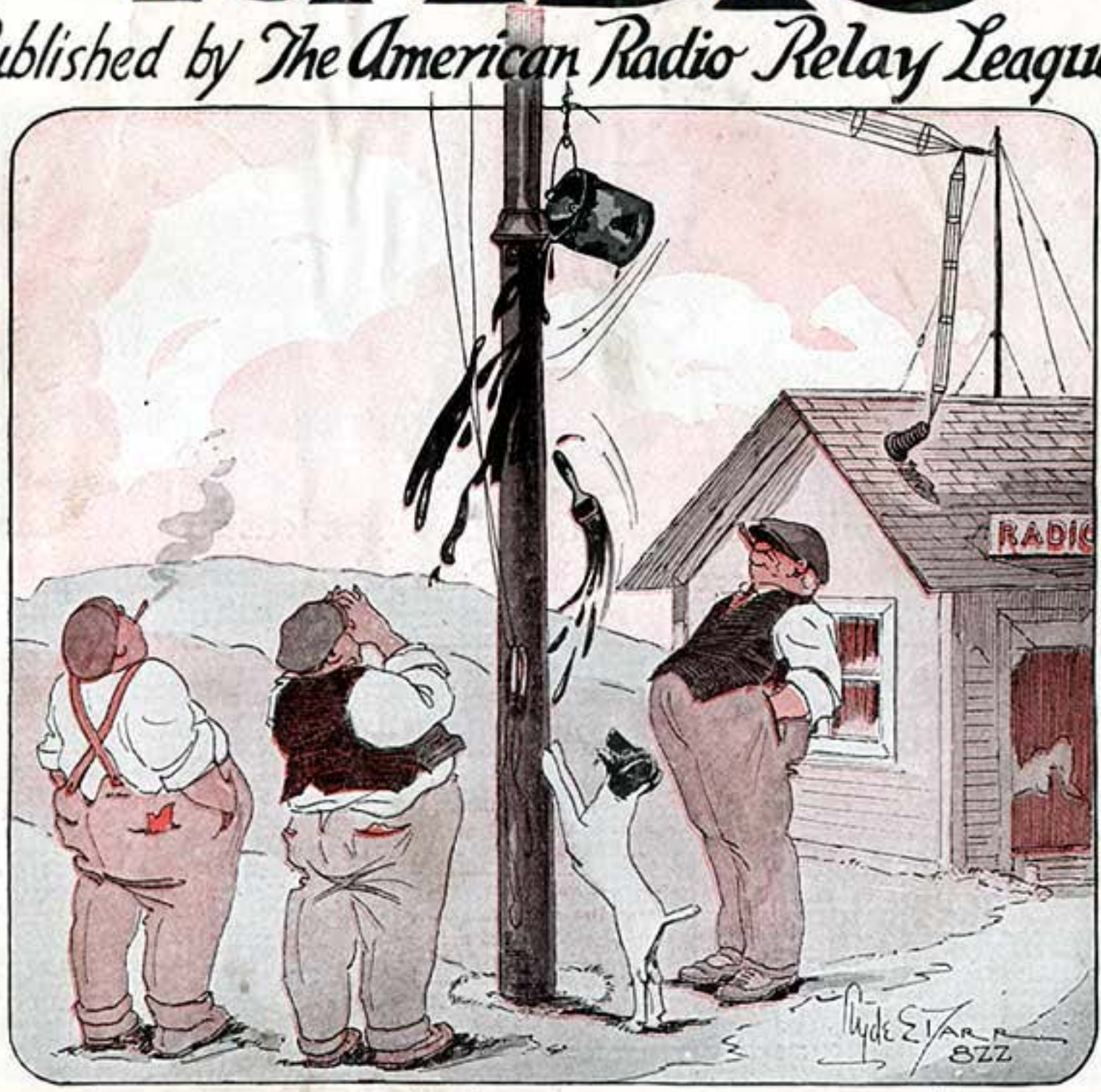
QST

DEVOTED EXCLUSIVELY TO

AMATEUR RADIO

Published by The American Radio Relay League

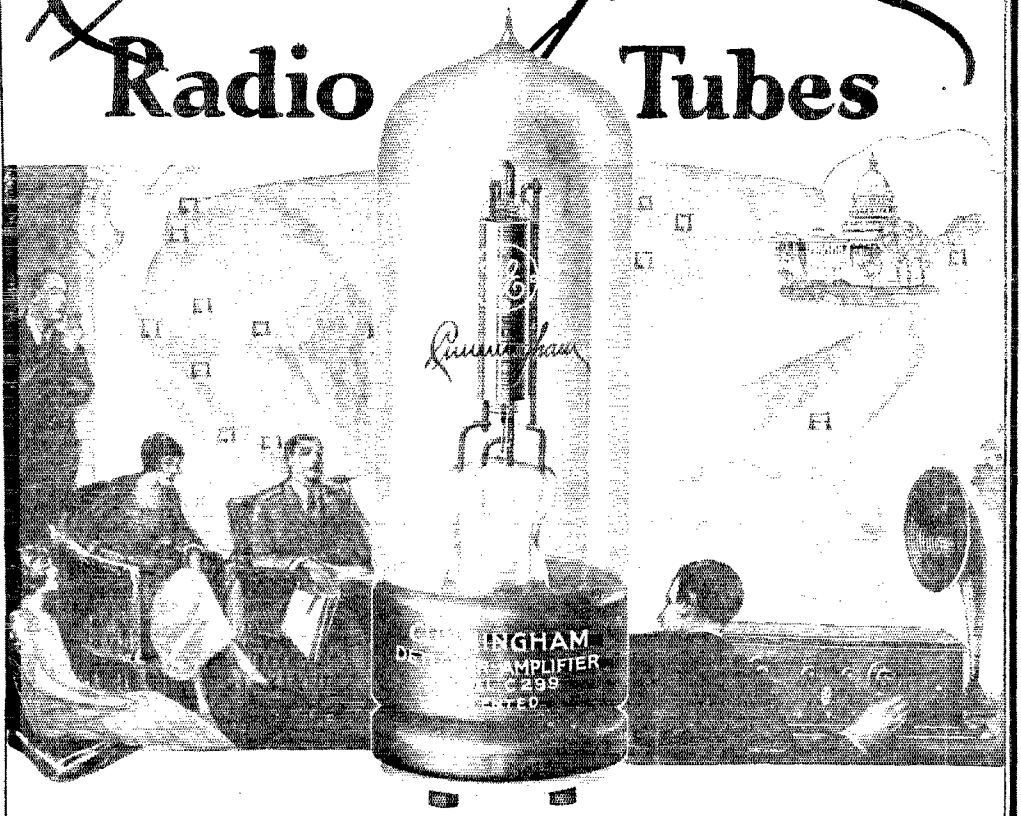


"Hi, Skinny!"

AUGUST
1924

20¢

Cunningham Radio Tubes



Millions will listen-in on the broadcasting of the Presidential Campaign

This year, for the first time in history, it is possible for millions of United States citizens to hear every word of our statesmen in their oratorical battles for the honor of the presidential nominations and elections.

Radio has created a situation that founders of the Nation would consider ideal. It has destroyed the sinister isolation that in decades past has caused strife, misunderstanding and even civil war.

Today these entire United States are listening in on the political campaign. Sectional lines are swept away. A united nation will hear, will ponder, will judge, will vote, from a knowledge of real issues and vital questions.

Radio, the Wonder-Worker, has brought the forty-eight States into a radius no larger than a Colonial town-hall. A new political era dawns, thanks to its magic.

PRICES ON CUNNINGHAM RADIO TUBES

Now in Effect

C-301 A —5 Volts 1-4 Ampere filament	$5.00
C-299—5 Volts .06 amp. Dry Battery Det. and Amp.	5.00
C-300—5 volts Gas Content Detector	5.00
C-11—1.1 Volts .25 amp Dry Battery Det. and Amp. Special Base	5.00
C-12—Similar to C-11 with standard base	5.00

The vacuum tube has made possible this broad and far reaching application of radio telephony and plays the most important part in the operation of your receiving set.

It is now your privilege to enjoy this wonderful opportunity of Radio broadcasting. Specify Cunningham Radio Tubes for clear reception.

PATENT NOTICES. Cunningham tubes are covered by patents dated 2-18-08, 2-18-12, 12-30-13, 10-23-17, 10-23-17 and others issued and pending. Licensed for amateur, experimental and entertainment use in radio communication. Any other use will be an infringement.

Cunningham 40-page Data Book fully explaining care and operation of Radio Tubes now available by sending 10c in stamps to San Francisco office.

