarding Radio Low-Loss Products.

THE SHARP SPARK PLUG CO., Wellington, Ohio

"Sharp" Products—Licensed Mfrs. JOBBERS, DISTRIBUTORS—Write for our Proposition

The Sharp Radjo LOW LOSS TUNER

The 100% Self-Shielded Transformer

has made a big hit with both set makers and set manufacturers because of its small size, its amazing volume, and most of all, because of its pure undistorted tone. It is half the size of other transformers, but its results are unequalled. Absolutely new and scientific design and construction. Rated 1 to 3, 1 to 4, 1 to 5 $3.50. Ratio 1 to 10 $4.50.

SEND FOR BULLETIN No. 91. Read all the exclusive features of this and other transformers. Tells how to gain free hook up diagrams beautifully printed in two colors.

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A condenser is no more efficient than its weakest feature—a thought borne constantly in mind in designing and making U.S. Tool Condensers. As a result, the gradual perfecting of each part has lead to the nearest point approaching condenser perfection. Ask your dealer to show you Type 6, with the micrometer dial.
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Six cents per word per insertion in advance.
Name and address must be counted. Each initial counts as one word. Copy must be received by the 1st of month for succeeding month's issue.

YOUR RADIO—WHAT IS IT? SIMPLY A FORM OF AMUSEMENT? OR THE FULFILLMENT OF THAT AMBITION TO EXCEL? YOU DEMAND THE BEST. BUT HOW TO ORDER A PLATE THAT ISN'T A WASTE IF YOU—NOTHING BUT AN EDISON B—THE 8ML KIND, PRICED FOR RESULTS, NOT JUST TRIMMING. GET IT FROM YOUR NEXT DOOR MASSEY--KICK-STARTER FOR THAT LOLOSS SET) $82.75. 100 VOLTS (JUST RIGHT SIZE) $10.00. 130 VOLTS $25.00. 150 VOLTS $28.50. COVETED CABINET WAX FINISHED. RUBBER MAT. LARGEST EDISON ELEMENTS CAREFULLY WIRED WITH PURE SOLID NICKEL GENUINE EDISON ELECTROLYTE (THE ONLY WAY) THICK FLAT BUMPS. 105 VOLTS $35.00. OTHER VOLTAGES. STATE UNIVERSITY CARDS HAS 600+ CELLS. SINGLE FILLED PARTS. 240 rms READY TO WIRE. 200+ WIRE DISCOUNT. 1200 VOLTS UP YOUR EDISON B WILL WORK—IF MADE FROM 8ML SURE-FIRE PARTS. LARGEST LITHIUM POWER ELEMENTS 6c, DRILLED 7c. WIREPED WITH PURE SOLID NICKEL 10c PAIR. G ELEMENTS 4c PAIR. 2 POSITIVES. 1 NEGATIVE 3c TIP AND 2M. 1½" TIP AND 1½" BOTTOM. 1½" x 6½" 5c. LIFE INSURANCE POLICY FOR YOUR B, WIRE WITH $35 PURE SOItID (NOT PLATED OR ALLOY) NICKEL WIRE 15c FT. AMPLIFIERS, TRANSMITTERS. FOR THE SUPERHIGH AND HIPOWER TRANSMITTER A STILL HUSKIER CELL—SUPERCELL—3000 MAMLP HOUR CAPACITY. 100% POWER 100% LIFE. Fits TUBE GLASS TEST TUBES INDIVIDUALLY WRAPPED ¾ x 6¾". 1 x 8¾" 4c. SHOCK PROOF 1 x 6¾" FLAT-BOTTOMED TYPES. 1½" 7c. 1½" x 6½" bottom 5c. LIFE INSURANCE POLICY ON THE OTHER. EASILY Charge IT WITH A WILLARD COLLOID RECTIFIER. SMALL 50 VOLT SIZE 3c. JUMBO 150 VOLT WAVE COLLIOID 25c SMALL $4. LARGE FOR HI-CAP CELLS 50c. CHARGES 100 VOLTS ALL IN ONE BITE. USES BOTH HALVES OF CYCLE. HAVITAGE TUNED VIBRATOR CHARGER INSTRUCTIONS 50c. EVERYTHING FOR THAT EDISON R. FRANK MURPHY—RADIO 8ML 4837 ROCKWOOD ROAD, CLEVELAND, O.

WHY SUBSCRIBE FOR QST? FOR STATION EFFICIENCY. SURE, READ QST, THEN GET IT FROM 8ML. DON'T CHOOSE THOSE SIGNALS WITH A GRIMY AERIAL. TRY THE BUS WITH THE OLD BUS WITHOUT GAS—NOR THE B ROAD GLASS WITH METAL CLAMPING RING, $1.75. READY TO WIRE. 2½" BOTTOM HEAVY FLAT BOTTOMED GLASS JARS. 105 VOLTS JUST RIGHT SIZE. WITH ORDER. BERNARD T. STOTT. 60 PALLISTER AVE., DETROIT, MICH.

REAL BARGAINS 100 volt Todd Edison B Battery 12.50, 140 volt Kimley 16.00. Both have front panels. UV1714 R.F. Transformers $8.00. UV1716 for superhet $5.00. R3 Magnavox $17.50. Shipped COD. Van Bantam, Helena, Mont.

We bought $10,000. worth United States Government Aircraft Department Radio Transmitting Receiving Sets (with all lights on board) for $9999.00. We bought $10,000. worth United States Government Aircraft Department Radio Transmitting Receiving Sets. We are AMPS AT TEN VOLTS. PLENTY OF THEM IN OUR STORES. VOLTAGE $15.00. 150 VOLTS $20.00. BOTH HAVE FRONT PANELS. READY TO WIRE. DISCOUNTS DRESSED UP IN THE STOCK, PRICE $35.00 FOR FT. WORTH. WE ARE PULLING FOR U.S. BARGAINS 100 volt Todd Edison B Battery 12.50, 140 volt Kimley 16.00. BOTH HAVE FRONT PANELS.

TALK TO ONE OF OUR THROUGHLY SATISFIED CUSTOMERS, THERE'S THOUSANDS OF THEM, IN CHANGING FROM FIVERS TO FIFTIES THERE Isn'T A SINGLE PART TO DISCARD ALL IN THOSE PARTS, SUCH AS NO. 50. WATT SOCKETS $2.50 LARGE GRID LEAKS. $1.65. ONE MFD 1750 VOLT TEST FILTER CONDENSERS $2.50. 30000 VOLT 800 PLATES AND GRID CONDENSERS $2.50. ACME PLATE, POWER, AND FILAMENT TRANSFORMERS WITH SEVERAL MODELS OF EACH TO CHOOSE FROM. BUILT TO ORDER, SHIPMENTS IMMEDIATELY ON ORDER. WE ARE READY TO FULLY MEET YOUR NEEDS, WILL BE ABLE TO FILL YOUR ORDER. REAL BARGAINS 100 volt Todd Edison B Battery 12.50, 140 volt Kimley 16.00. BOTH HAVE FRONT PANELS. READY TO WIRE. DISCOUNTS DRESSED UP IN THE STOCK, PRICE $35.00 FOR FT. WORTH. WE ARE PULLING FOR U.S. BARGAINS 100 volt Todd Edison B Battery 12.50, 140 volt Kimley 16.00. BOTH HAVE FRONT PANELS.

MAKE YOUR NEUT REACH OUT—Same panel, same layout, fewer parts. Our $5.00 Kit includes the one different part, 22 feet real gold sheathed wire, lithographed original Kludge diagram, and complete simple instructions. Nothing else to buy. Give selectivity with deep, resonant volume, NOT obtainable elsewhere. We originated this end run name score of buyers it has delighted. Satisfaction guaranteed. Details $10c. Kit prepaid anywhere $5.00. New 48 page catalog, thousands of items, many exclusive for station. We accept postage stamp same as cash. KLAUD RADIO LABORATORIES, Kent, O.

HI Mr. Fan! DON'T LET THIS REAL BUY GET BY!—Brand New UV-202 Radiotrons (5 watt tubes) regular price $4.00; MY PRICE $3.00; only post office or express orders accepted. V.F.P. Box 931, Egersvall, N. Y.

What are we offered for the following material: all in lowest wholesale condition: a. QM: 1 Model A Type MT4 Magnavox Tone Arm 1. Thordarson Type R 1/2 KVA Transformer: 1 Thordarson Type R 1/4 KVA Transformer. Wireless Oscillation Transformer. No reasonable offers refused. M. E. Emron & Son, Inc., Trenton, N. J.

RADJO LABORATORIES: Kent, O.

RADIO Join our Sales organisation and make big money! We want a man in every county to sell well-advertised sets and parts made by the best manufacturers. Widener of Kansas City makes $150.00 weekly. You can do as well or better. Write today for catalogue and samples. National Radio Advertisers, 111. W. Grand Ave., Chicago, Ill.


ESPHERANTO! Learn Esperanto and communicate with Radio Fans all over the world. Our free sample lesson contains 1000 words, 1000 illustrations and demonstrates how easy this language can be learned. Send for it now. Benson School of Esperanto, Inc., 20 Mercer St., New York. N. Y.

"Low loss self balancing radio frequency coils $1.50 each; 100 volt used Edison element welded H. battery cells, wax moulded in wood box with Farnsworth connections $18.00 each or $60.00 a box. Beethoven Co., Inc., 175 Centre St., New York City.

"radio Call PINS" 25c. Your Station Call in Solid Gold Letters on tiny 50 watt tubes! 2.50 each. Write R. C. Ballard, 1922 W. Sunnyvale Ave., Chicago.

ARRIVED TOO LATE for Christmas—50% discount from list price! Grove Co., 5, 10, 12, 15, 18, 14 RORD RORN. All absolutely new in sealed boxes. Reference QST. Cash only, shipped prepaid. Address Mr. Larry Healey, 531 Continental Ave., Detroit, Michigan.

SAVE 20% on Everything from List Price. On all Standard Radio Merchandise. No exception. Every type and manufacture, from complete sets to parts, tubes and loud speakers, including Atwater Kent, Cunningham Radiophone, Fada, Western Electric, etc. Mail orders promptly filled: 10% deposit with each order. On orders over $25.00, 25% deposit is required. You may pay in only one of our Authorized Economy Radio Sales Co., P. O. Box 99, Station O, Department 28, New York, N. Y.

RECEIVING AND TRANSMITTING ACCESSORIES. WHAT DO YOU NEED? I HAVE IT OR CAN GET IT FOR YOU QUICK. PYREX SOCKETS $1.40 AND PYREX ANTENNA INSULATORS $1.00. WRITE FOR COMPLETE LIST. CASH IN ORDER FROM THE SIXTH DISTRICT HAM AND SAVES MONEY. J. F. DAVIDSON, 6CEK, BOX 216, KINGMAN, ARIZONA.

New General Electric 1/2 H.P., 110-220 Volt 60 cycle 1750 R.P.M. Single phase repulsion induction motors. These are late type 40 degree continuous duty motors all in original boxes. Prices $5.50 each F.O.B., Chicago, Ill., with order, balance C.O.D. Quantity limited. Also other stations. Queen City Electric Co., 1784 W. Grand Ave., Chicago, Ill.
ATWATER KENT Parts at one third off list. If you want a real cooker here is your chance. Send for list. Shipped C.O.D., Van Hornice, Helena, Mont.

RADIO SALES MEN and SET BUILDERS—We need you in your town. If you are reliable and well known in your community, we will appoint you our representative and furnish you with standard well advertised sets and parts at prices that will enable you to sell at a handsome profit. Write at once for catalogue and sales plan. Waveland Radio Co., Div. 45, 1027 N. State St., Chicago, Ill.

1 UC181 400v variable TRANSMITTING COND. with DIAL—$2.00, S.P.D.T. 17 in. 100 amp. 600v LIGHTNING SWITCHES—up. If you are reliable and well known in your community, we will appoint you our representative and furnish you with standard well advertised sets and parts at prices that will enable you to sell at a handsome profit. Write at once for catalogue and sales plan.

WANTED—4KW, 110 volt or 220 volt, 60 cycle generator. Mann Engineering and Research Laboratories, Grantwood, N. J.

WANTED—honesematic coils—all sizes, also long wave receiver—describe fully—Baina, IWB.

SELL CHEAP—200 watt transformer, pair "G" tubes, signal change over switch; aerial millimeter; real equipment—write, Harold Firle, Fort Dodge, Ia.

SUPERHETS—everything for that Superhet. UV1716s 2150$0 half price. All parts guaranteed, Transportation PAID. Write for special bargain list. Nearly all original package stuff. 25 cents more on any radio material. WANTED—no. 2 Omnigraph, Ryan Shoe Co., Hannibal, Mo.

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WANTED—1/2 H. P. SINGLE PHASE 110 V. 60 CYCLE MOTOR—$10Q.

FOR SALE—Grebe CR 5, $35.00; Grebe CR 8, $40.00; Grebe amplifiers, $20.00; Guaranteed, half cash, bal. C.O.D.—J. Wilson Morrow, Wernersville, Pa.

"SHIX for a REAL QRT.

Fifty Watter New $18.00. U.P. 1015 Transformer New $5.00. R. 3 Magnavox $17.00. 7A Power amplifier with tubes. First order gets these bargains. 2 U.K.J., Russell, Kansas.