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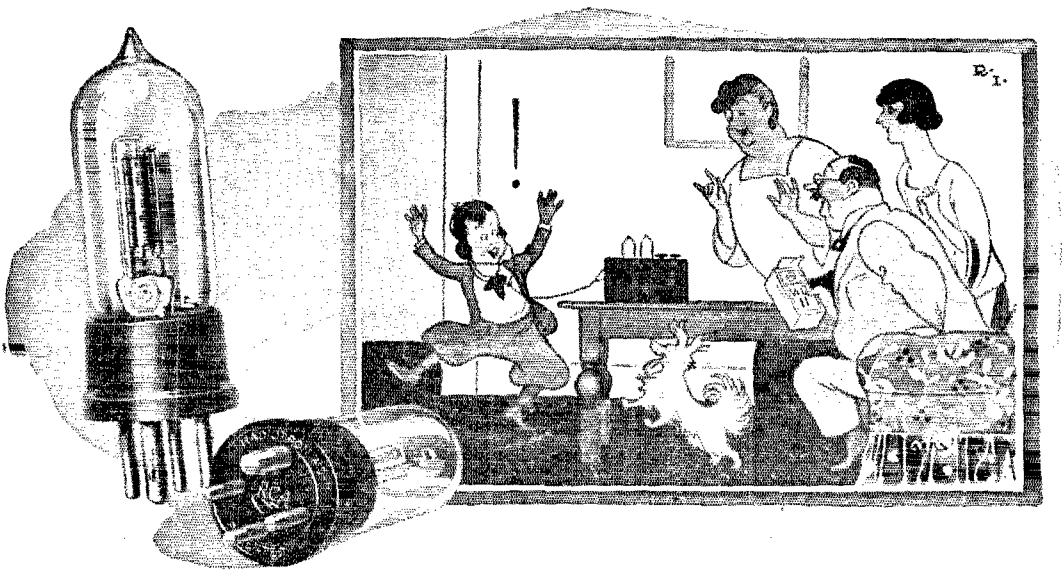

Radiotrons WD-11 *and* WD-12 *Made History!*

It isn't a genuine WD-11 unless it's a Radiotron.
It isn't a genuine WD-12 unless it's a Radiotron.
It isn't a genuine UV-199 unless it's a Radiotron.
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It isn't a genuine UV-201-a unless it's a Radiotron.

You Can Change Your Set to Dry Battery Operation.

If your radio set is equipped with navy type tube sockets, you can change to dry battery operation by inserting WD-12 Radiotrons. Ask your dealer for information as to how this can be done.

These are dry cell tubes—the tubes that made possible the swift progress of radio in the home everywhere. They meant clear tone—undistorted detection — radio and audio amplification — and volume reproduction — all with dry batteries. They meant radio in the city—on the farm — off in camp — everywhere!

And to-day, there are millions of these popular Radiotrons in use. Everybody knows them familiarly as "WD-11's" and "WD-12's." But they are not genuine unless they are RADIOTRONS.

Always be sure to look for that mark on the base, and for the RCA mark on the glass. It's important, whether you are buying a new set with the Radiotrons in it, or buying new Radiotrons to replace old ones. Then you have the genuine — sure to live longest—serve best.

Radio Corporation of America

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RCA

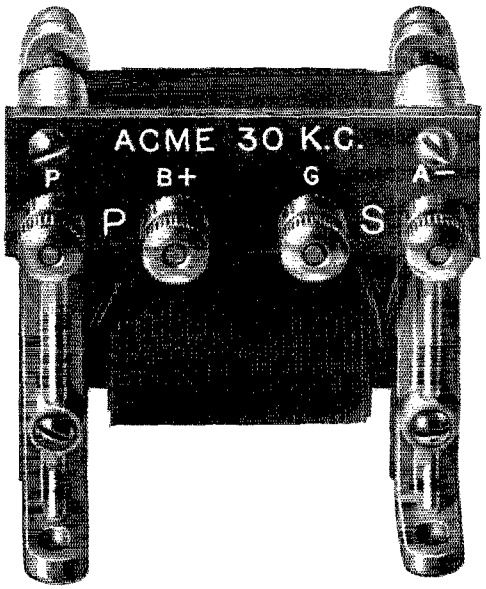
This symbol of quality is your protection

Radiotron

REG. U. S. PAT. OFF.

Use an Acme 30 KC.

for long wave amplification



ACME
30 K.C.

THE success of heterodyne sets depends upon the long wave amplifier you use in the circuit. Introduce an Acme 30 KC. radio frequency transformer into your circuit and improve the results you get. In this respect the Acme 30 KC. meets a real need of the amateur just like all Acme transformers.

We have found in our laboratory that we can run these transformers with the grid return to the negative side of the filament; in fact, we can run them as high as six volts negative. We have also found that it is not necessary to shield the transformer, and that they operate satisfactorily in cascade as high as four stages without interstage oscillation.

Send 10 cents for booklet, "Amplification without Distortion."

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ACME *~for amplification*

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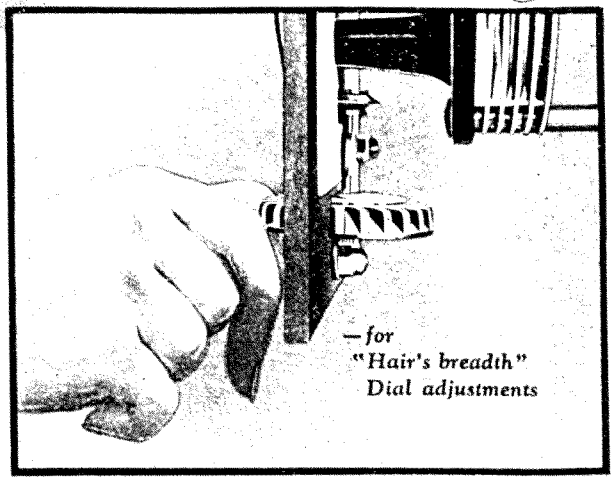
TRADE MARK
REG. U. S. PAT. OFF.

A Device found only on GREBE Receivers



—for "Hair's breadth" Dial adjustments

"WHEN the archer misses the center of the target he seeks for the cause of his failure within himself."

—Confucius

The man who owns a Grebe Receiver seldom misses, for the Tangent Wheel Vernier enables him to acquire extreme accuracy in tuning.

Dexter Tiffin

The Grebe Tangent Wheel Vernier

TO HAVE once experienced the ease with which you can tune in stations on a Grebe Receiver, is to know the value of the Tangent Wheel Vernier.

The keenest appreciation comes, however, when you find yourself instinctively reaching for this ingenious little device below each of the tuning dials on some neighbor's receiver.

This and many other details of Grebe craftsmanship are fully covered by patents granted and pending. These details are sought by the man who looks inside of the cabinet.

Let us tell you more about Grebe Receivers

Grebe Regenerative Receivers are licensed under Armstrong U. S. Pat. No. 1,113,149, Oct. 6, 1914.

A. H. GREBE & CO., INC.
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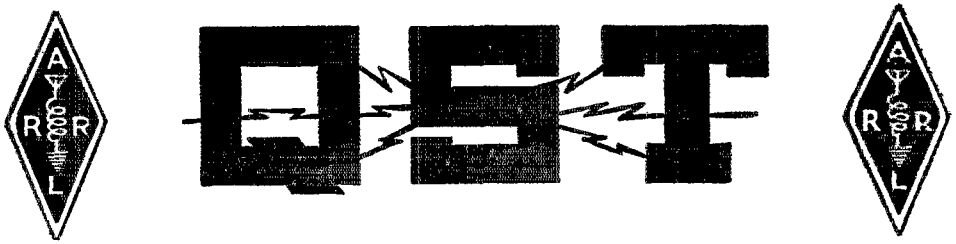
Western Branch: 451 E. 3rd St., Los Angeles, Cal.



The Official Organ of the A.R.R.L.

VOLUME VIII **AUGUST, 1924** No. 1

Q S T is published monthly by The American Radio Relay League, Inc., at Hartford, Conn. Keneth B. Warner (Secretary, A.R.R.L.), Editor and Business Manager
S. Kruse, Technical Editor; H. F. Mason, Department Editor
F. C. Beekley, Assistant Editor

Edwin C. Adams, Advertising Manager

David H. Houghton, Circulation Manager

Subscription rate in United States and Possessions, Canada, and all countries in the American Postal Union, $2.00 per year, postpaid. Single copies, 20 cents. Remittances should be by international postal or express money order or bank draft negotiable in the U. S. and for an equivalent amount in U. S. funds.

Entered as second-class matter May 29, 1919, at the post office at Hartford, Connecticut, under the act of March 3, 1879. Acceptance for mailing at special rate of postage provided for in section 1103, Act of October 3, 1917, authorized September 8, 1922.