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HIGHEST OFFER TAKES—one fifty watter—NEW—H. W. Ammeter—$4.00 ohm grid leak: Acme trans., 1500 v.; Two Mercury Cond.; one Neutrodome; one—1/2 K. W. uses; Practical H. P. motor 3000 RPM; C. Wiehe, 105 W. 61st St., Chicago, Ill.

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1-60 watt W. E. Seg. C. Tubes brand new. Guaranteed perfect article. Money refunded if not as represented. $5.00 each. C. E. Nothnagle, 1Z12 es 1PA.

FOR SALE—10D Western Electric loudspeaker—Harvey Griffin tube; D-10 DeForest Reflex Receiver; Baldwin Vacuum Tube Radio; American Electric Aviation Phone; Stromycro Carlson phones; Baldwin Phonograph attachment; VT-1 Signal Corps Tubes; Radiotron; Amplyflex AF transformers; DeForest RC Mounting; RCA CW transformers; Microphones; Weston meters, 160 A; Pada; Power amplifiers; Radiola V. IV; Federal 59, bargains; Robert Scaring, 1213 Gray Ave., Urbana, Ill.

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SACRIFICE MUST SELL. Kennedy Universal 110 and 525 Amplifier $80.00, cost new $170.00, excellent condition. Circassian Walnut Cabinet, same as advertised in January 41, page 65. ACT QUICK. George Bryce, Bristol, Conn.

HAM SUPPLIES—A-G-Q HEARS NEW ZEALAND ON ROICE 101A TUBES—SO CAN YOU $2.50, ROICE 5 WATT TUBES $1.00, C-G 191A SPECIAL TUBES $1.79, JEWELL 0-500 MILLIAMMETERS $8.95, 0-150 VOLTMETERS $8.95, No. 12 ENAMELED WIRE CENT A FOOT, WARDWELL ALUMINUM WIRE SQUARE 24G, "CP" SHEET LEAD SQUARE FOOT 85c, "S" TUBES PAIR $20, CARDWELL .00025 CONDENSERS $3.00, MAERCH 10" PLATE GLASS INSULATORS 50c, B. W. J. R. ROYAL OAK 5" Tubing, A-Q-C-5-R-V. 1109 EIGHTH AVENUE, FORT WORTH, TXAS.

Plate Glass Panels at reasonable prices, beautiful, distinctive. Radiola AA 1520 3 watt continuous wave, always mentioned for the short wave tuner. Get your own for $2.75, sold at the regular prices. Their quality and workmanship is guaranteed new and perfect, $250.00. 1 and 2 Micro- 

WIRE, WIRE, WIRE. They want to know at the factory how Johnon up in Waseca can use so much of it. We'll sell them—it's because the Hams like the stuff, they like the price, and they like the service. Price of copper's going up tight, but No. 12 solid enamelled wire is still $8.95 per thousand feet here, and 75c per foot here, with all the copper in the United States. All wire is guaranteed and $5 per thousand or 55c per hundred. Maxon wire too, any size from 10 to 20. No. 16DCG for ex-

STANDARD NAVAL ELECTRODE INSULATORS, guaranteed new and perfect, 12 and 18 inch strain type, $1.50 and $2.25 each respectively, 7½ inch disc type, $8.25 each. Several sizes of Naval-glass guaranteed new and perfect, $250.00. 1 and 2 Micro- 

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mitting parts. All in perfect condition. Paul Ring, 199 Mass Ave., Boston, Mass.

USE BETTER HAM STUFF AND GET MORE PB REPORTS. IF YOU BUY CHEAP STUFF NOW YOU WILL BUY BETTER LATER. SO BUY 1ST. WE SUPPLY HAM EXCLUSIVELY. PYREX INSULATORS, SWITCHES, METERS, ANY TYPE AND MAKE. HARDWELL TRANSMITTING COUNTERS, POWER UNIT TRANSFORMERS, TUBES, CHOKES, MOTOR-GENERATOR SETS, ESCO, COMPLETE TRANSITTERS RECEIVERS. WE BUILD INDUCTANCES OF ANY TYPE COUPLED INDUCTANCES. $11.50, SPEECH AMPLIFIERS TO GET THAT FONE ACROSS. "S" TONES IN YOUR BOX COMPLETE ANYTHING SHOWN IN TYPE AND MAKE. CARDWELL TRANSMITTING EQUIPMENT.
FOR SALE—UV902, 5 watt radio tubes, power tubes and three dollars each; (Limited supply 1000) these tubes new made. Morris Engineering and Research Lab, Grantwood, N. J.

GREBE 15 New; first check for $35.00 takes it or will ship D.D.A. St. E. Grebe, Sedan, Kan.

FOR SALE—an 80 w. transmitter complete with 2-500 volt power tubes. Type 15 mount is ready to work—fine DX record $175.00, Louis E. Sowers, Jr., 126 N. 4th St., Clinton, la. Radio 9DXD.

CHEMICALLY PURE ALUMINUM 1/2 inch $1.30 1/16 inch 90 cents sheet lead $3.95 per sq. foot, postage paid. Geo. Schults, Casumet, Mich.

EDISON ELEMENT storage B batteries assembled and wired—save you time, trouble and worry; only first grade elements using 100 volt, type "A" tube in oak case, $12.00; super-heterodynes and neutralites need a heavy duty B battery; 3 positive and 2 negative plates in a 1" container answers the question: 100 volt heavy duty type complete, $16.50, 140 volt, $24.00, sample cell free! every guarantee written; for complete list of batteries and parts.


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Flash sets, bombarding outfits, high frequency furnaces. Our bombarding outfits just the thing for the independent. Morris Engineering and Research Lab, Grantwood, N. J.

OMNIGRAPH WANTED—five type, condition, number of dial, and price. Geo. Bowman, 1838 Del Mar Ave., Fresno, Calif.

FIVE WATTERS—see last month's ad, also look for next months. Sent to you C.O.D. $3.50 and parcel post. Your money back if you are not satisfied. Don't go on for weeks with your head in your hand that you have TO pay a high price for a good five watter. $3.50 is enough and we will prove it. And by the way, did you have a higher price on a money back back and MAYBE. Almost once. RADIO VACUUM TUBE COMPANY, 55 Halsey St., Newark, N. J.

RADIO CORP. BARGAINS, METERS, ETC. Look at these Prices—Meters UM533 $2.25, UM578 $10.25, UM579 $11.45, UM580 or 581 $19.25, UP1653 Power transformers $19.05. UC1015 Condensers $2.25. 600 volt Westinghouse ground switch $1.60. Write us for others. A real ham store. The Radio Service Store, 108 E. Front Street, Bloomington, Illinois.

HAMS: Get our Samples and Prices on Printed Call Cards made to order AS YOU WANT THEM. Radio grams 25 cents per 100. Hinds & Edgerton, 19 S. Wells St., Chicago, Ill.

FOR SALE—SOME MEYERS TUBES NEW. $2.95. Trimp, 928 Cortland St., North Bergen, N. J.

2BCA transmitting cond. W.C. 1311 John Firth 0-600 DC volt meter. U.P.1386 600 volt 525 watt B.C.A. Hi-voltage transformer. RCA 5 watt sockets, W trade for fifty W.E. or R.C.A. Best offer takes them. H. C. Block, 1 Oak St., Ypsilanti, Mich.

REAL HAM WAVE METERS, range 50-250 meters, built the way QST says is right, in a 9 x 7 cabinet, accuracy guaranteed within one percent, curve chart furnished. $7.60 postpaid. Edward Bromley, Jr., Whitehaven, Wash.

EDISON A BATTERIES FOR SALE. BATTERY CONSISTS OF 8-8 CELLS WITH NEW CASE, SOLUTION & CONNECTORS, IN PERFECT ELECTRICAL & MECHANICAL CONDITION. CAPACITY 300 AMPERES at 6 TO 8 VOLT, MANUFACTURERS PRICE NEW $180. MY PRICE ON A FEW SETS $100. DETROIT COMPLETE BATTERY WEIGHS 150 LBS. R. T. STOTT, 50 FALCON TWR AVE., DETROIT, MICH.

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100—GENERATORS, GN2—$10. special price in lots of five. Kenetics $2. UC1831 transmitting condenser $2. UC1879, $2. 600 volt 10 amp. Western Electric condensers inid $50. 1/2 mid. 0.05 amp. 100 volt, choke $1. Bakelite lead insulators signal corp. 50. Telefunken detectors standard base 6V. Radio tubes $92. 2 tubes $25. 4 tubes, General radio 8-12 stage inductance. R. Wood, 88 WAY AVE., CORONA, N. Y.


FOR SALE—RC parts for twenty watts, half horse A/C motor: telescopr, omniograph, four foot lattice. All cheap. Lewis, Proshl, Va.

WANTED—Model FOUR CORONA typewriter, first class condition. C. T. ASMUSSEN, 180 Marstall St., West Lafayette, Ind.


NEW UP1257. 40 henry 300 millihamp choke coil. $8. Also used 200 watt trade for filament transformer. A Carr, Leon, Iowa.


SELL—neutralytes, five tube, best parts $30.00; audio- transformers, two filament, best offer. Robert McCracken, Guaynoba Falls, Ohio.

PUREST VIRGIN ALUMINUM FOR SALE. PARTICULARS UPON REQUEST. 2EM.

NOTICE—A card from anyone hearing 3SD or 3XX will be appreciated by the owner of these stations. All apparatus is being used. C. A. Johnson, 5332 Gainor Road, Wynefield, Philadelphia, Pa.

Rotors, hard rubber for three inch tubes. 50 cents each. Bakelite tubing 3" by 5/8" drilled for rotor shafts; also all hardware for quick assembly, Quality prices. The Carter Mfg. Co., East Cleveland, Ohio.

—PEPPO—"Non plus ultra"—PEPPO puts a lasting and tremendous"Kick" in ur Edixon "A" and "B" Busses A set of "PEPPO" and an itter"Membrane" solution, enough for ur 30 cell one hundred volt "B" batt. Price per can 1 1/2 lbs. $1.25. We sure and get "PEPPO" and refuse all weak and worthless substitutes. RADIO-TEST-TUBES especially strong constructed 3/4 x 6", 3 each; SUPERIOR ELEMENTS 6c per pair, direct price. A.G.C. Model 6c per set, and $1.00 1/2 each; PURE NICKEL WIRE 1 1/2 feet. Everything pre- paid, attach remittance to order. Prices on all other Radio Sets and Equipment upon request. Northwestern Radio Laboratories, Inc., 21 E. 50th St., New York, N. Y. Manufacturers and distributors of "PEPPO", 1895 Taylor Ave., Detroit, Mich.

CALL CARDS mostly printed with YOUR Call Name and Address on back. Black printing, quality cards. Latest Design (New Postcard backs) 100—$1.45; 200—$2.25; 300—$2.95; 400—$3.75; 1000—$6.45 PREPAID. RADIO- GRAMS: Name, Address. Call 706—716; 200—$1.45.

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WHILE THEY LAST—Kennards original short wave articles in September, October and November numbers of Amateur Radio. Sent postpaid for 50 cents or free with a subscription $2.00, Executive Radio Council, 136 Liberty St., New York, N.Y.

RECEIVING AND TRANSMITTING ACCESSORIES. WHAT DO YOU NEED? I HAVE IT OR CAN GET FOR YOU QUICKLY. JUNKETS, LOGS, and PYREX ANTENNA INSULATORS $1.50. WRITE FOR COMPLETE LIST. ALL SHIPMENTS C.O.D. ORDER FROM THE SIXTH DISTRICT HAM AND SAVE MONEY. J. F. DAVIDSON, 3 CEE, BOX 219, KING-MAN, ARIZONA.


SPOKEN ESPERANTO FOR BEGINNERS—class textbook. 52 p., $0.50, 2, $1.00. Norman Frest, 12 Ash Place, Cambridge, Mass.

FOR SALE—100 watt CW and phone set; 20 watt CW and phone set; 150 watt 1500 volt motor generator. Complete transmitting outfit. All in first class condition. 1 AET, 145 Rockwell St., Norwich, Conn.

SUPER-HET—2 tube Experimenter Model C $150.00. Cardwell condensers—chased sockets—UV1716 trans. in walnut cabinet—will ship C.O.D. subject to examination. Transmitter—DeForest OT5 with two Kenotron and one UV222 $76.00. Root's Radio Shop, Galva, Ill.

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QA9D—Lee Charette, 17 Wamesit St., Lowell, Mass.

QFW Richard Fontaine, 65 Davis St., Revere, Mass.

QASN—A.L. Budlong, Glastonbury, Ct., address at Headquarters: IDQ, J. M. Clayton, dittos; I0X, L. W. Hatry, dittos, 12AQ, 10A, S. Krause, dittos.

Q8H—Roger M. Spleen, 7 Miller Ave. Holyoke, Mass.

QB—Roy Phelps, 2129 Clave Ave., Grassmere, Staten Island, N.Y.

QA9F—Ludwig Leuf, 50 Gramatan Avenue, Mount Vernon, New York.

QOM—G. F. Robert C. Baumgardner, Box 5, Fort Eustis, Virginia.

QASU—RUSH P. POWELL, 41 Adams Ave., Montgomery, Ala.

QATH—Wm. W. Adams, Box 214, Center, Tex.

QAUD—Rawleigh H. Ralls, 629 E. Edwards St., Edmond, Oklahoma.

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*Always mention QST when writing to advertisers*
Brass Plates—Soldered Joints—Grounded Rotor

*Are Standard Features of the Bradleydenser*

The Bradleydenser is a low-loss condenser with many distinctive features that insure long life and high efficiency. For instance, the brass stator and rotor plates are soldered at all joints. The plates cannot become loose, corrode at the joints or work out of alignment. The rotor is mounted on a long sleeve bearing that supports the rotor plates without the use of an outer end-plate. Therefore, the di-electric material is reduced to two small buttons. This means low loss and sharp tuning.

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*Build for Efficiency*

This filter tuner with resistance-coupled audio amplifier is equipped with Bradleydensers. The tuning is very sharp and selective.

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Send for the latest information on the Bradleydenser. It will pay you to know about this remarkable low-loss condenser before planning your next radio set.
Observe the compact construction of the Bradleystat, shown below. Note the two columns of graphite discs, the pressure screw and the internal switch. Only two terminals, and yet the range is from approximately ¼ ohm to 100 ohms. The entire range is stepless and noiseless.

Graphite Discs provide smooth control

The Bradleystat is smaller than the UV-199 or C-299 tubes. It is much smaller than the 6-volt tube.

Bradleystat

PERFECT FILAMENT CONTROL

For All Sets and Tubes

The new Bradleystat has taken the radio world by storm. Thousands of radio fans have replaced their old wire rheostats, even in ready-built sets, with Bradleystats to get noiseless, stepless control, so essential in every radio set. The new Bradleystat is so compact, and the "one-hole" mounting so simple and convenient, that it is but a moment’s work to install the new unit. Furthermore, a Bradleystat-equipped set can use any tube without change of rheostats or connections.

The super-heterodyne receiver, shown above, is equipped with Bradleystats at 1, 2, 3, 5, 8, and 13. Within the set, they are mounted on the baseboard; the others are on the panel. A Bradleysleak is used at 4, a Bradleyswitch at 6, and a Bradleysimeter at 7. Bradleysdensers are used at 9 and 12, and micrometer dial control is obtained with Bradleysiers at 10 and 11. This Allen-Bradley-equipped set is typical of thousands of multi-tube sets using the new Allen-Bradley line for maximum efficiency. Build for better radio by following this example.

Please send me the latest literature describing the entire Allen-Bradley line of superior radio devices.

Name: __________________________
Address: _________________________

Allen-Bradley Co.
277 Greenfield Ave., Milwaukee, Wis.

Mfrs. of Graphite disc rheostats for over 20 years
No set is better than its Loudspeaker

The one big thing in radio is tone. If you are listening to music, you want the tone so exact that it carries over the very personality of the artist. If you are listening to speech, you want the human voice—not a “radio voice.” If you haven’t heard a Radiola Loudspeaker, you may not know how clear it can be.

Try a Radiola Loudspeaker on your set and you will get the finest tone the set can produce—as clear as on a fine pair of headphones, but thrown out into the room in full volume for the whole family to enjoy.

Radiola

RCA

Radio Corporation of America

10 So. La Salle St., Chicago, Ill.
28 Geary St., San Francisco, Cal.
The Traffic Department

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

Message traffic handling has taken on quite an increase during the last two months. In October we were around the 6,000 mark and in January we almost reached the 30,000 mark. The “DX Craze” is passing away as are the “rubber stamp” Q signals about QRE, QSA and QSB. Everybody seems to know that everybody else is QSB VY, QRE FB, and QSB OK and this all happens on the 75-85 meter band and we hope it won’t be repeated on the lower bands. From the way messages reach Headquarters, it does appear delivery has improved to a great extent. That is what we are urging all along—better message delivery and no messages to hang on the hook longer than 48 hours.

Last month 9ACI won the honor position with 355 messages. 1KV was a very close second with 338 messages. 1FM takes first honors this month with 370 messages. FB!

Two more members are added to the Brass Pounders’ League, and the number of messages shows an increase—we look for many additional BP’s next month.

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Above are all new Brass Pounders’ as no call appears this month that appeared last month. Does many who stick in the League each month? Don’t forget that Traffic Department Trophy which is mentioned on Page XV of February QST. The contest is on, OM, so get busy and see if you can win it. It isn’t going to be easy by any manner or means—it will take hard work to win it, but it can be done.

Your TM will be in the Pacific somewhere between the west coast and Australia about the middle of April looking for ham signals. More details next month, but the call of the floating station will be NBRIL on about 55 meters QRV all amateurs any wave any time—day or night. Listening will be done on all amateur bands. Probably 20 and 40 meters in daylight and 40 and 80 at night. Keep an ear out for NBRIL and send all reports of reception of two-way work to the U.S. Naval Research Laboratory, Bellevue, Anacostia, D.C.

On March 15th, our first attempts at regular weekly day light transcontinental work will be started, to continue each Sunday thereafter. For the present, we will undertake this transcontinental communication on 40 and 80 meters, with as many routes as possible. Division Managers are to observe routes through their divisions and make them as flexible as possible. In reporting communication and contact, mention should be made of the wave-length used in each case. Every amateur should be prepared to make use of these routes for message traffic. Messages are to be started from your own station regardless of where you are located. The idea is to establish regular Sunday schedules for this work.

Reports for the month should be a decided increase in activity and since we have more space to present it, we call your attention to happenings in each of the division reports which follow.

What Is an O. R. S.—and Why?

By P. H. Quinby (9DXY), Midwest Division Manager

The Official Relay Station of the American Radio Relay League is an appointment that is causing more or less confusion in the minds of a large number of League members and brass-pounders. The hope of clearing up this confusion and explaining the subject will lead to the full satisfaction of all amateur finds today. Then it was merely a pleasure, and messages were forwarded in an easy and leisurely manner which suited the whim and convenience of the operator. If newspapers were not handy, the “hook” was often stripped to start the early morning fire in the shack. This caused many messages to go astray and were not delivered. It was beneath our dignity to mail them. They must go “in spark” or not at all. Of course there were many operators who felt the responsibility of clearing their hook and maintaining reliable communication but such was the exception rather than the rule. We all felt the need therefore, of placing a greater responsibility upon these stations and classifying them according to their reliability. So we conceived the idea of forming a regular trunk and branch line traffic system, the idea to establish regular traffic routes, criss-crossing the country in such a way as to maintain reliable communication in almost any direction.

These routes were worked out in detail throughout the various divisions and occasional tests were made to demonstrate their efficiency. In these tests messages were sent from ocean to ocean and answers returned in a remarkably short time. However, as the system expanded and the stations became more numerous, the appointment grew more or less common and lost some of its value and distinction.

The organization then began to lose its morale and with the oncoming of the war was, of course, completely disintegrated.

The development of radio during the war gave a new impetus to the game and the new organization jumped off to a flying start. Many new hams came on the air and appointments were granted right and left. If a man could handle a certain number of messages a month and made known his ability through his reports, he was granted an appointment without further questioning. This brought a large number of unreliable stations in our ranks, which naturally slowed up traffic and gummed the works. Something had to be done. Many complaints were received upon the unreliability of communication and laxity of message delivery. The conclusion was finally reached that a wholesale cancellation was in order so we wiped the slate clean and started all over again.

This time we compiled a set of iron bound qualifications and regulations for the O.R.S. that would make it difficult to secure in the first place, and impossible to retain in the second place, unless a certain definite code of action was rigidly lived up to by the appointees. The result was our present system of Official Relay Stations which has been in successful operation for more than a year.
The qualifications for an applicant are now as follows: He must be a League member in good standing, his appointment is cancelled if he allows his certificate to lapse, he must abide by the law, he must show a spirit of cooperation and loyalty, his reports must be regular, accurate and without exaggeration. He must report regularly and in time; his reports are made up of information given by O.R.S., and his cooperation is invited to make this a division which shines in the eyes of the public. "(Won't you please do your part, men?"

WASHINGTON,—The report of SAVJ came through direct to the D.M. via a kick, this month reporting 23 messages.

DISTRICT OF COLUMBIA—the beginning of the New Year finds approximately the same number of stations active as the month previous. Nearly everyone is down on 80 meters. 3HWT goes one better, however, and is able to quickly change from the 18 meter band to the higher frequency to break loose with a large traffic report. Hope he does. 3BWT reports working a couple of English stations this month. His working has been heard all over the country. He and old 3JJ are probably the only ones in the District who have made extreme efforts this month. 3BMT reports he is through. 3SH is one of the few who gave the 80 meter wave a try and went back to 20 meters. 3GJ reports he has been able to work the New Zealand this month for the first time and with a splendid report. If the regular reports from the Gang around Baltimore, and Long Beach are not forthcoming, we must assume they are busy getting new DX. 3KE reports activity is down from what the A.D.M. or O.R.S. worked in the past few months. 3KE, 3HB, 3SW, 3GJ and 3FJ, are two newcomers who are making out in their new location. 3GJ in his second mailing lists, etc., which we cannot take space to enumerate here.


NOTE: D. S. Oscar A. Hayek, Penna. Dist. No. 2, in a summary of work done in his district during 1924. This is an excellent idea and shows the interest taken by Rau's men.

MARYLAND.—A.D.M. Delchmann seems to have trouble getting reports in around Baltimore and the Atlantic Division. This is largely due to the fact that Maryland and in fact the complete Atlantic division, reports have been omitted for the past few months, and the fellows feel it has been a waste of time reporting to the A.D.M. under the circumstances. Maryland should consider the A.D.M. and write regularly with their A.D.M. regularly with activity reports, even if no messages are handled.

Traffic: 3BPP, 29; 3BWT, 19; 3PZ, 10; 3AB, 11.

This being the first report for this division that comes through the hands of your new manager, little time has been had to write personally to all the persons in the division, there are of course, many receiving reports, and the old standby Distric of Columbia and Eastern Penna. are the only ones coming through with complete reports. Old reports from O.R.S. have drifted through their slips and are included. In the future, all reports must go through the regular channels and particularly on time and its arriving late to be included. The regular monthly report will not go in. The new manager is going to insist on this so there may not be many surprises from the East in the next few months. 3SW, 3DQ, 3UZ, 3PB, 3PH, 3LL, 3DQ and 3SMO are all on the job and reaching out. Fine business and a great deal of credit in making up reports with very little to go on. The following has been made up from what the A.D.M. has been able to ascertain by listening to. 3AJD, with a big handle has no trouble working nightly with transatlantic stations. 3LG and 3MFM the same. They are most consistent. 3TE has worked DAS and has been reported in New England this month. 3WZ has been doing fine on the 80 meter band, 3SW, 3DQ, 3UZ, 3PB, 3PH, 3LL, 3DQ and 3SMO are all on the job and reaching out. Fine business but please report. 3SG and 3HE are doing fine on DX on the 50 meter band. 3SRU a new O.R.S. at Annapolis, Md., in Dist. No. 2, with two ops., both Commercial and Military, working Europe and sending out a fine signal. 3SG has been doing DX and reports he has worked Europe and sending out a fine signal. 3SG has been doing DX and reports he has worked Europe and sending out a fine signal. 3SG has been doing DX and reports he has worked Europe and sending out a fine signal.


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Traffic: 9IG, 9J; 9DW, 9.

There should be more O.R.S. appointed in all the division, and all those who have requested certificates and have not received them should please notify the editor. Every possible means will be taken to issue O.R.S. promptly, but the D.M. is just starting and a great deal of correspondence must be cleared up and with the present condition of the office it is impossible to answer anything until things are straightened out. He patient, fellows, write in your troubles and you will be taken care of.

WESTERN PENNA.—Dist. No. 9: Traffic reports are light this month due to two causes, the first one that most of the active stations were working as committees to the Pittsburgh convention, and the second being that A. W. McAulay, 9CEO, the D.M. of the D.S., has not had the opportunity to arrange the station lists for the district and get in touch with them.

A circular letter will be prepared and a copy sent to each O.R.S. in the district.

Much interest in the short waves is being shown, especially on the 410 meter band. Very few are down on 40 and it is believed that most of the stations in the 9th district, operating regularly, 80 meters seems to be popular on account of the fact that it would be well suited for the "watter bottle" and be more suitable for DX work in this section of the country.

His signs continue to get out well and were heard at Swedish SMYTT in full daylight (990 L.A.T.) and with only a 10 watt transmitter.

DX which seems to be so great in this section of the country.

Dist. No. 11: 9BCC is going good with a 50 watter and 9DQF is having trouble getting his out. His new 100 watt fone is working well but has put his "watter bottle" down to 80 meters. 9EJ has been working at 810 meters.

9DQF, 9; 9DRS, 9; 9GID, 9; 9O.T A, 9; 9KVL: 9.

SOUTHERN NEW ENGLAND—

Traffic: 9ACQ, 14; 9JEI, 16; 9DW, 12; 9EL, 17; 9IK, 15; 9IX, 2.