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

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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EDITORIALS
de AMERICAN RADIO RELAY LEAGUE

Showing the World

WITH the coming of international amateur radio and especially with the birth of the movement for world-wide amateur organization, another serious responsibility has been placed upon our American Radio Relay League. Do you fellows realize that A.R.R.L. is expected to assume the leadership in international amateur affairs? Do you know that amateurs in every foreign country are looking to us of the United States and Canada to blaze the trail, and as individuals to set an example of amateur accomplishment on which the rest of the world can pattern? We amateurs in North America far outnumber the rest of the amateurs of the world, we have the strongest amateur society and are the best organized, we have had the most experience as an organized group of transmitting amateurs. Ours, then, is the duty of leadership, and the rest of the world is frankly expecting it of us.

It is a heavy responsibility. Our Board of Directors and our officers will plan and execute the part our A.R.R.L. takes as a national association in the development of world-wide amateur radio, but the duty of the American brasspounder is much greater than that. As individuals we are expected to be the best amateurs in the world! When the amateurs in a new country come on the air, they are going to pattern themselves on the hams of the great A.R.R.L. We have seen how our American practices came everywhere into acceptance when transocean communication was established, and it will be the same way in the future. Quick as a flash, now, don't you see the horrible truth? We're not good enough for the world to use as a pattern, our average of goodness is too low. Imagine the new amateurs of Finland or Siam getting all set to burst into the amateur game, and carefully studying American radio as a guide to conduct. Think of what they will hear: the shameful QRM, the wobbly notes, the futile CQ-ing, the minor violations of regulations, the rotten fists! Are these things to be taken as a standard for the world? Don't you see, fellows, that we must clean house?

This end of the job is something that can be handled only by each one of us as an individual North American amateur Each one of us, on his own, is confronted with the job of making himself a better amateur. Every A.R.R.L. member should have the ambition to make himself so good an amateur that it would be safe for the amateurs of the rest of the world to pattern themselves on him.

We have many problems we must solve. First off, we must learn to be more courteous and considerate of each other on the air, conducting ourselves more like the brother-amateurs we profess to be, avoiding squabbles both on the air and in our clubs and councils, and in our operating showing more teamwork and less hoggishness. In our air work we must develop greater efficiency and eliminate lost motion, learn to handle traffic with a snap and to chew the rag like good fellows, throwing our whole hearts into the game and playing it hard, fast and cleanly, according to the rules. There is a lot of messy operating in America and we ought to cut it out, send Continental that can be read, clip these fearfully long calls and CQs, learn when to stop, avoid needless QRM. Remember that our signals can be heard the world over and that we are supposed to be a model!

It is our duty to demonstrate the usefulness of the amateur and to encourage amateurs in other countries, by our example, to do the same thing. When there is a storm and the wires are down, or any other such opportunity to serve, let us be Johnny-On-The-Job and "show the world." Nothing will so much help the amateurs of the Old World to get needed privileges from their governments as a demonstration of their value to the state. Let's show them how. Their continued safety, and ours too, depends on a strict observance of the radio laws and regulations of our respective countries. In that respect we must be the best country, not the worst. B.C.L.'s exist all over the world now, too, and the policy of the helping hand to the listener-in was never so important as it is now.

But thruout all this efficiency and machine-like precision we must retain our "humanness" and our spirit of fraternalism, for it is in the development of a world-brotherhood that Amateur Radio has its greatest opportunity to serve us. After all, radio is our servant, a hobby which we all enjoy, and there is no reason why we should permit it to destroy our individualities and reduce us to automatons. We have rules and system because coördination and teamwork are essential to our sport, but we must retain our perspective and remain live human beings, not victims of our own machine.

Technically we have a long way to go. Because most of us crowd the daylight out

of our tubes and suck the line dry clear back to the power-house every time we press the key, our notes wobble all over the lot and our waves rarely stand still. We tear up the neighborhood with a brutal key-click and a supply growl that cries to high heaven of misplaced ingenuity. Briefly stated, what we must master in transmission is silent plate supply, less power and greater efficiency, clickless keying, notes that are constant, and outputs that remain on one frequency. Until we achieve these things we are no model for the rest of the world.

The internal organization of our association needs hearty coöperation from all of us. We must build up our membership, too, so that our society may continue to embrace all the worth-while amateurs. We should consider it a duty to bring the new fellows into our A.R.R.L., particularly the many thousands of potential transmitting hams created by the popular interest in reception, who now are standing just outside our doors.

These are the most important of the things we must tackle. By overcoming them we will eventually perfect our A.R.R.L., make it a worthy representative of ourselves in international amateur affairs, a constant example to the rest of the world, and a better and more helpful organization to ourselves as members.

James H. Turnbull

In the unexpected death of James H. Turnbull there was lost to us a most energetic radio investigator and a true friend.

Readers of *QST* knew Turnbull through his incisive articles. These articles by no means represent his entire helpfulness to the A.R.R.L.; his interest in us and our affairs was demonstrated by loans of apparatus and by almost daily notes, always to the point, always helpful.

Turnbull's experimental radio work was amazingly comprehensive and varied. At station 2XQ in the radio laboratory of Union College, and at the Schenectady laboratories of the General Electric Company, he carried on a rapid series of experiments that covers the operation of tubes in parallel, short-wave transmission, key click elimination, high frequency dielectric losses, inductance design, antenna field strength and associated subjects. Some of this work has been published in *QST* and additional articles will appear posthumously. Turnbull worked for the late Charles Proteus Steinmetz in his historic investigation of high-voltage cable break-downs. In still another field, that of photography, Turnbull distinguished himself, inventing a number of devices the patents on which were sold to the Eastman Kodak Company.

Such restless activity proved too great a strain and a sudden illness resulted fatally. "Jimmy" will be long remembered, as are few men in radio, by his many friends and associates in Schenectady and by the whole A.R.R.L. membership.

Notice to Our Newsstand Readers

As announced in recent issues, The Traffic Department Report and the "Calls Heard" Department have been eliminated from the newsstand edition of *QST* because our non-member readers in general are not particularly interested in them. This results in a saving in expense which makes possible the publication of a larger and better *QST*.

These two departments are included in the edition supplied to members of the A.R.R.L. If you are interested in them, it is proof positive that you ought to be a member of the League. May we not direct you to the handy application blank appearing on page 87 of this issue?

WWV Schedules

Schedules of Frequencies in Kilocycles

(Approximate wavelength in meters in parentheses)

Eastern Standard Time	Aug. 5	Sept. 5	Sept. 22
11:00 to 11:08 P.M.	125 (2400)	300 (1000)	550 (545)
11:12 to 11:20 P.M.	133 (2254)	315 (952)	650 (461)
11:24 to 11:32 P.M.	143 (2097)	345 (869)	750 (400)
11:36 to 11:44 P.M.	155 (1934)	375 (800)	833 (360)
11:48 to 11:56 P.M.	166.5 (1800)	425 (705)	1000 (300)
12:00 to 12:08 A.M.	205 (1463)	500 (600)	1200 (250)
12:12 to 12:20 A.M.	260 (1153)	600 (500)	1350 (222)
12:24 to 12:32 A.M.	315 (952)	666 (450)	1500 (200)

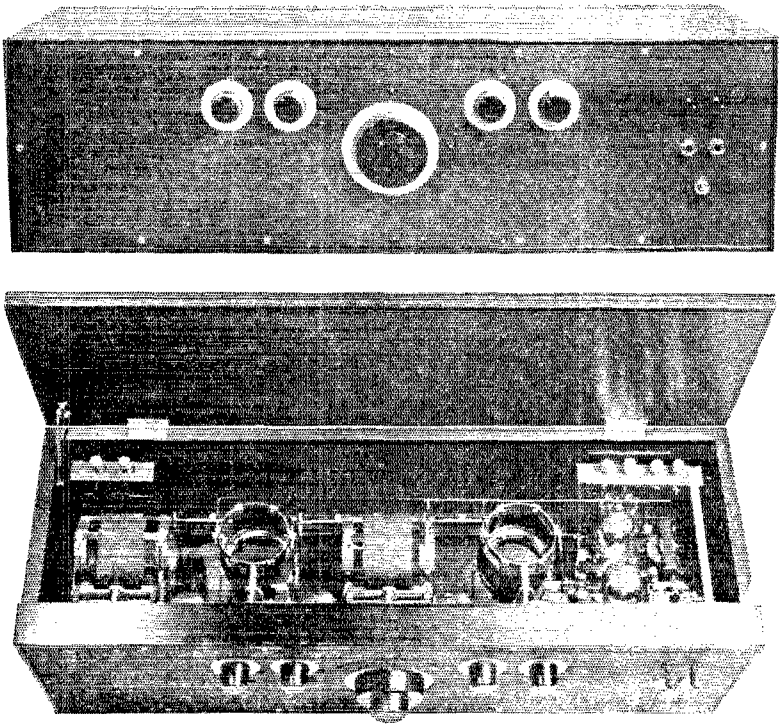
A One-Control Neutrodyne

"The Super Calamityplex"

By J. L. McLaughlin*

There! We always did say it could be done.—Technical Editor.