CENTRAL DIVISION

R. H. G. Mathews, Mgr.

INDIANA—Eibhart: 9YI, the star station, has made no changes, as his liver is poking out satisfactory. 9CXG is working both coasts with a "moonshine" tube. 9BSM and 9BON are waiting for new broadcast licenses. 9ABP is running a close second with 9BYI. (Whoop 'em up, OM!) 9BDI has his lone 50 watter still going and is better than the "5 watter bottle". 9DDZ is still hitting 'em with 15 watts. Napppance: 9APD says "bum report for the month due to trying to get the set down to 80 per. 9DRS has a 10 watt fone that has been heard lately in Massa­chusetts, Connecticut and New Jersey. Fort Wayne: 9AFY has been reported married. H1 AEK is better known as pre-war 8VA. 9H1L is the "Sensation of the Keenan Hotel System. His set was visited by 1P1 the other day. Says that traffic fell off for a few days after his rectifier failed". His daylight DX for the month was 9CVX, 29B: and 9AZK on the 29th.

99UAJ has been trying to get the set down to 80 per. That beats sending it by the ox ceart. 9BON has a 50 going on 150 meters. 9BJL has been doing some very fine DX this fall. 9BPT says that there is no DX this month and is working with 9BRT, 9EJU, 9EG and 9FJP all working steadily and all with a new LC transmitter. Marion: 9CIL has been appointed O. M. 9AZX is still without a antenna.

Dist. No. 2: 9FZ worked Australia, New Zealand, Great Britain, and France on a 50 watter. 9DYT has been working both coasts on one 5 watter and A.U. has worked the plates. All of the above stations are off now. 9DI is the most active station.

Indiana is sparkless now. 9AHE is working regular­ly on a 5 watter. He put a message into Port­land, Maine, over this station one night. That beats sending it by the ox ceart.

9BON has a 50 going on 150 meters. 9BMG is now working on 120 meters. 9CP is doing experiment work but handling much traffic.

9EM is off the air studying for commercial. 9BR, Prof. Abatz, has left, so there is no O.M. at Portland now. 9CIF is the new station of the "Kutban Hotel System. Albany: 9HUC has been doing some very fine work on 80 meters. 9BPT sold his old transmitter to 9EFZ, and has junked the spark, so

9AY is working on a new 10 watter. 9AK, 9BVI, 9BMG, 9BYR, 9CIE, 9CMF, 9DHJ, 9EJU, 9EG and 9FJP.

KENTUCKY—Things are going on well in the state with more stations in operation than ever before. 9HP has been the most consistent station for the past month. 9MN and 9ELL are doing good

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work on 80 meters, from coast to coast. 9M1 has been hearing Chile and Great Britain. Since 5W has meters he is using a couple bombs around the sixes and sevens. 90X is working all over town with a single circuit received and 15 volts on a WD 11, utilizing his set moving to another part of the town. 9BPR is a newcomer to the game, and has his 100 meter working from New Port, is regular. 9ALM has been issued to ex-SDAW, who is in Wilmore attending college. 9CDP and 9BML are both newcomers to the game, and are doing well because of burned out tubes. 9LH burned out his filament transformer trying to get tuned up. Will be QRT for a few days, 9JFR is still sending when time works don't QRM. 9EP is being heard on the other side consistendy. 9DWZ, with two 5 watters, is doing pretty good on 100 meters.

OHIO—Dist. No. 1; 9FU is still trying to get his set to put out a 150 meter range. 9SY is out for the rest of the winter due to loss of poles. 9FU is busy at college—little accomplished except experimental work on low waves. 8BO is on again. 8BN sends in a real report. He is working on 150 meters and ready for R.K. emergency. 9CIF is on again and handling quite a bit. 9DCA is going strong on 80 meters working the west coast regularly.

Dist. No. 4; STT knocked off 55 messages this month. 8QW and 8AKC, 8ACY and 88KM have been off the air most of the month. 8BQJ and his transmitter is building a new one. 9BBW is still on 40 through 85 meters now, and is working the west coast. He is sending the "green flannel underwear" with 47 messages to his credit. 9DJE gets to the coast west. 9RBC had a good total. 9JGI is new to Cleveland but has no antenna pole. His new QRA 80CB is not on very much, as he is changing to 80 meters. 8DFF is QEW college and is handing his resignation as C.M.

Dist. No. 2; The message total has increased a little this month, more stations are reporting traffic handled. 8ZE continues to work the west coast every time he is on. He gets reports from Australia and New Zealand with GRTY. He has had no luck working G5LF on schedule. 9DJE is on the air again and handling quite a bit. 9EAA is putting Cleveland on the map, having worked Europe 4 times. 8ACM, Cairo, Rico and Mexico. He is hearing so many Europeans that he doesn't know who to call first.

8DGP received a card from A3BQ and Scotland. 8BQJ is on 80, his meters are still on 170, but will be on 80 soon. 9DNP is breaking records with 17 ft. high antenna working on 40 meters every time he is on. 9DNP came up 8XZ morning with a fine 5 watts, and was therefore QRW for two weeks. He put the receiver in the back yard at his bedside and 10 minutes afterward logged 8F8Z and 8PCL.

Dist. No. 4; 8AIB is on 80 meters and working HIC. 8GWR's synk rectifier is knocing them cold. 8ZQ is in town again and working hard for an O.R.S. 8CVA works the west coast. 8ALW is still on 200. 8APR is on every night—good work for a night watchman. 8BDK got a set of "S" tubes and is going strong. 9SY is on 80 meters now, and was therefore QRW for two weeks. He put the receiver in the back yard at his bedside and 10 minutes afterward logged 8F8Z and 8PCL.

Dist. No. 6; We have two new O.R.S. this month, 8HAL and 8SHI both of Columbus, and both turning in nice totals. 8SYN continues to work a small set of European stations, but can't hear foreign stations, due to power. 8SHA and 8SHP have both worked N.Z., and 8RAU also worked England and France. 8SZ is doing some fine work on 20 and 40 meters. He is using a No. 500 Europe many times. (Keep up the good work, man. I'll join you when I hear you again.) 8D0 is now back and is reaching out FB.

Dist. No. 6; Activity in district No. 6. 8AK hand in his first report this month. He sent in a box for a 50 meter set for this month. SATZ has blown his eleven river and has a 50 meter working now. 8AAM hands in his first report this month. He has worked west coast stations with one 5 watter.

Traffic: 8AK, 323; 8BYN, 176; 8GZ, 113; SBN, 72; 8APR, 68; 8AUA, 62; 8TT, 58; 8ADA, 51; 8ANH, 47; 8HWB, 47; 8CJP, 42; 8DPN, 37; 8CCL.

IV

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not yet shown up. 9AKU is the only active station in Freeport.

Dist. No. 7: It has just been announced by the Chicago Radio Traffic Assn., that the "Third National A.R.R.L. Convention" will be held in Chicago this Fall, September 17th. It is expected this will be the largest gathering of amateurs ever held in the world. 9AAW is on 81 meters with pure d.c. He will soon be lower. 9AZL is back on the air again and is working on 20 meters with great delight, works all day and pounds the key all night. 9DKQ blew his fifty about the middle of the month and 9BEQ also blew his five watters so bought a fifty. (A 100 per cent optimizer. A.D.M.)

Traffic: 9CLZ, 158; 9DXL, 36; 9DQU, 79; 9ELR, 70; 9AIQ, 55; 9DQH, 50; 9CLA, 48; 9AW, 42; 9E40; 9DVW, 36; 9CHL, 34; 9AHI, 33; 9BRE, 34; 9AET, 27. 3RQ, 9WJ, 9. 9RFX, 17; 9MC, 16; 9AWL, 15; 9DXL, 14; 9AYE, 14. 9DZ, 14; 9DK, 14; 9DZL, 14; 9BUI, 12; 9ZAT, 12; 9DQ, 10; 9GK, 10. 9EGC, 9; 9GOA, 4; 9CSW, 3; 9BIZ, 2; 9AEM, 3; 9Al, 6; 9RQL, 6; 9EFQ, 4; 9AWL, 2. ATTJ.

MICHIGAN—Dist. No. 1: This district has some good traffic hustlers this month with 9DGT taking the lead. Don Mix says the R. Q. W. H. Supreme Council at Flint is getting along fine, and he has just ordered 1,000 new buttons for prospective members. 9ZS, 9WA and 9DOO all have been heard in Europe.

Dist. No. 2: 9CED bats over 100 this month. 6RCO is another 100 hitter. 9CED has been heard in Europe several times on 80 meters.

Dist. No. 3: A district meeting was held in Grand Rapids on January 17th. 9AJW reports the local A.R.R.L. Council is doing the right thing in the early hours. 9AYF held tests every Saturday night and Sunday morning.

Dist. No. 4: 9BAI brought in a good total of 160 messages while working short during the holiday vacation. He is still on the upper waves and has not had time to get down to the real DX section. He is now coming down to the short waves. 9DK, "some old bird," school QRM to 9AEU's emergency batteries, donated by Burney Battery Co. are working fine. 9ADP is knocking 'em dead on 80 meters for 9AKY, everything working. 9ARL has worked a bunch of stations in spare time but not much traffic.

Dist. No. 5: 9CIV moved most traffic in the district. 9BVA gets all over the U.S. on 80 meters but no European report from 9BVA to 9BVA in QRM. 9BZA, "Mr. & Mrs. A.R.R.L. Rabbit Hunt ever held in the world. 9BRK is on 81 meters with pure d.c. He will soon be lower. 9AZL is back on the air again and is working on 20 meters with great delight, works all day and pounds the key all night. 9DKQ blew his fifty about the middle of the month and 9BEQ also blew his five watters so bought a fifty. (A 100 per cent optimizer. A.D.M.)

Traffic: 9CLZ, 158; 9DXL, 36; 9DQU, 79; 9ELR, 70; 9AIQ, 55; 9DQH, 50; 9CLA, 48; 9AW, 42; 9E40; 9DVW, 36; 9CHL, 34; 9AHI, 33; 9BRE, 34; 9AET, 27. 3RQ, 9WJ, 9. 9RFX, 17; 9MC, 16; 9AWL, 15; 9DXL, 14; 9AYE, 14. 9DZ, 14; 9DK, 14; 9DZL, 14; 9BUI, 12; 9ZAT, 12; 9DQ, 10; 9GK, 10. 9EGC, 9; 9GOA, 4; 9CSW, 3; 9BIZ, 2; 9AEM, 3; 9Al, 6; 9RQL, 6; 9EFQ, 4; 9AWL, 2. ATTJ.

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V
MINNESOTA—Shouts of joy are heard at the return of the Brass Pounders’ League! Please notice that O. E. S. must report every month—no exceptions. A wholesale cancellation of O. E. S. is starting this month for the non-reporters.

Dist. No. 1: 9BAY’s pet 50 went west getting started on the 78 meter band. (His three page thesis on 2000 is almost completed.) 9D1V is reported from 42USC and IBS. is in a nice spirit. He is a man in the state for traffic this month, (9BD) 9D1V is doing nice work and expects to install S tubes. 9AYQ mourns the loss of a five watter, but the low wavers, 9EGU, and 9HMR, have been appointed. 9AYQ points out the 5 meter band. (His three page thesis on exchange with N.Z. He did it in November with a fine effort on his new job SR 0.M.) 9JGU is keeping right on with his good work. 9EGU continues to work all over the country on five watts on 80 meters. 9D1V is the only Waseca good on 15; 2EQ, 22; 9BSW, 5; 9AWM, 4; 9DSDP, 5; 9EGG, 3; 9MBS, 5; 9BTZ, 2.

Dist. No. 3: 9AXS still takes the lead for consistent DX. He has worked 2AC, 9ZRG, 9HRG, and two others. Several of the gang are rebuilding on low loss lines and are experimenting with the 20 and 5 meter bands. 9EGG continues to work all over the country on five watts. This district claims the most and best five watters in the country.

Traffic: 9AXS, 58; 9CAJ, 30; 9DMA, 30; 5COF, 24; 9D1C, 28; 9CYX, 25; 9PDF, 20; 9DQM, 15; 5JP, 12; 9EGM, 12; 9PTU, 11; 9BSW, 5; 9AWM, 4; 9DSDP, 5; 9EGG, 3; 9MBS, 5; 9BTZ, 2.

Dist. No. 3: 92T is the star station working numerous Z and foreign stations. 21 owls have been heard, including 2ZAC under his supervision. (9BD) 9AR has increased his DX with increased voltage capacity. 9DPD claims the honor of being the first Dakota division amateur to work 2AF. E. He did it in November with 5 watts. 9SW is getting good results using spark coils for plate supply. 9CAJ and 9CYX have had a little trouble. 9BDQ found the source of the trouble in a leaky power line. 9DMA has been back on the air. 9BFU blew a fuse, but is back with replacement. 9FWR reports little traffic. 9CAJ and 9CYX are operating on low loss lines and are experimenting with the 20 and 5 meter bands. 9EGG continues to work all over the country on five watts. This district claims the most and best five watters in the country.

Traffic: 9AXS, 58; 9CAJ, 30; 9DMA, 30; 5COF, 24; 9D1C, 28; 9CYX, 25; 9PDF, 20; 9DQM, 15; 5JP, 12; 9EGM, 12; 9PTU, 11; 9BSW, 5; 9AWM, 4; 9DSDP, 5; 9EGG, 3; 9MBS, 5; 9BTZ, 2.

NORTH DAKOTA—Unfortunately, the A.D.M. for North Dakota has found it necessary to resign on account of lack of time. He is at present taking over his father’s business, and may be with us at some time in the future in an active way once more. We want Bert Wick as an A.D.M. at present, but hope to hear his signals from 9AER frequently. A new election is being conducted at present for the new A.D.M.

9EE, Ellendale, has a transmitter going successfully on 80 meters. 9EAF and 9D1R are very active.

Traffic: 9DBR, 31; 9BZP, 19; 9AFM, 4.

SOUTH DAKOTA—Hats off to 9D1R, fellows! He works Australia with one lone flyer and with a low input he is making quite a name for himself. South Dakota is still among the leaders. The regulations are going to be enforced a little more strictly in the future, gang, so watch your step.

Those reports mean something, so let’s get them in and on time.

Dist. No. 1: Are you fellows going to let your D.S. be the sole A.R.L. representative in your district? Looks like it! 9GKT reports DX FB on the 160 meter band and rattles the cans everywhere, although hampered somewhat by snow. Some rumors are heard of a new station in Sioux Falls, but it has not materialized yet. 9GKT, 13.

Dist. No. 2: 9ASL works the west coast at noon thirty in the morning with 10 watts, and says he has his key elick conquered. Get his dope on a real filter that will increase your range. 9ASL wants the old man in before he moves back to his old stand, but the OW says, N.D. Says the old place may be ok for DX but “dubonuce” for everything else. 9ASL bawls up his new DX work and says the new man is on and ready for traffic. 9GTA still out of commission, but will be with us again in the near future. 9BDF, worked Australia on 80 on 1200 and 1800 hours with his new low and do well. 9HIB has new DX work and says most of Hiron’s DX work. 9HIB has his new generator and is back on the job.

Dist. No. 5: 9B1W has worked both New Zealand and Australia. 9B1W’s a message to 2AC, as usual, and has also been reported heard in England. Guess we can be proud of him too. 9B1W has rebuilt.

Traffic: 9GKT, 19; 9AGL, 38; 9ABY, 24; 9D6Z, 34; 9CS8, 26; 9T8, 8; 9BDW, 26; 9GKD, 18.

HUDSON DIVISION
E. M. Glaser, Mgr.

2AGR and 2WR have been appointed official broadcasting station. New O.R.S. are 2CVL, 2EQC, 2BQ, 2M7, 2AGM, 2ZB, 2BW, 2CSL and 2ABR. At the Second District Convention held in N.Y.C. the first week in March, there will be a Hudson Division Traffic Meeting. All officials and owners of O.R.S. are urged to be present.

Traffic: 9GKT, 19; 9AGL, 38; 9ABY, 24; 9D6Z, 34; 9CS8, 26; 9T8, 8; 9BDW, 26; 9GKD, 18.

NEW YORK CITY—2CVL is a new O.R.S. and is going to put out the finest DX ever heard by the Hudson Division. 2CVL is making B.C.L. sets 2CVL is going full force with the set pending daily. We heard the O.W. was very ill. (Hope recovery soon, Fred.) 2CVT, C. M. was the busiest station this month as usual. 2CVT has been ill.

BROOKLYN—Brooklyn is low in traffic but high in activity. 2CYH, C.M. is technical “KD” of a local paper and has his hands full. He hasn’t been on much. 2W5 is trying hard to improve that unreadable list. 2W5 must keep it up. Johnny, you’ll get there! 2CYT, on 75 with pure tone, has made reports from several foreign countries. 2EQ and 2ABR are still on 150. 2WC has a new 250 which he runs very well under normal. On 40 and 80 he can beat ‘em. (Mack—D.M.) 2AAY has been busy at school; hence, not much doing in radio. 2FE has at last reached the west coast with about 100 watts and a small, low antenna, too. 2BBR was reported in India, 350 miles northeast Calcutta, very readable and steady. Calls are all coming in from Australia and vicinity. Europe is local. Hi! 2SKH has heard a few Australians and expects to be QSO soon. He has a lot of equipment and a good gang. 2BNL has at last dropped to 80. 2SKR reports little traffic available. 2LA has trouble with an unreadable note. The report at 2LD came down but he is going again. 2CSL is the gang that is getting to the west coast often. 2CNK managed to get his pair of 250’s down on 80. Some QRM, we say. 2ATB worked QSO on twentys and we guess old time interest. Come on, fellows, wake up! 2XNA is going during college hours and occasionally at night.

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E. M. Glaser, D.M., is now president of the C.C.N.Y.
Radio Club and 2BOY is Chief op.
2BSL and 2AVE are on once in a while. Where is the rest of the bunch?
The Staten Island gang are coming up every month. 2CPE and 8BQU are the mainstays for activity.
2CIS is on the air. 2B and 2CTK are expected to be getting more DX, and 2CDH is very busy whenever he has a chance. The station would make a good O.R.S. if on the air more often. Whenever he has a chance. The station would make "6 • 2B::lL all districts, England, and France not exaggerated. He worked very soon.
his 50 watters. He stuck in a 20wA and carried on, working 1,500 miles. ZBPB is QRW at College. 2CXB handled a nke big bunch of traffic this month. Also he filled out and mailed his report. 2ANM and 2CDH both are doing very well. 2CHZ is still on the job. That is getting most of all of the O.R.S. to report.

Dist. No. 1: 2KX recently went down to 82 meters and found to his delight that this wave was almost nil there. 2BBS reports no traffic. 2AMS and 2CDH both are doing very well. This is one of the stations able to do this again in the near future when 2AJF revises a "Consolidation with 2L V with a super-station and is regularly handling more traffic than this. He is going to get an O.R.S. Just as quickly as the certificate can be filled out and mailed to him.

Dist. No. 3: This little district, although it boosts only a few active O.R.S., certainly helps to boost the traffic total. 2ANM and 2CDH both are doing very good DX. 2CHZ says that more noise will be made now than ever.

Dist. No. 2: 2WR has installed a 250 watter but will return to the 50 watter which gave better results. 2BKO has worked the largest number of messages handled by a single station in this district is 2BGI, who has worked all countries 15 times, handling very important msgs. for the U.S.A. He was also QSO England, Bermuda and Portugal.

Dist. No. 4: 2CQZ is conducting experiments on 40 meters with very little success. 2ACZ has been appointed C.M. of New Brunswick. 2BVO is heard regularly working good DX. 2AVZ has been heard in New Brunswick.

Dist. No. 5: 2AWF is getting Albany going fine. There are two O.R.S. and more going. He is always doing 22BIS and 2BOY for DX but says he is almost all there. 2BSB reports no traffic. He blew two 5 watters so was QRT for a while. He filled out and mailed his report. 2ASZ is still on the air with very little success.

Dist. No. 6: 2ACS with his old 50, dropped to 78 meters. He worked 36 west coast stations and 4 Europeans in one month. He is on every day and through an immense deal of traffic as a result. 2CPA is QSO all districts.

Dist. No. 2: Yonkers, only reported by 2ADD, C. M. of Yonkers.
2AAM says that he is working the coast easily on 5 watts and 80 meters. 2APY is still very active. He is working on 160 meters with very /ittle success.

Dist. No. 4: 2ANM reports no traffic. 2AMS is still on the air with a five watter and 2CHZ has also handled a very large bunch of traffic. He sent his report by mail.

NORTHERN NEW YORK—Dist. No. 1, 2CJX again leads with the best traffic report for the month which is very FB. 2AT has QST's 8 to 60 meters and reports that every one of the O.R.S. to report. The only rock crucher remaining in operation is that of 2BMR and we hope that this one goes where all other sparks have gone.

2AJF has returned from Cuba and can now return this month at 2AlCF who worked QSO in Brazil several times and delivered a fine DX. They received their first report from the WPst ooast and still feels the effect of getting most of all of the O.R.S. to report.

Dist. No. 2: 2AFJ is the only active station and is handling considerable traffic.

Dist. No. 3: 2CJX is the best DX. "The report from the WPst ooast and still feels the effect of this month.

Dist. No. 4: 2CJX again leads with the best traffic report for the month which is very FB. 2AT has QST's 8 to 60 meters and reports that every one of the O.R.S. to report. The only rock crucher remaining in operation is that of 2BMR and we hope that this one goes where all other sparks have gone.

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Dist. No. 3: 2CJX is the best DX. "The report from the WPst ooast and still feels the effect of this month.
NEBRASKA—Dist. No. 1: Traffic has been steadily moving and increasing during the last month due to the fact that the majority of stations are active and on the air consistently. Most stations are experimenting with the low waves, but not much is as yet being handled on the low bands. There are a large number of Omaha stations active, and consequently traffic is moving through smoothly.

Traffic: 5AJS, 18; 5BWX, 10; 5CIA, 12; 5BWL, 16; 5CLQ, 10; 5BWR, 16; 5CMR, 12; 5AEF, 18; 5CYP, 17; 5CSD, 12; 5BMR, 16; 5WR, 12; 5ARE, 18; 5CDK, 17; 5CQD, 10; 5BCW, 16; 5BTS, 10; 5BGO, 18; 5DQZ, 10; 5BQW, 6; 5GQS, 14; 5BGI, 20; 5CDP, 29; 5AUH, 6; 5PUL, 16; 5BZJ.

4 KEY—Fourth in QSLs receiver. 4R4S reports F. for their good cooperation. In regard to DX, 2BMR, 16; 2WR, 17; 2AJA, 28; 2AFP, 17; 2ATC, 27; 2COT, 91; 2AZY, 10; 2BGO, 18; 2GQZ, 10; 2CRW, 6; 2GQS, 14; 2BGI, 20; 2CDP, 29; 2AUH, 6; 2PUL, 16; 2BZJ.

MIDWEST DIVISION

P. H. Quinby, Mgr.

4 RRS—Traffic is moving through smoothly. 9NL is on the air after installing a new antenna. 9FBA is a new O.R.S. and is evidently the most consistent station in this district as shown by his message report. 9CGS has been on 80 meters and says he is sure FB, but has experienced some trouble so far. 9CJF is back again with 100 watts and good signals, expects to have a 60 watt on 80 meters. 9EAQ reports good DX, but little traffic. 9AKS is on with 10 watts and no traffic. It is a district where there isn’t as many active stations as usual. Very little activity in Lincoln except for 9MFR. 9GAU reports not much traffic. 9CZO, using 1 201 A, has been transmitting with the British A Craft hookup, and has some kick. Another O.R.S. is 9DUO. In spite of his low power he has handled a large number of messages. 9DKY is handling traffic very well on low waves and has some kick.

Traffic: 5AJS, 18; 5BWX, 10; 5CIA, 12; 5BWL, 16; 5CLQ, 10; 5BWR, 16; 5CMR, 12; 5AEF, 18; 5CYP, 17; 5CSD, 12; 5BMR, 16; 5WR, 12; 5ARE, 18; 5CDK, 17; 5CQD, 10; 5BCW, 16; 5BTS, 10; 5BGO, 18; 2GQZ, 10; 2CRW, 6; 2GQS, 14; 2BGI, 20; 2CDP, 29; 2AUH, 6; 2PUL, 16; 2BZJ.

Dist. No. 2: Traffic is moving smoothly throughout this district although there isn’t as many active stations as usual. Very little activity in Lincoln except for 9MFR. 9GAU reports not much traffic. 9CZO, using 1 201 A, has been transmitting with the British A Craft hookup, and has some kick.

Traffic: 5AJS, 18; 5BWX, 10; 5CIA, 12; 5BWL, 16; 5CLQ, 10; 5BWR, 16; 5CMR, 12; 5AEF, 18; 5CYP, 17; 5CSD, 12; 5BMR, 16; 5WR, 12; 5ARE, 18; 5CDK, 17; 5CQD, 10; 5BCW, 16; 5BTS, 10; 5BGO, 18; 2GQZ, 10; 2CRW, 6; 2GQS, 14; 2BGI, 20; 2CDP, 29; 2AUH, 6; 2PUL, 16; 2BZJ.

KANSAS—The DX and traffic season is at its best. Traffic is picking up along with DX records.

Traffic: 5AJS, 18; 5BWX, 10; 5CIA, 12; 5BWL, 16; 5CLQ, 10; 5BWR, 16; 5CMR, 12; 5AEF, 18; 5CYP, 17; 5CSD, 12; 5BMR, 16; 5WR, 12; 5ARE, 18; 5CDK, 17; 5CQD, 10; 5BCW, 16; 5BTS, 10; 5BGO, 18; 2GQZ, 10; 2CRW, 6; 2GQS, 14; 2BGI, 20; 2CDP, 29; 2AUH, 6; 2PUL, 16; 2BZJ.

Traffic: 9AMZ, 4; 9AKS, 97; 9AMY, 66; 9BLK: 23; 9AMC, 18; 9APM, 6; 9BFS, 18; 9CPL, 17; 9CIA, 22; 9CVO, 18; 9CAB, 20; 9CVP, 18; 9CQZ, 10; 9CW, 6; 9DQS, 14; 9BGI, 20; 9CDP, 29; 9AUH, 6; 9PUL, 16; 9BZJ.

Missouri—Politics are passed from key to key. 9EAO has been QSLing to G3. 9DZL has handled 400 QSOs of recent traffic. 9BZT has been heard on the heavy Reitert storm which rippled the wires.

Traffic: 9AVJ, 169; 9BCX, 22; 9AMU, 49; 9CHN, 1; 9DJO, 15; 9DZL, 25; 9AMX, 10; 9DQW, 1; 9CMR, 14; 9DTH, 25; 9BWS, 12; 9DZQ, 32; 9DYQ, 31; 9DMS, 39; 9EFH, 18; 9BPB, 46; 9DIP, 47; 9APM, 6; 9CS, 15.