IT seems to have become the practice of radio designers to give some high-sounding name to every new set that is brought out, whether it be a modification of some fundamental circuit or else an old circuit jacked up with a new panel design and fancy dials. And so, not to be outdone, I have named the set I am about to describe "The Super Calamityplex".



THE ONE CONTROL NEUTRODYNE
One knob to tune with, three to "set and forget".

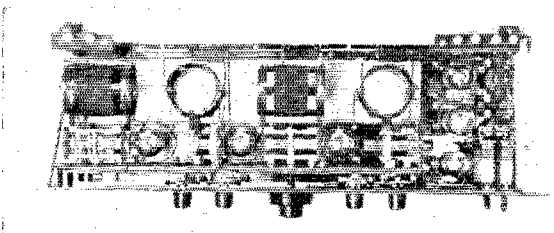
The Super Calamityplex is an attempt to simplify the operation of an otherwise complex receiver. It consists fundamentally of three stages of tuned radio-frequency amplification. Ordinarily such a receiver would call for four tuning controls, one for the antenna coupler and one for each of the radio stages. Such a set would be hard to handle, just as the ordinary commercial neutrodyne requires three controls for two stages of radio. By a mechanical arrangement that connects all of the condenser shafts it is possible in this set to tune over the whole tuning range with but one control.

The Circuit

The antenna coupler and the three radio-frequency transformers are identical. They are of the type used in neutrodyne sets except that the coils are wound on

*Experimenter's Section, A.R.R.L.

skeleton forms instead of solid tubing. The object of this is to reduce the high-frequency resistance of the tuned secondary circuits as much as possible. These skeleton forms are made by screwing 6 bakelite strips to bakelite end rings. The outside



THE SET TURNED OVER ON ITS FACE

Showing the tuning dial on the "master" variable condenser and the three vernier condensers shunted across the other three main variable condensers.

Notice the beautifully simple arrangement—three r.f. tubes in a row, then a detector-and-audio unit at the right. Oh yes—notice that the third small knob is the rheostat, which you can also "set and forget".

diameter is 3½". The primaries are of No. 22 S.S.C., six turns being made into a coil that will just fit into a short tube that slips inside the skeleton frame. This short tube is adjusted to come inside the filament end of the secondary. The secondaries are of the same wire, have 70 turns and are tapped at the 15th turn for the "neutrodon" as shown in the diagram, and as is customary in commercial neutrodynes.

With these transformers the tuning range is 210-560 meters when using a Cardwell condenser of 250 μμ*fd.* (.00025 microfarad) capacity. With smaller coils the range can be made lower as desired.

The adjustments of the condensers so that they all work in synchronism was the difficult part of building this receiver—but once all the tuning circuits were in balance no serious difficulty was encountered.

As an aid to fine tuning three small variable condensers, of three plates each, are used. They need not be adjusted for each change in wavelength but are intended to put the tuning system into balance, after which it is controlled by the single dial. One of these small condensers is connected across the first, second and fourth main condenser; there is none across the third main condenser.

Balancing

The Hazeltine method of balancing tube capacity is used but a little differently from the common neutrodyne practice. The first tube's capacity is completely neutralized, so also is the third, but the second is only partly neutralized. This allows the middle tube to oscillate feebly and helps the strength of weak signals. Any tendency to oscillate too strongly is easily controlled by means of the filament rheostat.

Rheostats

Only one rheostat is used and it controls the radio frequency tubes and the detector, all of them UV-201-A's.

The two audio-amplifier tubes receive their filament current through a Cutler-Hammer resistance unit mounted inside of the outfit. This is adjusted for the proper value and fixed.

The Jack System

The phones and the loud speaker are plugged into the two jacks. Either the phones or the loud speaker can be connected to the detector, the first audio amplifier tube or the second audio amplifier tube, by simply operating these cam switches.

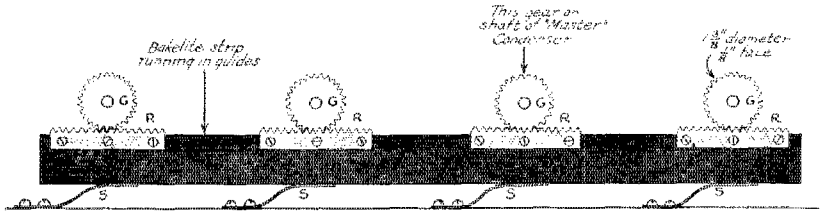


FIG. 1

R Short pieces of brass rack.
G Gears on condenser shaft
S Flat steel springs to keep rack in mesh

The Gear System

The method of connecting the condenser shafts is explained in Figure 1. A 24-tooth brass gear is placed on the shaft of each condenser and temporarily secured with the set screw. The bakelite strip with its pieces of brass rack is now put into position in the guides, which are not shown in the figure or the photograph. The flat springs push the racks into engagement with the gears. The gears are now carefully adjusted on the shaft until all condensers run exactly together. Then the gears are se-

cured into place by soldering so that they will not shift later.

Other things being equal it is desirable to have the gears and racks made with fine teeth. The teeth should be of such design that when the rack is pushed against them the teeth will mesh firmly without binding. All possible slack must be avoided. If these requirements are stated to a gear works they will be able to provide the proper shape of teeth.

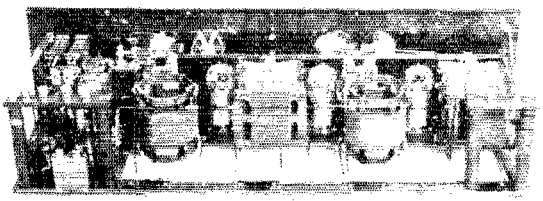
The face width of both the racks and the gears is ⅛".

The Control Dial

The main shaft, that is, the shaft of the third condenser, is run through to the front of the panel and carries an Accuratune dial. Because of the extreme selectivity of a number of tuned circuits working in series, it is absolutely necessary to have a very high vernier ratio, such as given by this dial.

Switching System

The cam-switch circuit is shown in Fig. 2. 1-2-3-4 is one cam-switch, 5-6 is the other. When the switches are "normal" the switch blades 1, 2, 3, 4, 5, 6, make contact with the stationary contacts 1a, 2a, 3a, 4a, 5a, 6a, respectively. When the 1-2-3-4 switch is "up", blades 1 and 2 make contact with 1b and 2b, respectively. When the 1-2-3-4 switch is "down", 3 and 4 make contact with 3b and 4b, respectively.



THE REAR VIEW

Nothing has been overlooked—all terminals are up where they can be reached without acrobatics or extension wrenches, the tuned circuits are inches away from everything, the "neutrodon" condensers are on the rear strip where they are *easily* acessible to the owner when the cabinet is removed, and out of the meddler's way when the cabinet is back again.

When switch 5-6 is "down", blades 5 and 6 make contact with 5b and 6b respectively. To begin with, a pair of phones is plugged into the "phone" jack and a loud speaker into the "speaker" jack. By operating the switches it is possible to put the phones into the detector plate circuit or the first audio amplifier plate circuit, but it is not possible to damage the phones by putting them into the second audio step.

The operation is as follows:

Throw switch 1-2-3-4 to the "up" position, which connects the "phone" jack into the detector plate circuit. To use the speaker in this position throw switch 5-6 "down" and pull the phone plug out somewhat.

Throwing the switch 1-2-3-4 to the "down" position puts the "phone" jack into the plate circuit of the first audio amplifier tube. To use the speaker in this position, throw 5-6 "down" and pull the phone plug.

Two stages of audio would damage the phones; therefore the connections are made so that only the speaker can be used in the last stage. This is done by throwing both 1-2-3-4 and 5-6 to **"normal"**.

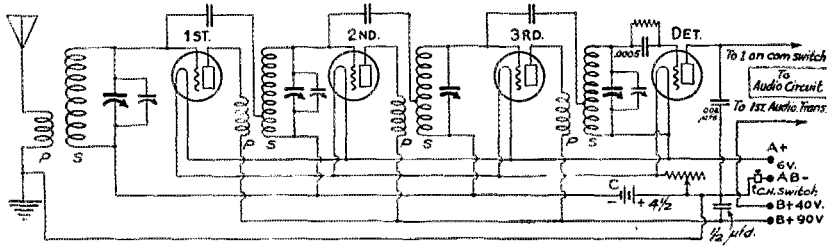


FIG. 3 RADIO FREQUENCY CIRCUIT

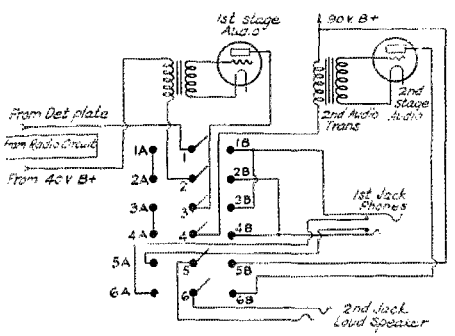


FIG. 2 AUDIO FREQUENCY CIRCUIT

To use two headsets in parallel, proceed as follows. First set switch 5-6 "down". Then plug a headset into the "phone" jack and another into the "speaker" jack. Now throw 1-2-3-4 either "up" or "down" but do not move 5-6 until the phones have again been removed from the "speaker" jack.