MISSOURI—Traffic has had the customary boost this month due to the numerous messages sent during holidays, likewise there were more stations on during this time to handle them.

Traffic: 9DMJ, 243; 9AAU, 35; 9DLB, 22; 9DZX, 15; 9PW, 11; 9BSH, 11; 9ELY, 10; 9ACL, 2; 9BHJ, 5; 9BRU, 5; 9DWO.

Dist. No. 4: Traffic is moving smoothly on low waves, reaching both coasts. 9AOB is building a 260 watt M.O. set for 80 meter work, with 9KD and before 9CQD did. Well, 9CQD worked Melbourne, Aust., thus winning the charming ankle warmers. 9EFH then bet his 9CLQ that he could total up a larger mileage than 9CQD could. Each QSO had to be handled on 80 meters in the day time, which is very FB.

Traffic: 9AVJ, 169; 9BCX, 22; 9AMU, 49; 9CHN, 1; 9DJO, 15; 9DZL, 25; 9AMX, 10; 9DQW, 1; 9CMR, 14; 9DTH, 25; 9BWS, 12; 9DZQ, 32; 9DYQ, 31; 9DMS, 39; 9EFH, 18; 9BPB, 46; 9DIP, 47; 9APM, 6; 9CS, 15.
a wad of msgo this month. 9RR had a mix-up with a vicious dog and is laid up at this writing, but able to get about and pound brass. A new aerial made its appearance at his ranch (7) and DX is better. 

3ACX operated 9NZD, 9BBK and 9RR during the tie-up of his own and is very busy. lBNL has a new Reinartz tuner, 9BKK also has a new aerial. 3ACX operated at 9NZD during the vacation period. !GA reports DX very poor.

CRR is sending in his first report. lCCT is on 80 meters. lAYX had a little feminine QRM this last month. lBBK is always ready to QDR any time for the president of the Springfield Radio Assn. owing to the resignation of Mr. Howard Gourney. 1AWW is on the sick list. lEO and l1L are still operating on 15 meters.

Dist. No. 5: 1BZ reports his 50 gone west, and has been operating at 1KC. 1KC reported working GRHI, Mesopotamia. The DX is about 13,000 miles.

Traffic: lGA, 76; 1GJR, 10; 1BBK, 74; 10V, 25; 1AKZ, 1; 1AYX, 25; 1COT, 4; 1BS, 32; 1KY, 68; 1AYX, 17; 1AVF, 23; 1BQV, 42; 1LMN, 39; 1CIT, 11; 1AD, 41; 1GVR, 1. lBBK is the owner of the QRM bug in K.C. Recently all the sub-stations of the light company and the street railway company were down one by one in an attempt to locate the trouble, but nothing was observed.

Traffic: 9DX, 7; 9AYK, 15; 9BVK, 109; 9DDO, 6; 9EOA, 25; 9EGS, 26; 9BBU, 14; 9CMK, 77; 9DACL, 20; 9GFS, 9; 9DQQ, 4; 9AYL, 5; 9CDO, 20; 9BILZ, 8; 9BDZ, 7; 9DOJ, 20; 9RR, 127; 9ACX, 25.

NEW ENGLAND DIVISION

1. Vermilya, Mgr.

MAINE—This month's report reminds us somewhat of the old Brass Pounder days with 1PM handling 370 messages. C. M. Sever of 1FM and his gang started with a lot of credit for the booth that they had at the Radio Exposition at Portland, it was during this time that most of the 370 msgs were handled.

Dist. No. 1: 1ALK is receiving cards from England and France. 1AUR worked Bermuda. 1PD is now using 50 watts and is being heard in England and France.

Dist. No. 2: 1APM is down on the short waves and in its place has started using 1WRF and hears England, France, Holland and Central America regularly. 1BHT also has a new tuner and is hearing NZ nearly every morning. 1FM was at the Exposition building part of the time last month. He worked 9XI at 4:00 and has been heard by several other Britishers also. 1FM has a new 50 watt. 1VF will soon have an O.W. on.

Dist. No. 3: 1BDD is doing good work. 1CRU is working British stations and QCMK.

Dist. No. 4: 1ACQ is going down on 80 meters.

Dist. No. 5: 1CX is working the 6th district with a 5 watt quality transmitter. He worked 1WRF and has been heard by several other Britishers also. He worked 9XI at 320 P with 5 watts input on 40 meters and has been shut down during quiet hours on 80 meters.

Traffic: 1ACQ, 9; 1ALK, 57; 1APF, 90; 1APM, 4; 1ACU, 17; 1AUR, 4; 1BDD, 26; 1BLN, 54; 1BHT, 115; 1BQV, 25; 1CAR, 71; 1DD, 9; 1MM, 370; 1HE, 29; 1IXAAXQ, 14; 1PD, 12; 1VF, 24.

EASTERN MASSACHUSETTS—Traffic has surely taken a big jump this past month, 851 msgs being handled. The DX is about 13,000 miles, and DX is better. 1WRF is putting the old Brass Pounder days with 1FM behind and would appreciate name plate. He expects to be on with a 296A shortly. 1W is after 1SB's DX, and is getting there too. 1BGG also reports fine DX on the short waves.

Traffic: lGA, 76; 1GJR, 10; 1BBK, 74; 10V, 25; 1AKR, 1; 1AYX, 25; 1COT, 4; 1BS, 32; 1KY, 68; 1AYX, 17; 1AVF, 23; 1BQV, 42; 1LMN, 39; 1CIT, 11; 1AD, 41; 1GVR, 1. 1BBK is installing "S" tubes. 1AYR is out of luck. Will someone please loan him a transmitter? Hi! 1AEX is working as per usual. 1AVE, the latest O.R.S., and continues to whistle. Give 'em your

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IX
messages for Headquarters, gang. 1XW is heard occasionally on short waves, 1YD is using a master oscillator on short waves, 1YR, 1BDX, and 1AJG are all QSO Europe, any time. 1CMQ was during the Xmas vacation, as his traffic report will show 1XW, having recovered from his sac rec fever, has gone on short waves, along with the rest of the gang. There is one notable exception. 1AAM, with the rest, continues to work on everything and everywhere on 160. Radio conditions in the state have been very peculiar at times during the last month; for instance, 1AMY and 1BDX both worked Europe and the Pacific coast the same evening, but fifteen minutes later were unable to establish consistent communication with each other—forty miles or so apart.

Traffic: 1AYR, 65; 1AAM, 16; 1AJG, 23; 1BDX, 42; 1CMQ, 24; 1XW, 38.

NEW HAMPSHIRE—Traffic seems to be picking up a little, but we still hold out for a good deal more if we could get hold of it. Don't forget us, gang!

Traffic: 1YB, 83; 1BKN, 64; 1B3F, 67; 1AJG, 78.

NORTHWESTERN DIVISION

Everett Kirk, Mgr.

There was no record breaking transmissions reported this month, but traffic is on the rise and being handled more on the old time style form. Stations are making schedules during the day in order to make messages delivered with greater ease. Many stations received a personal letter from Capt. McLean, Head of the Communications Corps, thanking them for rendering the valuable assistance being establishing communication with the Shenandoah.

Traffic: Traffic is on the incline towards bigger totals, but there is also one source that troubles all over the state. The state traffic finder is 1GB who handled over the hundred mark. He just received his O.S.S. certificate and his procedure for traffic handling can be rated as A-1. TX is on a trip to NYC and hopes to get 1SG distress reports while visiting there. 7MI is very busy trying to make his Super-sink work. Hi! 7AFO, 7AFN and 7AGI of Tacoma are heard nowhere. 7AIE's antenna doesn't want to work on 75 meters. 7GR is handling a German 30 watter. 7FG put in a 20A, but reports that it gets blue on the gills. 7TR and 7GF report light traffic. 7BJ can't be heard much, but is down from much time now and then. 7AJV worked everywhere during Xmas but lost his set. 7AJV is having trouble making DX heard. 7LJ and 7DC are working on the low waves. 7DF got his new antenna up from falling on the C/P, where he finds the wind blows too. 7AN has been very steady on 80. 7NO is coming down. 7SM finally got his chem. receiving condensers in place, so he is now on a lower wave. 7KU is the main-stay at Seattle, works everywhere. AEL and 7FD are having trouble making their equipment heard. 7FD has been heard on 100 meters. 7TAP is on occasionally. 7ADQ, 7QY, 7GM and 7FD are on but no reports. Why not jar loose OMYX? 7PM-M to Everett will be on short waves. 7TV Everett's newcomer has 15 watts working. 7FN just received a report that there is a mess heard in Clallam, but none on 75. 7QA also worked there. Traffic: 7GB, 106; 7ABG, 46; 7KU, 32; 7NO, 28; 7LH, 26; 7TF, 24; 7GE, 21; 7TH, 24; 7JR, 23; 7AG, 19; 7ZB, 17; 7AJY, 11; 7AF, 10; 7GE, 9; 7AX, 7; 1XW, 6; 7DF, 5; 7BJ, 4; 7AGI, 4; 7JL, 3; 7FN, 2; 7FD, 1. Total 462.

OREGON—Only one new O.RS was appointed last month and one new CM for Portland, due to 7AKK's leaving town. Please give your reports to him. 7ZY is working all districts with a one five watt on 75 meters. 7UM is on occasionally on the higher wave band, he had 60 tubes in his set. His work on the lower band. Hurrrah! 7CQ and 7LR succeeded in working Australia and New Zealand respectfully. Each report handling of messages and very steady signs from the Westerners. They both use 50 watt bottles, with 7LR's running the hottest. Hi! TALC in 150 meters. Fine this month, which is a gift from Headquarters. 7AIP next. Everyone reports that messages are becoming more plentiful, with less of the rubber stamp variety. 7AV, 7ADM, 7QD, 7LQ and 7GW are the most constant on the higher waves. 7TR has left for the U. of C., but TACM will keep the station going for the next few months. 7QV and 7HH of Medford worked well recently.

Traffic: 7ALD, 70; 7AIP, 58; 7MF, 37; 7TR, 35; 7QD, 34; 7ALX, 24; 7AY, 20; 7LQ, 20; 7LS, 19; 7SY, 17; 7PP, 11; 7QW, 8; 7ADM, 7; 7FM, 1. Total 444.

Idaho—Activity throughout the state is good and practically all the stations are back on air. Message reports are slack but it's hoped a 100% one next month. There is probably a new station close by or in your town O.M.s, give them a tip and have them report their totals. 7AA at Moscow reports that the north end of the state is going strong. He is on with a new antenna using CW on 20 and 170 meters. This marks the passing of Idaho's last spark bug. 7IU is doing FB working out in all directions. He has a mean DC welder and is now having peace with the B.O.C. 7IU reports that there is an awful power leak in his town. He blew his old faithful set, so has to rely on only one now. 7AIS is making a set do the work of a 50. He has 4 tubes, then borrowed a, 3 watt, from a power amplifier, to break it in and the funny part is, it did! 7ACP has a time to keep his antenna up from falling off a tree, and it is still the most of the time. 7PJ is back again with the same old bang. 7FT and 7RQ are both on with 6 watt bottles. 7ZN-OT is still helping the 7L at 7SI. 7YA promises to be on soon, no fooling this time. 7OB has a new receiver, hopes to work G6LG and ZAA who reported his signs recently. 7TV a new station in Boise, operated by Cecil Crow, has a 5er peaking on 80 meters.

Montana—In spite of the favorable weather conditions practically no reports were received from the only real active stations being 7MP and 7TD. 7MP ran out of 202's so uses 201's and gets out fine. 7TD is going to use a 50 watter with excess voltage on the plate and a 200 meter. 7TD's condensers and resistance. 7FT reports ND, too much school work. Ditto 7TD and 7GR. 7AGI had a brand new vertical ant. just put up and then the wind came along and has to start over again. 7ZU sold his MG, will have some other source of plate supplies. Traffic: 7MP, 53; 7TD, 4. Total 57.

PACIFIC DIVISION

M. E. McCreery, Mgr.

Traffic is picking up considerably on the low waves and shows 4. 7AIP, 7GQ, and 7GM are on the higher waves, is almost out on the lower waves. 6G6 is now using 100 watts and takes more of San Diego traffic. 6G6 has his own high waves but has a harmonic on about 80 meters and works some stations there. 6GZ is now using a 250 watt bottle and getting out fine. The antenna system at 6GZ consists of a one wire antenna 70 feet long and nearly vertical, with a large 12 inch copper ball on top. The counterpoise is a two wire fan.

Dist. No. 1: 6CDV, 6CHX, 6CGC and 6ZG are now down on the short waves and getting out fine. This, which the low waves are going to do. The following states have used the higher waves, is almost out on the lower waves. 6G6 is now using 100 watts and takes more of San Diego traffic. 6G6 has his own high waves but has a harmonic on about 80 meters and works some stations there. 6GZ is now using a 250 watt bottle and getting out fine. The antenna system at 6GZ consists of a one wire antenna 70 feet long and nearly vertical, with a large 12 inch copper ball on top. The counterpoise is a two wire fan.

Dist. No. 2: The traffic total has been a little higher than usual. The experiment has found it necessary to reprimand some of the C.M.'s, so don't let it happen again. Messages are moving through less dead and 80 meters, as a whole, is a decided improvement over previous months. 6BJX mourns the loss of a 30 watter. 6GQR has been fooling with various types of tuners,
including super-hets, but promises to be on more in the future. 6SRF has a new fixed up short waves. 6BEH has been tearing around town trying to get parts for the new transmitter. 6AAO DX is OK, but his message list looks good. 6HRF has been off the air practically all the month. 6LI the guardian of the south coast is reporting to be using a one wire vertical antenna. 6BUR with 6HER. 6CSW works all U.S. with ease though we could use a lot more for his message total. 6AHP, the first station to QSO and get a lot of traffic through because of less QSO. 6CMQ will be on 40 meters shortly. 6BBQ finds plenty of traffic on the low bands. Santa Monica has the honor of claiming the first 40 meter station in the new ORS. is using a new set and getting not FB. 6AAO says more and op. (the boy with the gold nugget is off until now) 6J7E aays that in spite of heavy winds he is getting in on more in "the east coast meow." 6MAL says that his 250 watt set is working all U.S. and Canadian districts since he has been on for 80 meters. He is using a 40 watt power supply and has heard G2MN and also CH 0TT. He worked Brazilian WJS, and up to date, he has been heard in 15 countries and has worked every station in the U.S. He expects to do a little better next month on the antenna which is of the ORBULAR PARACHUTIC type. 6HI Tennis got the best of him lately. (It is the tennis exchange and it is reported that the last month has been all like a wonderful dream. He has worked a few more N.Z. and A's. He has been QSO'ing with all stations in Europe, South America, China and India. A ship op has heard him in the Antelope Valley, Calif., and has received cards reporting his signals in Europe, China, Malaya Straits settlements and Korea and making a total of 8 Aussies and 6 auzies worked. Japan. Another ship op has heard him off the coast of every Ors area station. He is using an orsbular parachutic type of antenna. 6AAW is off the air due to illness. 6CSN just got his set up on 80 meters and reports fine work. 6FL will be on 80 meters soon. (Attaboy, OM1) 6BLQ reports very little doing due to a very loud power leak around his station. 6BNT reports that his 250 watt went to land of eternal darkness. 6GW is still busy trying to get the set to work on short waves. 6BBQ is working all U.S. districts but 6BE8 working in France. 6AC has been busy making and breaking receivers but he has a good one now having heard G2OD on Jan. 14th. 6AFC is trying to get his watts off but is rebuilding. 6AJG is having his troubles getting his transmitter but will be going strong soon. 6BG has been off the air temporarily. 6BIM is trying to get on 80 meters. 6CLS reports a new antenna. 6CLV reports very little doing. 6AW, 6AWW and 6DFP are new O.R.S.

Dist. No. 6: It seems that the young ladies have gotten a hold of the old girls again. 6AGV is on regularly now working the east coast and has several reports from Australia and Korea with 75 watts input. 6CGD will be on the 20 meter band and will use his new station starting out right. 6ADF is busy experimenting at U. C. now and is working on a 1 meter set. (Good luck, OM1! 6ARB is after the Y.D.'s. He is contesting in competition with OM1 for Y.D.'s sister on the usual.) He has received reports from ensland, Belgium, and Korea this month. 6BFU, 6IM is having trouble with a sink recept. Both his older boxes are down but as soon as he gets them up will be back on 80 meters. 6CEG is on regularly between 1 and 3 a.m. He has a XL op. age 4 months. 6CDP will be on with 5 watts. 7PR is second op there. 6GKC is now the Asc. (Wonder if King meant that—E.P.) He is now in France. He will be on from 20 to 40 meters next month. 6CIT has moved again so has suspended operation for a while. His new QRA is 2970 Telegraph Ave. Oakland, Calif. and has the laurels for the number of messages handled. 6AAA—42. 6EW is doing fine work with 50 watts and has worked nearly all the states and twice in Canada. 6BPR is doing good work on 5 watts. 6HP has been rather handicapped as part of his antenna came down and he hasn't had time to put A is now on 80 meters and reports fair work on 150 meters but will be down on 30 soon. 6ANW is now on 5 watts. He hasn't gotten off the coast yet, but here's hoping. 6ZX—6KR is down on 80 meters now and works the east coast whenever he is able to get on the job.

Reports coming from districts 4 and 5 are sure F.B. What's the matter with you fellows in district No. 6? Get a good report from Richmond and Berkeley districts, but in the 4th district we are a dead bunch, as the C.M. informs me that he got TWO O.R.S. station reports. Fellows, this is not putting any of you up, but a slaughter of O.R.S. certificates if you don't wake up. Don't think that the C.M. is going to phone you fellows up every month because N.D. If you are not interested in A.R.R.L., affairs, why should he be interested in you and give you a C.M.'s report and hand 7500 for them and your C.M. will send them to you. 6TJ—EIIJ just got a card from FCS having been heard on December 21, 1924, and it cks with their log. 6EB and 6EIIJ and 6TRP and 6TTP are doing fair work in the Oakland area, and it's sure a very bad showing and the A.D.M. wants to see a better report and don't ask fellows. "What's the matter with the SIXTH dist. when you don't report any-
thing at all. In fact, I'd be ashamed to ask. Come on, let's produce the old stuff we used to give the C.M. By the way, the A.D.M. has a phone now of his own and any of the gang that want to get in touch with him can do so by phoning Humboldt. 

ROANOKE DIVISION

W. T. Gravely, Mgr.

WEST VIRGINIA—8A8E-8AGH works all districts except the sixth and seventh at noon with a 20 watter. He is putting in a 50 watter now. 8BU-8AZK is off the air putting up a new mast and installing a 100 watter for use when QSM works the sixth district nightly and has been reported in New Zealand. 8ZW-8BSY, home from Carnegie Tech, knocked us out with a new station. 8BLL put in a new stick. 8DNS, with a 5 watter (?) works sixes and sevens FB. 8AP is still on high waves. SDO1 is very active. SCFE is on the air again and handling traffic. SDES, home from school for the holidays, was on the air. He is operating at the school station.

Traffic: 8DFM, 43; 8ZW-8BSY, 5; 8DES, 16; 8DOL, 19; 8AND, 11; SCFE, 1; 8DNS, 5.

NORTH CAROLINA—Dist. No. 1: 40G, 4FA and 4TJ have been issued O.R.S. certificates. 40G and 4FA turned in traffic reports and are yelling for more. 4FA is working on both 75 and 150-200 meters. He is QSO Porto Rico and all but the seventh at noon with a 20 watter and says he doesn't like the short waves. 4LO will be on with a 50 watter. 4GW is on the air in spite of the fact that he is on the station most of the time. 4NY is QRV jewelry business and his YL, so guess ND 'ill finish the work. 4JG turned in traffic reports 130-200 meters and raised a lot of racket on the short waves.

Traffic: 4OG, 27; 4FA, 21.

Dist. No. 2: 4MI sends in his first report as D.S. direct to the A.D.M. over the wire. Things are moving along just as usual with 4TJ and 4IR in the lead. 4JS was on during the holidays and did some excellent work. He heard a bunch of English stations with the “two spring" noise. 4IR is raising an awful racket on the upper waves with one five watter. 4TJ has “rotten" power lines. We are expecting some stations to come on, 4JS has some trouble on 200 meters, but won't take out and O.R.S. 4BX finally managed to get going. 40U shot four fivers and battery charger bulb and has, in other ways, been out of luck.

Traffic: 4MI, 35; 4GW, 21; 4TJ, 16.

Dist. No. 4: 4NT-4MA have combined junk, and are back on the air. They have been issued O.R.S. certificates. 40G and 4FA turned in traffic reports and are yelling for more. 4FA is working on both 75 and 150-200 meters. He is QSO Porto Rico and all but the seventh at noon with a 20 watter and says he doesn't like the short waves. 4LO will be on with a 50 watter. 4GW is on the air in spite of the fact that he is on the station most of the time. 4NY is QRV jewelry business and his YL, so guess ND 'ill finish the work. 4JG turned in traffic reports 130-200 meters and raised a lot of racket on the short waves.

Traffic: 4TJ, 28; 4IR, 9.

Dist. No. 4: 4NT-4MA have combined junk, and are back on the air. They have been issued O.R.S. certificates. 40G and 4FA turned in traffic reports and are yelling for more. 4FA is working on both 75 and 150-200 meters. He is QSO Porto Rico and all but the seventh at noon with a 20 watter and says he doesn't like the short waves. 4LO will be on with a 50 watter. 4GW is on the air in spite of the fact that he is on the station most of the time. 4NY is QRV jewelry business and his YL, so guess ND 'ill finish the work. 4JG turned in traffic reports 130-200 meters and raised a lot of racket on the short waves.

Traffic: 4TJ, 28; 4IR, 9.
operating the station under the station license of 3KS. The station was assembled and in operation a few days after the, and in the excitement several were sent west. 3IN's

A.R.R.L. STATION 3KS

10 watt supplied with 600 volts from MG set, finally was made to do the work. The antenna gave trouble because of the steel building, but was changed outside the building and better results were had. The following A.R.R.L. members operated the station: 3TI-3KS, 3MK, 3GKA, 3AFE, 3GW 2CEY- KOC, 3OL, 3GJU, 3AEK, 3IN, and 3UV. A large crowd was always around the booth being shown the way in which traffic is handled. A total of 141 messages were handled, some replies were received by radio and by mail, one message to California was delivered in due time so the sender states. Credit is given the following stations for the consistent relaying of traffic from these stations: 3BWJ, 3AHA, 3DING, 4JR, 8HAR, SAME, 3BHIM. All A.R.R.L. stations in the city assembled in handling traffic as 3KS was swamped at all times. The booth was the most attractive at the show and was constructed at very little expense. A superhetrfone was operated only 20 feet from the transmitter and no QRX at all. (And still we have to QRX for the single circuit birds—D.M.)

Dist. No. 2: The hams around Petersburg are trimming their aerials now for short wave work. 5ATB QRF work, but keeps in code practice with a saxophone. 3ABS lost both sticks in recent electric storm. He is erecting a temporary one now and remodeling for 80 meters. 3BMN works west coast regularly. 3ANX is out of range. 3JOE is making a new station in Macon. 3FJL is doing good work consistently with 5ARW, GASU and 6ATT report goil forward by air mail to teach the Casper amateurs to have a set in readiness for any storm emergency work that may come up.

Traffic: 26HX, 24: 5AJA;

COLORADO—Sorry to say, but no report received at the D.M.'s office on February second, when this report comes forward by air mail to reach QST factory on time.

SOUTHEASTERN DIVISION

H. L. Reid, Mgr.

ALABAMA.—A survey of reports coming in from the various Dist. Sup'ts, shows quite a pick-up in activity. District No. 2 stands out this month for traffic handled with District No. 3 following second. 5AC leads the state with a total of 94 messages. District No. 3 reports the most activity and several promising new stations.

Dist. No. 1: This district, although the largest in the state, reports the least activity and the smallest amount of traffic. 5VV is doing consistent work on a lone 5 watt, working the first district with ease. 5AMH has been wrecked by the lower waves, for he has not been able to reach out consistently since deserting the 150-200 meter waves. 5ACM and 5QP are the only other stations reporting.

Dist. No. 2: Sup't Rush reports that 5AC led by 5BK by 4 messages, which shows promising competition among the Mobile gang. 5QR certainly did his duty as a new O.R.S. (Good work, old man!) 5AD will be on the air shortly and will add another station to the South Alabama gang. 5AOM is reported to have a very bad case of "YLitis."

Dist. No. 3: Considerable activity is reported from Montgomery. 5AJF, 5ADA and 5NL are handling traffic consistently with 5ARW, 5ASU and 5ATT as promising material for O.R.S. The Montgomery gang is showing itself as a true "ham" gang. This fellow, Tom, must have the true "ham" spirit for it has been reported that he has known to break a date to go help out a fellow "ham." 5BWI is in the air now since the street car people ran out of sand. He handled 2 messages. 3AUU erecting a gutier aerial and planning 20 and 40 meter work.

Dist. No. 3: 5BG5 has his four coil Meissner on 150-200 meters and expects to get down on the short waves. 6BUH reports his 50 watt tube has gone west in Europe. St. Augustine is not so lively of late; 4SB has known to break a date to go help out a fellow "ham." Traffic is becoming normal again since experimenting had its inning. 4JL works Cuba regularly and handles most of jax's traffic. 4FS worked G8IF with one 5 watt and 60 watts input. 4PK is copied regularly in Europe. St. Augustine is not so lively of late; 4SB gets the DX but very little time for traffic. Central and Southern Florida have "copped" the laurels from Jax. 5AIJE is active on all waves down to 18 meters—does extensive experimental work and

ROCKY MOUNTAIN DIVISION

N. R. Hood, Mgr.

UTAH—Dist. No. 1: 6CJR has his new station going in his new home, and is going strong on 78 meters. 6CKI of Logan is attending the U. of Utah and has little time to devote to his set at home. He reports that he is now operating the University station, 6CAQ, 6HF is sick he bed at the present and we hope he has a speedy recovery. 6BHJ has put in work and is doing some excellent work on short waves. 6BUH reports his 50 watt tube has gone west and is now on with 5 watts. He is on 80 meters, 5CHQ-JER has been able to devote only a couple of nights to his set, but will be on regular soon. 6BV has put thru 72 messages, but is not yet an O.R.S. or he would have been in the box seat this month. His O.R.S. has been approved. 6CRS is another station due for an O.R.S.