Results

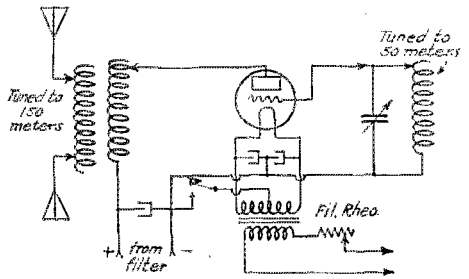
This set has been in operation for quite a time and has given results that compare very well with superheterodyne performance. The ease of control is the finest feature, as stations can be found by turning ONE knob.

Third Harmonic Transmission

By F. Dawson Bliley, 8XC-8GU*

MY first problem on short waves was that of making my antenna operate at 50 meters when its fundamental to ground was about 110 meters.

At first I tried to accomplish this feat with two series condensers, one in the antenna lead and one in the counterpoise lead. This worked fairly well down to about 100 meters but it worked very poorly on waves shorter than 80 meters. I finally got the set to work on 50 meters with some difficulty, only to find that the series condenser in the counterpoise lead did no good whatsoever; the counterpoise could even be disconnected entirely with no drop in the antenna current. Having noticed this (the same thing is true at many other stations—Technical Editor), I began to wonder if the same rule applied to the antenna. I tried taking the condenser out and connecting the antenna directly to the helix. The set continued to operate at 50 meters. I then reconnected the counterpoise without any condenser and found that the set still worked on 50 meters.



THE CIRCUIT AT 8XC-8GU

This kept me wondering for sometime. How did this set, with the antenna tuned to 150 meters, send out a good strong wave on 50 meters? The condition was really as I have stated, for the number of turns in the antenna and in the plate circuit were exactly those I had used when transmitting on 150 meters.

The next thing I did was to listen on all my nearby harmonics to see if they were anywhere near as strong as the transmitted wave, but no, they were all quite faint.

The Secret

The whole secret is this: The antenna and counterpoise, together with the plate inductance, were tuned to 150 meters (checked by wavemeter). Now the circuit used was the so-called "reversed feedback" circuit. It had a condenser shunted across it and had been tuned to 50 meters while the antenna and counterpoise series condensers were in use. While the various changes in the antenna system were being made this coil had been left tuned to 50 meters, and it was compelling the tubes to continue to operate at 50 meters.

The antenna was tuned to 150 meters, the grid was tuned to 50 meters and the set was operating at 50 meters; the set must be transmitting on the third harmonic of the antenna fundamental. (Most authorities call the fundamental the first harmonic which makes the ½ wavelength the third harmonic). The third harmonic would be three times the frequency or ⅓ the wavelength in meters, according to this rule.

Suggestions

The odd harmonics are quite often stronger and more easily found so it seems advisable to use the odd harmonic if transmission is to be done in this manner. One would then be able to transmit at 1/3, 1/5, 1/7, etc., of the wavelength to which the antenna was tuned. For instance it would be possible to work at 30 meters by tuning the antenna to 150 meters and the grid to 30 meters or else by tuning the antenna to 90 meters and the grid to 30 meters.

Experience

After using this set for some time for experiments on 50 meters with NKF and 1XAM, reports came in that the wave had a tendency to shift around. To stop this I thought of coupled circuits. I did not

*450 W. 9th St., Erie, Pa.

think that harmonic transmission would work in this way but was surprised to find the antenna current about the same and the swinging cleared up in fine fashion.

It seems best to tune the grid coil first to the desired wave with the antenna and counterpoise disconnected from the plate coil or the coupling coil. Next both are connected again and the antenna is tuned to an odd multiple of the wavelength of the grid coil. It might help matters a little to try tuning the plate coil.

The grid coil is of 8 turns wound on a tube 5 inches in diameter. The antenna and plate coils are both pancake, each containing about 10 turns of one inch brass ribbon. This set has been used with a 50-watt tube and an input of about 100 watts in noonday transmission to NKF and 1XAM.

At 8XC-8GU somewhat better results have been obtained by bringing the grid coil near the plate coil so as to provide stronger feedback. With this arrangement it has been possible to do away with the variable condenser and to accomplish tuning by using the taps on the grid coil and the capacity effect to the plate coil.

At 1XAQ the arrangement shown in the diagram hsa been used without change and fairly satisfactory operation secured at the fundamental and at all of the odd and even harmonics up to the ninth (nine times the fundamental frequency). The even harmonics should be avoided however as strong radiation on the fundamental is present when they are being used.

A Daylight Relay

This scheme for getting the transmitter down is so simple and the results have been so promising that I wish to suggest a daylight relay on 50 meters. It should be possible to make it transcontinental if all the different X stations will take part. How about it? Will you write me?

Building Superheterodynes That Work

Part III

*Edited by S. Kruse**

A COMPACT SUPERHETERODYNE

For all waves from 60 to 600 meters

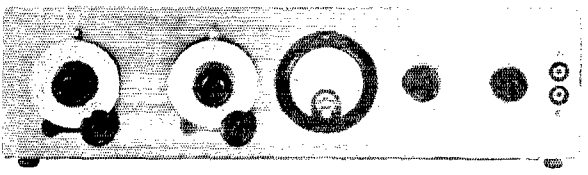
A superheterodyne that can be used for all ordinary purposes is a pleasant contrast—most of those we see today are good for one purpose only.

The receiver described in this article is good for regular reception, 100-meter broadcast reception, ship signals and, with a slight change, amateur work..

This set makes use of a novel construction. The entire set is mounted on a sheet of 1/20" nickeled brass which has been bent so as to act as panel, shield and frame, all in one. The forward part, which is bent up as a panel, measures 4⅞" high by 18" long. Compare *that* with some of the "compact" superheterodynes you have seen. The part of the brass sheet which is left as base measures 8¾" by 18". The rear edge is bent up to make a 1" reinforcing flange which stiffens the base. The whole thing can be slipped into a cabinet if desired.

Tube Arrangement

Naturally the set is designed for small tubes, either C-299 or UV-199. Going across the set from left to right the tubes are arranged as follows: 1st detector, 3 stages of long-wave radio, 2nd detector, oscillator. This unusual arrangement gets the oscillator far away from the first detector.



A Compact Superheterodyne

Transformers

In a compact set it is strictly necessary to use transformers that have very little stray field. In this set the shielded iron-core General Radio transformers, type 271, are used. They are set within ¼" of each other yet there is very little trouble with coupling between stages or with long-wave

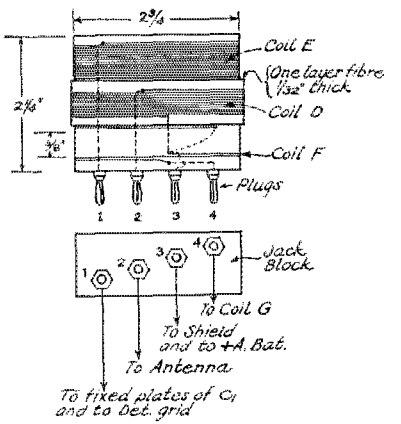
*Most of the contributors to this series have been mentioned in Parts I and II. The editor here wishes to give thanks also to Mr. Henry A. Raud, R. B. Bourne, Don Canady, H. A. Snow of the Radio Frequency Laboratories, Inc., H. S. Bixby of 8AKN, Raymond Moore of 6ARX, R. T. St. James of the St. James Laboratories, and Brent Daniel of The Radio Instrument Company.

station interference. The metal cases of these transformers are grounded to the brass sheet which supports the set.

The Input Tuner

The input tuner is shown in Figure 1. It is intended for use with a small single-wire antenna not over 25 feet high and 50 feet long. For this reason the coupling between primary and secondary is made as close as possible by winding the primary right on the secondary. Both circuits are tuned by means of the secondary condenser C_1, Fig. 4.

If one wishes to use a larger antenna this scheme will not work very well as the tuning will become very broad. It is then necessary to add a primary circuit which is tuned and is very loosely coupled to the secondary merely setting the primary coil near the set. A convenient way of doing this is shown in Fig. 2. Another convenient way of doing the thing is to put an ordinary tuned "wave trap" into the antenna and use



A - TUNER FOR SMALL ANTENNA

ALL WINDINGS NO. 26 S.C.C.