Traffic: 6CKI, 6; 6CJK, 6; 6FM, 12; 6BLH, 59; 6RH, 6; 6RM, 10.

WYOMING—7AJY put thru the most messages this month, and did that in 10 nights. 7HX ex-7DH

QST FOR MARCH, 1925

XIII
still found time for 9 msgs. He imd lXAM worked and re-established Lakeland as a relay point. He affected. ,IBJ, ,l.fF., and 4K'l' have done their best at, present our hams, and especially 4SA. are acro.. .

Traffic: 4RR, 4.

PORTO RICO—With ideal radio weather prevailing at present our bands, and especially 4SA, are accomplishing the undreamed-of. Dependable communication is being had with England and the coast stations, and there has been an increase in the number of messages handled as a result.}

WEST GULF DIVISION

F. M. Corlett, Mgr.

Traffic: 4RR, 4.

SOUTHERN TEXAS—Dist. No. 1: There are about half a dozen stations in Houston which we hope soon to include in both exchange and traffic. One says "don't come near me". 6YL will also be at the 5CA key. 50X is doing excellent work and continues one of our greatest DX stations. He reports unusual shortage of traffic. He, like SOX, of Houston, works the Aussies and also New Zealand. 50E reports unusual shortage of traffic. He, like SOX, of Houston, works the Aussies and also New Zealand. 5OM? 50X is using 100 watts on 17 meter stuff and is QSO anywhere. The coast station, Bevveille and Cuero, are doing their bit; 5ZAI at Bevveille and 4BP and 5RA at Cuero. 5GW at New Braunfels is almost dormant.

Dist. No. 2: E. G. Conroy, C.M., San Antonio, says biz is picking up in his section. Conroy sends a lengthy report, boys, and he wrote it in bed, sick. That's the spirit, fellows!

Traffic: 6FT, 23; 5AEP, 19; 5EW, 12; 5ALR, 5.

OKLAHOMA—Conditions in Oklahoma seem to be slowly improving. Although traffic is very light, stations are beginning to ask for stations outside of Oklahoma City reported this month.

Dist. No. 1: This district showed the most activity. 5APZ is building a 5 watt, in addition to his 29 watt for use on 75 meters. He reports that the QW has received her operator's license and will be first "Op" at 5APZ from now on. Don't crowd, fellows! 5CU takes honors for this month. 5AS states that important business kept him off the air last month, and was heard by the A.D.M. 5APZ wails that everybody was calling Europe and wouldn't handle traffic. 5UJ was moving, but is going again now. He wants to know who puts out the official broadcast? (Should they back up this comment, the A.D.M. apologizes for his three page report to the D.M., explaining that "Am sick, and wrote this in bed"—gives the other fellows a boost for good work while doing the same thing; and making no boast of it—D.M.) 5MN works ones and twos as locals. 5WP is on 80 meters with 30 watts. 5ZAE has been off the air, as his set was out of operation, but Mr. Wall surely is active in A.R.R.L. matters, and his report headlined "Corpus Christi and installed 5ABZ on his yacht, the "Bridge". Amateurs should be on the lookout for 5ABZ'S. Corroy, of San Angelo, is again working under his old 120 call, SACC. He has 80 meters. The work he did during the there the W. Texas buzzard (you know which buzzard—D.M.) appeared in every Hearst paper in the U.S. on January 3rd. 5ZAM, 5APZ, and 5CM, 5ASZ, 5AGQ, 32; 5AQW, 9.

Traffic: 5APY, 27; 4C; 19, 19; 4KT, 13; 4BJ, 24.

NORTHERN TEXAS—This month's DX records show that 5NW was QSO both Australia and New Zealand, 5SD, 5UJ, 18, (or S2, 5RD, worked N22AC 6SD was QSO ASY and S4; 5UV worked N22AC again.

The chance for storm relief work came, and Texas A.M. met the call promptly. On Sunday, January 20th, most of North Texas telegraph and telephone wires were in trouble with a heavy ice—beating the record of last year. After the return of the Postal Telegraph Company at Ft. Worth informed 5ADR of the Star-Telegram force that they might need amateur assistance in handling what is the use of relaying if we don't deliver the message? The 5APX reported his 5ZT type low-wave neutral is building a 5 watter, in addition to his 5G9Q and 5ZAE has been off the air, as his set was out of operation, but Mr. Wall surely is active in A.R.R.L. matters, and his report headlined "Corpus Christi and installed 5ABZ on his yacht, the "Bridge". Amateurs should be on the lookout for 5ABZ'S. Corroy, of San Angelo, is again working under his old 120 call, SACC. He has 80 meters. The work he did during the there the W. Texas buzzard (you know which buzzard—D.M.) appeared in every Hearst paper in the U.S. on January 3rd. 5ZAM, 5APZ, and 5CM, 5ASZ, 5AGQ, 32; 5AQW, 9.

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The past month has been one of steady improvement in Canadian amateur affairs. The Wednesday night "prayer meetings" in which all the Canadians participate on 125 meters are a great success, and constant reports are coming in that so many Canadians were never heard on the air at one time before. It was expected, various trans-Continental records were exchanged, and the gang was treated to a two-way message from Halifax to Vancouver and back in twenty minutes, carried out via 1EE, 3NL, 61Q, and 2CG.

In connection with the 125 meter wave, it is pointed out that the Canadian amateur is going to lose this wave in the near future. While the wave is very popular in the Maritimes, there is no possibility that it will be taken from the Maritimes amateurs before the new 125 meter band is available. As the 125 meter wave is not being used by the Central United States conference at Washington some months ago, by which all the shorter wave bands are occupied. We are, however, assured that on the loss of this wave the Canadian amateur will be given another wave of probably 6 meters in width and probably slightly shorter in wavelength which will be back in twenty minutes, carried out via 1EI; ClNI. f>BJ.

Canadians will probably be between 115 and 120 hours in force in that Province. At the present time it seems necessary to get around the inactivity, but we may be able to get our Eastern stations on a little later and in that way to move the time forward and satisfy the Western end of our relay chain.

Another item in connection with our relay work on this wave for test purposes. Reports will appear in later issues of QST as to the results achieved during these tests.

There is also a scheme on foot for the establishment of a relay chain operating in the 40 meter band to make some daylight tests on these waves. Preliminary runs and useful work have already been made with British stations to listen on Wednesday nights from 5:30 A.M. to 9:30 A.M. with the idea of having a British relay chain. This chain will be in active operation by the time this appears in print, and no doubt further reports will be established.

The southern portion of Ontario is within the region of total eclipse on January the 24th, and two Toronto Stations are to transmit special signals during this time for test purposes. Reports will appear in later issues of QST as to the results achieved during these tests.

This month has seen the arrival of several new stations in the Maritime which have been promised for a long time and it is with great pleasure that we are able to give the readers a list of these new stations. Things have happened so fast and marvelous in amateur radio during 1925, which is only one month old, that it is hard to predict what will happen in the next month. Support goes in, and it takes claim to prominence among the gang for having worked CBD in Argentine on January 25 and has the honor of being the first Maritime and the second Canadian station to become QSO with the Argentine, 3XL, being the first Canadian to work him just one hour ahead of 1DD. In addition to this super DX on 85 meters, 1DD, has been working a lot on 40 meters and has worked 1000 miles at noon. It will interest the gang generally to know that one station, i.e. 2CG of Meters, was a German with whom he worked at noon on 40 meters was able to work consistently with the Maritimes using one 201A with 350 volts on the plate, a feat which we in the Maritimes have not yet been able to perform. This dawn daylight DX 40 meters seems to be the choice. 1EB did some useful observation work on 80 meters during the eclipse of the sun and managed to work 1000 miles from those areas affected by the eclipse were equal to those conditions that prevail at night. The regular Wednesday night trans-Canadian contests have been a great success, and among the stations heard on the job were 1AM, 1AB, 1AF, 1EI, 1AI, 1AE, 1CO, 1DJ, 1AW, 1DD, and 1AR. It will be noticed that 1EB has handled 1000 miles on 40 meters.

The Maritimes have been a bit slow this month, with 1ARs special mention for having brought PEI back to the fold with a splendid signal. 1AR is working the whole world from Ft. Rich. 1CO deserves special mention for having brought PEI back to the fold with a splendid signal. 1AR is working the world with 100 and 125 meters.

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QUEBEC DIVISION

J. V. Argyle, Mgr.

The D.M. wishes to express his pleasure at the mark of confidence in being re-elected by acclamation, and to assure the boys that he will do at least as much for the Division in the future as he has been able to do in the past. All existing appointments are hereby renewed.

This month was not so active as the last in the sense of long distance traffic handling, but the general average was well maintained. Traffic honors go to 2BE, he handling the rather weak list this month. 2FO and 2AX are two of the most enthusiastic keystrokes, and 2FO handled 26 QSOs in Porto Rico and generally is reaching out better and more often. 2AX is making an O.K. effort. The requests that sections' ears open on 155 meters Col. is, working on 125 and 80. 2FI and 2CG have done some experimenting on 40 meters and have been steadily recalling and running TXPs. The D.M. feels that this is a good move on the part of 2FI and 2CG and hopes that they'll try to do more.

There are some very pleasing rumors around of an honest-to-goodness 4-station of 100 watts opening up in Canada. We're wishing for that for three years. Some day we'll have a station in Three Rivers too, then stamps will be saved by ions.

Traffic: 2BE, 48; 2CI, 28; 2AZ, 7; 2BN, 18, 2CG, 15; 2FI, 10; 2AU, 15, 2AM, 53.

VANCOUVER DIVISION

A. J. Ober, Mgr.

Traffic skidded a great deal with no regular routes going. Most stations are scattered between 250 and 125 meters, and the old stations seem to have left the air or ducked down in the swing of the QRM mill. Let's make 125 meters a traffic avenue, maybe going across Canada. Our batting order will be in these pages again, because we will have something to hit at. The D.M. Relay is still going good but have not been able to hook the wood for the last count.

VANCOUVER—The Vancover gang has had the best winter in radio that it ever had. "High Tension" Library of a gang做out. 2AV also connects with the New Zealand gang on four occasions and with Australian 2BH, 2CC, 2FO also connects with New Zealand. (2FO, OM's I hope it continues—D.S.) 5HA handled 23 QSOs. 5BZ has been blowing tubes almost as fast as he can buy them, but mostly QSOs to 2AV and with a lot of new QSOs, including 2AV. 2CG is also kiting about "rotten" traffic— he says why the "Sam Hill" don't the gang rustle some messages and start them, and there would be no more ORFing. He handled 9 messages. 5BJ was laid up in bed for over a week and that knocked his traffic total on the head. 6 Mags was the count. The 5DS and 5CU combination, a new O.R.S., takes the cake this month for traffic handling and QSOs. That's very FB, OM's! 5HS says there is more traffic on short waves than on the longer waves. (This seems to be an up and down question with all stations—D.S.) After going down on short waves 5HS's flyer went "West". "Me thinketh this short wave business he very profitable, for the "Skidder" here. 5HS handled 10 mags—he got stuck with 8 which he had to mail. H11 5GF handled 19 messages. So far, he and 5GS are the only ones who can work reliably on 125 meters for the Trans-Canada Relay Route. This is an excellent channel for routing messages to the east every Wednesday night, and should be more patronized.

ALBERTA—4CW has sold out and it looks like he means it this time. 4GT has dropped to short waves but did not have a good report. He has a regular "His" in the gang now, and it is sure raises "Came" when nobody else is "Able." 4AX is not on the short waves yet, but says he is recking out in great shape when he is able to be on. 4IO is the star station of the month! He seems to know where to find all messages. He hands in a total of 26 which is FB. 4AB is putting in some chores to overcome the key-itch, and will be on soon. 4DQ is using just one 75 ft. pole now and has dropped to 80 meters.

EDMONTON—4HF is still plugging for new stations. 4JF is on the air but has a very poor location and has not handled much traffic. 4AH is on the air again. He is improving his QSB with a new rectifier. 4HF is moving and may change his operating location. 4IU reports messages are few and far between. He is trying out short waves message total, 4.

VANCOUVER—The little U. S. group is moving. 2OOQG has worked through 201A up to 280 meters, and stations quite inaudible in bright sunshine on 80 and 125 meters. 2GI and 20G have done some experimenting on 125 and 80. 2FI and 20G have done some experimenting on 40 meters and have been steadily recalling and running TXPs. The D.M. feels that this is a good move on the part of 2FI and 20G and hopes that they'll try to do more.

Traffic: 2BE, 48; 2CI, 28; 2AZ, 7; 2BN, 18, 2CG, 15; 2FI, 10; 2AU, 15, 2AM, 53.

WINNIPEG DIVISION

J. E. Brickett, Mgr.

Prince Albert—4FA is now using pure D.C. (90 volts) on a 201A (Low power with a vengeance) (oh. what—D.M.) 4AV has added a dynamotor, and is QSO U. S. G's and 7's. 4CH has received QRM—can't perk below 200 meters.

Traffic: 4AV, 26; 4HH, 21; 4FA, 20; 4FN, 17; 4FC, 10.