	60-180 METERS	200-600 METERS
COIL D	3 turns	10 turns
COIL E	18 "	60 "
COIL F	1 "	2 "

IMPORTANT NOTE

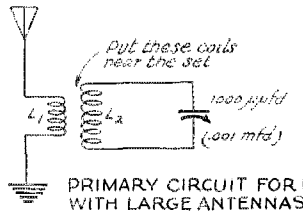
Lowest turn of coil D at same height as lowest turn of coil E

The short-wave coils must have their turns spaced so as to make the length of the coils as follows:- Coil D - 7/16" Coil E 1 7/16" This permits the use of larger wire and double-cotton covering in the coil E if desired.

FIG. 1

it as a primary, the trap being put near the receiving set. This is especially handy if the trap has several coils so that the wavelength range may be changed as desired.

When using loose coupling it is not very satisfactory to use an untuned primary—



PRIMARY CIRCUIT FOR USE WITH LARGE ANTENNAS

L_1 – *10 turns any sort of wire wound so as to fit closely inside ordinary honeycomb coil*

L_2 – *Honeycomb coil. To cover range from 60 to 600 meters use following coils: 10 turn 35 turn, 50 turn. The 10 turn coil will have to be made by stripping down a standard coil*

This circuit is improved somewhat by using a larger primary with taps and then one might as well go to the other circuit shown below

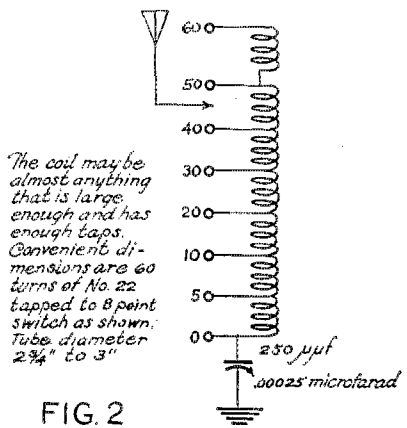


FIG. 2

TAPPED PRIMARY FOR USE WITH LARGE ANTENNA

especially not when the set is to cover the entire range from 60 to 600 meters.

The Oscillator

The oscillator, Fig. 3, is of perfectly normal construction and uses the well-known Hartley circuit. Its location is different from the ordinary; it is kept *as far from* the tuner as possible. This is as it should be—regardless of custom to the contrary. On weak signals the set can be operated without any more coupling between the tuner and the oscillator than is provided by the fact that they both use the same batteries. On stronger signals a little more coupling is needed and therefore a loop is pulled out of the oscillator circuit and carried over to the tuner where it is wound twice around the tube three-eighths of an inch below the secondary. This is shown in the diagram

and in the drawing of the tuner. The oscillator is tuned by C_2.

The Plug System

The tuner and oscillator coils are especially designed for easy removal so that the wavelength of the superheterodyne may be changed rapidly. If the set is left out in the open or provided with a cabinet having a hinged lid the coils can be readily interchanged since each of them is wound on a tube provided with four spring plugs fitting into the four sockets of a special mounting strip. The operation of these plugs and sockets is beautifully smooth and in considerable contrast to most types of plugs. It is indeed a pleasure to be able to make a positive contact with a multiple plug.

The oscillator coil may be inserted either way without affecting the operation of the set. The tuner must be plugged in correctly, otherwise the set will not operate. No damage results if plugged in wrong, however.

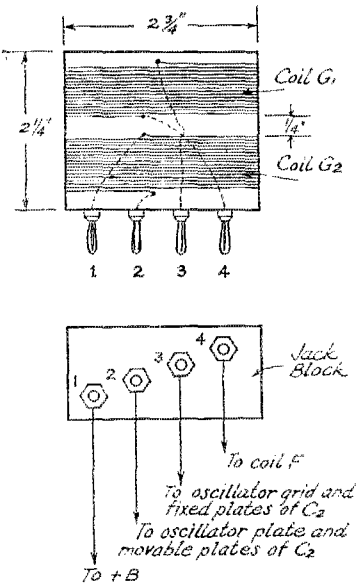
The Voltmeter

The set is provided with a Weston Model 301 voltmeter. This may seem an extravagance but is probably a good investment in the end as the C-299 and UV-199 tubes burn out with discouraging promptness when they are run on too high a filament voltage.

Rheostat and Potentiometer

Only a single rheostat is provided. It is in the negative A-battery lead and takes care of all of the filaments; see Fig. 4.

The potentiometer is in the grid return of all of the long-wave amplifier tubes and controls the amplifier. Best results seem to be obtained when the amplifier is not too near the oscillating condition. If such a set is to be used for continuous wave reception it might be a good idea to lead the grid of the tube just before the second detector to another potentiometer so that this tube could be made to oscillate separately.



OSCILLATOR COILS

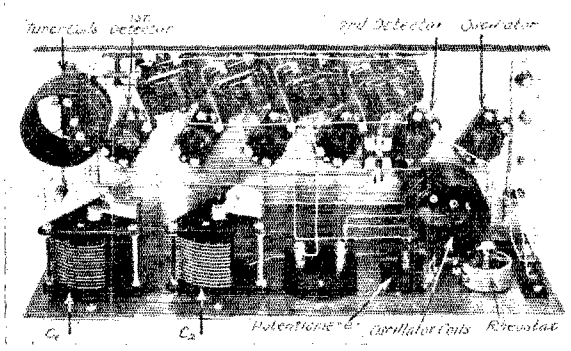
All windings No. 26 S.C.C.

	60–180 METERS	200–600 METERS
COIL G_1	18 turns	60 turns
COIL G_2	18 "	60 "

IMPORTANT NOTE

The turns of the short-wave coils must be spaced so as to make the coil-lengths as follows: Coil G_1 — ¾" Coil G_2 — ¾"

FIG 3



The compact superheterodyne turned over forward to show construction

General

It will be noticed that the set has no audio amplifier. It is not intended primarily to make the maximum possible amount of noise but to receive distant stations. An audio amplifier can be added in place of the phones if one wishes. This amplifier need not be special in any way at all.

The output of the set is brought to a pair of special jacks on the panel. An ordinary jack which will fit standard plugs could be used instead.

The condenser dials carry a gear slightly smaller than the metal dial. The vernier knob is on a spring arm and just below the vernier knob there is a small micarta

pinion which meshes with the gear on the dial. This gives a vernier having a ratio of about 6 to 1 without requiring a vernier shaft.

C.W. Reception

C.W. reception may be accomplished by using a separate potentiometer on the grid of the last amplifier tube and letting it oscillate to create the beat note.

A more reliable way is to use a second oscillator. This second oscillator must of course be a long-wave affair. There is no need to give details—the same sort of circuit may be used as in the first oscillator with no change except using two 750-turn

The diagram, Fig. 5, is mostly self-explanatory. The first tuned circuit for the intermediate-frequency amplifier is put right in the place where the phones normally go with no changes whatever. 10,000 meters was chosen for the frequency of the long-wave amplifier. I used a separate coupler with small mutual inductance both before and after the radio-frequency amplifier. The detector in the tuner is used as an autodyne in the same manner as when the tuner is used in the regular way, the only difference being that two points will be found on the tuning condenser where the same signal comes in. An autodyne detector for the final frequency conversion is

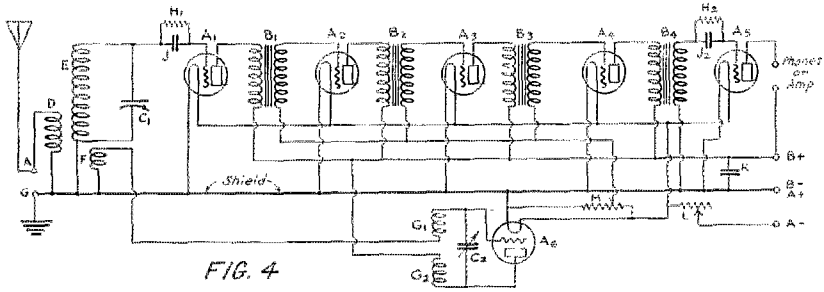


FIG. 4

The Compact Superheterodyne Circuit

A1, A2, A3, A4, A5, A6—C-299 or UV-199 tubes.
B1, B2, B3, B4—General Radio Co. transformers type 271.
C1, C2,—General Radio type 247 H condensers.
D—Primary coil.
E—Secondary coil.
F—Pickup coil.
G. G Oscillator coils.
H1, H2,—One megohm Daven grid leaks.
J1, J2—Micadon fixed condensers, capacity .0005 microfarad.
K—General Radio .4 microfarad fixed paper condenser, type 236.
L—G. R. Co. rheostat, 10 ohms, type 301.
M—G. R. Co. potentiometer, 200 ohms, type 301.

honeycomb coils in place of the coils G_1 and G_2.

This is an *additional* oscillator; the first oscillator is used as before. This second oscillator need not be adjusted often—it can be left alone most of the time and tuning done with two controls as before.

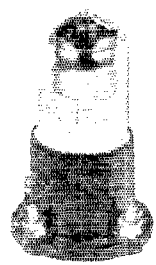
Still another way of doing the thing is to make the second detector oscillate. The way of doing that is shown in another article of this series and will not be discussed here.

THE REINARTZ TUNER WITH THE SUPERHETERODYNE

By R. B. Bourne

I thought it might be of interest to the fraternity to present another use for the Reinartz tuner. This is the circuit I used in copying European amateurs and it is so simple to handle that perhaps some who would otherwise balk at a superheterodyne might be tempted to try it.

used instead of a detector and separate heterodyne. To receive spark signals simply put a piece of tinfoil between the coils in the second autodyne. This is a crude way to accomplish the results but I have found that even music can be brought in undisturbed in this manner. The circuit is, however, primarily for C.W. I never listen for spark any more anyway.



St. James Air-Core Transformer In Vacuum.

6KA, 6ZZ, 6XAD have been heard all over the place with this circuit. Western Electric J tubes were used for the first and last detector and Western Electric L tubes for the radio-frequency amplifier. When all the preliminary adjustments have been made the tuner functions with characteristic ease over a wide band of wavelengths and is no more troublesome to tune than as ordinarily used. The selectivity is re-

markable and a swinging C.W. signal will sometimes go right out of sight in intensity before becoming inaudible through tonal reasons.

THE FAMOUS SECOND HARMONIC

There has been a good deal of puzzlement about the idea of introducing the second harmonic frequency, as is done in the Radiola superheterodyne. The purpose of this is to reduce the number of tubes required. The same tube is made to operate as the first detector and as the oscillator. In other words this tube is made to act as an autodyne detector. It is necessary to explain in detail what is done to show that there is actually anything new about this.

We quote here from the talk "The Story of the Super-Heterodyne" by Mr. Edwin H. Armstrong as given in Volume 3, No. 2, of the Proceedings of the Radio Club of America.

"As a matter of fact this (autodyne) was one of the very first things tried in France but, except for a very short wavelength, it was never successful. The reason was this: if a single tuned oscillating circuit was used the detuning to produce the proper beat caused a loss of signal strength which offset the gain of a tube. If two tuned circuits were used in the oscillator, one tuned to the signal frequency and the other to the heterodyning frequency, then . . . . a change in the tuning of one circuit changed the tuning of the other. The solution of this problem was made by Houck . . . . Houck proposed to connect the two tuned circuits to the oscillator, a simple circuit tuned to the frequency of the incoming signal and a regenerative circuit adjusted to oscillate at such a frequency that the second harmonic of it, beating with the incoming frequency, produced the desired intermediate frequency (which was to be amplified).

"The general arrangement is illustrated by Figure 6. In this circuit A is tuned to the incoming signal, circuit B is tuned to one half the incoming frequency plus or minus one half the intermediate frequency, and the circuits C and D are both tuned to the intermediate frequency. By reason of the symetrical action of the tube there are created in the circuit a variety of harmonics. The second harmonic combines to produce beats with the incoming signals of the desired intermediate frequency . . . . On account of the fact that circuits A and B are tuned to frequencies differing by approximately 100% a change in the tuning of one has no appreciable effect on the tuning of the other. This arrangement solves the oscillator problem and in addition practically eliminates radiation."

ONCE MORE—THE "FILTER"

(For The Last Time)

The form of "filter" can be argued about endlessly—the correctness of *calling* it a "filter" is also a thing that can be wrangled over—in fact we have already done it in these articles.

But all this does not clear up the "wherefore" of the so-called "filter." What *is* its excuse for being there?

There is a double answer because two possible reasons can be given.

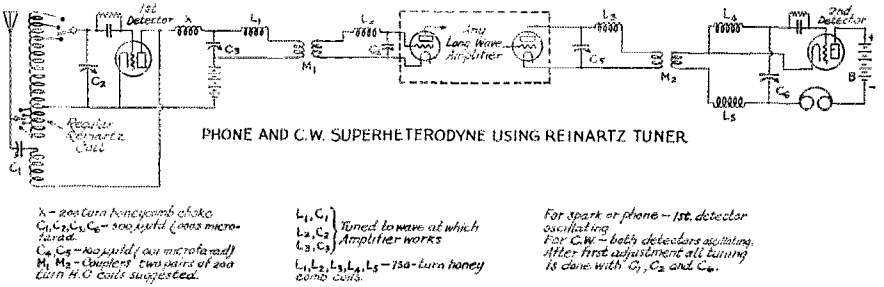


FIG. 5

1—The condenser-tuned transformer which is being called a "filter" is sometimes used to provide sharper tuning than is otherwise obtained with an amplifier in which all the transformers are quite broad. This use of the "filter" has been fully explained in these articles. It mainly applies to broadly-tuned iron-core transformers.

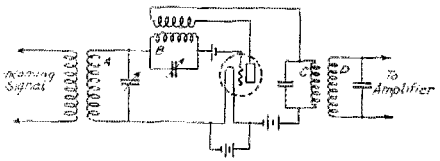
2—When a long-wave amplifier insists on oscillating it is sometimes very helpful to put in one transformer that is deliberately tuned to a different wavelength. With iron-core transformers having fairly good curves this is not necessary—nor is it necessary with air-core transformers as a rule. With very sharp transformers such a detuned stage may really be needed.

Where Should It Go?

From the above it will be seen that the "filter" can be at the start, center or close of the amplifier. Just which is the best location—or whether it is needed at all—must be found by experiment with each set.

THE B BATTERY

In a superheterodyne that uses anywhere from five to nine tubes it is natural to expect one will need larger batteries all around. The larger A battery is of course provided as soon as the operator notices that the filaments will not burn up to the proper temperature. Curiously enough the B battery is generally neglected and a good



The fundamental circuit of the second harmonic method of producing the oscillator frequency

FIG 6

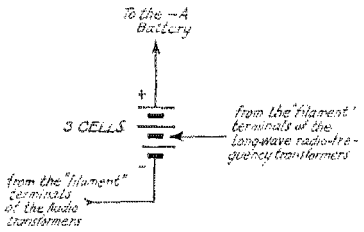
many superheterodynes (and for that matter other sets using many tubes) are handicapped by an insufficient plate supply.

If 201-A tubes are used it is especially important that the plate supply be ample. Storage B batteries are best but if dry cells must be used, be prepared for more frequent replacement than on smaller sets.

THE C BATTERY

A C-battery may be used in the intermediate frequency amplifier of the superheterodyne if desired. It is not particularly necessary unless excessive plate voltage is being used. With voltages up to 45 this complication may be avoided. However, if high plate voltage is being used the C battery should be provided and should be made adjustable so that voltages of 1½, 3 and 4½ may be obtained.

The audio frequency transformers should receive the full 4½ volts of the C battery



THE "C" BATTERY

FIG. 7

at all times if any plate voltage above 40 is being used; see Fig. 7. This is especially true with strong signals.

WHERE TO PUT THE PICKUP LOOP

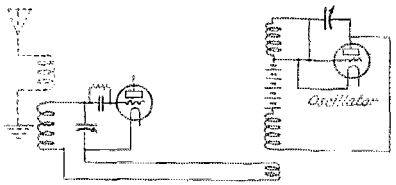
A number of our members seem all fevered up as to the relative merits of pulling a loop out of the secondary circuit and running it to the oscillator as in Figure 8A as against the other idea of pulling a loop out of the oscillator circuit and running it over to the secondary as shown in Figure 8B.

Personally we are entirely for the second scheme. It does not matter very much if the resistance of the oscillator is raised a trifle by putting a few extra feet of wire in it and running them next door to a lot of other things, but such practices are not much good in a tuned secondary, especially when there is no regeneration control.

THE "ULTRADYNE"

"Ultradyne" is a name that has been applied by Mr. Robert LeCault to a special form of superheterodyne devised by him and first disclosed in *Radio News*.

In the "Ultradyne," Fig. 9, the first detector does not receive its supply from the



Pickup coil looped out from secondary

FIG 8-A

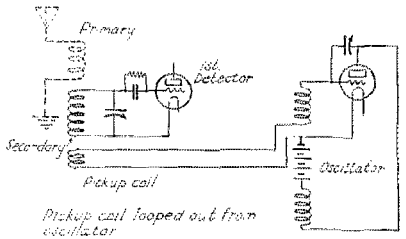


FIG 8-B

B battery but insead operates with an alternating current plate supply. This alternating current is of radio frequency and is supplied by an oscillator of the usual type. The action, as explained by Mr. LeCault, is that the incoming signal through the first detector "modulates" the radio frequency from the oscillator.

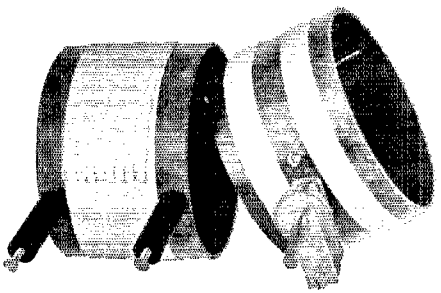
It should be pointed out here that the performance which takes place is not what one would ordinarily describe as modulation. The incoming frequency and the oscillator frequency are mixed in the plate circuit of the first tube in quite the usual fashion and the resulting intermediate frequency is produced by rectification in quite the usual fashion also. The difference lies mainly in the absence of an underlying direct current in the detector plate.

The claim will be made that the first tube in the "Ultradyne" acts in an unusual

fashion because it operates without a grid leak and condenser. To this one can reply that this is characteristic of the tube and not of the circuit; *the same tube will do the same thing in the ordinary superheterodyne circuit*—try it and see.

Ultradyne Advantages

Because the energy of the oscillator is not fed into the loop (or tuner secondary) this circuit usually radiates less and causes less local interference.



Branston Antenna Coupler. The tapped coil at the left is the primary which is mounted in fixed position. The movable coil at the right is the secondary. Especial attention is invited to the loose coupling.
(Courtesy Eastern Cycle Co., Hartford.)

While not willing to make an argument of the matter, the editor also has become convinced that this circuit is distinctly more sensitive than the usual one when weak signals are being received.

Ultradyne Disadvantages

In order to supply enough power to the plate of the first detector, the oscillator of the ultradyne operates at comparatively high voltages. It is believed that this causes the more troublesome production of harmonics which seem to be characteristic of the circuit. If that is the case the cure would be very simple; use a large tube or else operate with a C battery. Such a C battery would of course need to be put right next to the grid of the oscillator. These statements are not made on a sound basis of tube theory but simply on experience in the removing of harmonics in superheterodyne oscillators. The cures mentioned will work although the explanation of them may not be correct. Neglecting selectivity, there is no particular reason for putting a "filter" into an ordinary superheterodyne. In the case of the ultradyne, however, the editor has not been able to secure satisfactory performance unless the first transformer had fewer primary turns and was shunted by a fixed condenser as shown in the diagram. This is easy enough to do, however.

SUPER-HETERODYNE EXPERIENCE

Dr. O. E. Kelly, 5OG

Those constructing their own superheterodynes should understand the following points thoroughly:

1. Keep the parts well separated.
2. Use only the best materials.
3. Shield with 18 gauge copper sheet.
4. Keep all leads away from the shield.
5. Select your tubes carefully. No two are alike. Use a soft or gas tube as the first detector.
6. Use as little B battery on all units as possible.

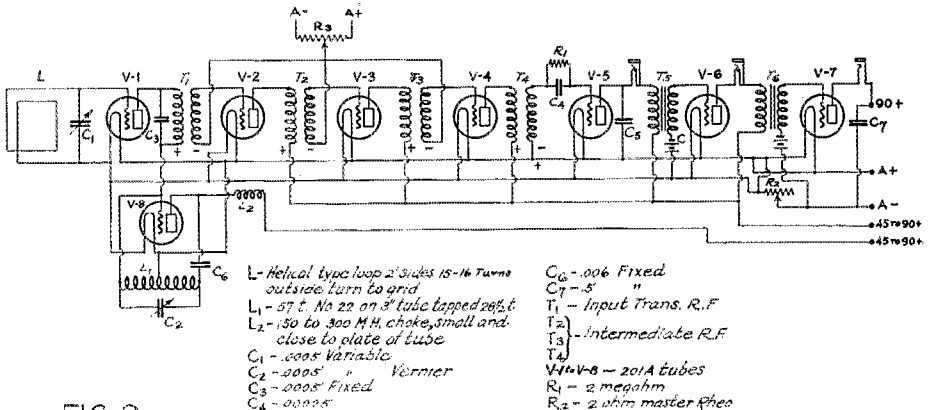


FIG. 9

"ULTRADYNE" CIRCUIT AS USED WITH R.T ST. JAMES VACUUM TRANSFORMERS

7. Use large by-pass condensers (2 to 4 microfarads) across all A and B batteries, also across the potentiometers.
8. Forget reflexing.
9. Forget second harmonics; you will have trouble enough with them without encouraging them.
10. Don't try to do the job in 43 minutes; draw your diagram first and think about it, then do it a simpler way.

11. Keep the oscillator as far as possible from the grid circuit of the first detector.

The Important First Detector

The most frequent mistake of all is the use of 45 to 90 volts on the first detector tube. The average individual seems to expect a feeble signal to work a grid that is violently biased negatively. It will not. Use a soft tube with 4½ to 12 volts on the

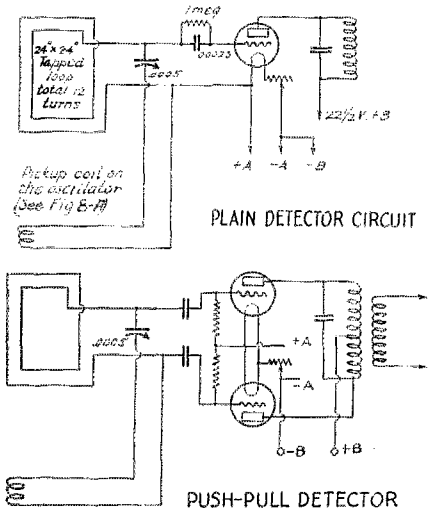


FIG. 10

plate; this will bring in the faint ones; it is the business of the long-wave amplifier to make them strong.

This arrangement will paralyze on strong signals but it is easy enough to detune or to reduce the filament voltage.

Figure 10 shows two detector circuits that have been used. The push-pull circuit has proven more selective. Using this circuit it has been possible to log French 8AB through the local intereference of 10 or 12 sets using alternating plate supply. 2LO, London, was heard under the same conditions. This is considered freak reception, however, as it is not consistent.

Oscillator Coupling

The writer strongly urges that no coupling other than through the "pick-up coil" be used between the receiving loop and the oscillator. Shield the oscillator all around, front, back, sides, top and bottom.

As just stated, keep the oscillator away from the first detector. Fig. 11 shows all about the construction excepting that the tube is about 4½ inches long. This oscillator is far superior to honeycombs, spider webs and particularly to freak oscillators—we have tried 'em all.

The Long Wave Amplifier

Almost any kind of amplifier is good after you get your signal into it. However, about one third or one half of the voltage usually recommended is best. The 201-A tube will work with voltages as low as 10 when it is resistance coupled. If voltages above 45 *must* be used the amplifier should be biased properly, not by guesswork but by comparison and measurements.

All kinds of long-wave amplifiers have been used here yet I still favor the resistance-coupled amplifier. It *does* require more tubes and it *does* require excessive B battery but it also *does* faithfully reproduce the signals that are sent into it.

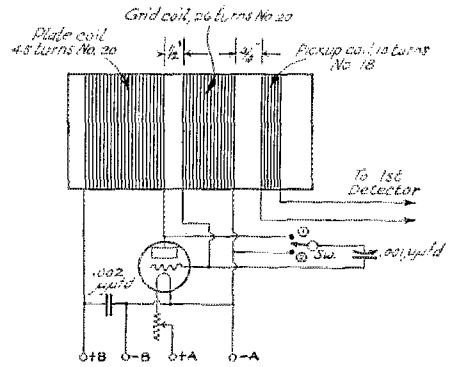
A rather unique amplifier was built by Mr. Gabus of 5XG. In it alternate stages are transformer and resistance coupled, thus using less tubes than the straight resistance coupling and still retaining some of its desirable properties. For those who have the time and money it is worth building. The circuit is shown in Figure 12. The circuit was stable using UV-199 tubes without a potentiometer. The grid leaks are critical and should be of from 10 to 15 megohms resistance.

On the 201-A tube, 50,000 to 80,000 ohms of resistance or impedance is sufficient; anything more than this is not worth the trouble and expense. ("Lavite" resistances are good.—Tech. Ed.)

Most authorities recommend battery voltages from 90 to 300 on the plate. You will get best results using from 45 to 90.

Principles

The real secret of the superheterodyne is to loose-couple every circuit so that its



OSCILLATOR USED BY DR. O S KELLEY

Switch on point 1 — Amateur range
" " " 2 — Broadcast and ship range
Total range 150 - 750 meters

FIG 11

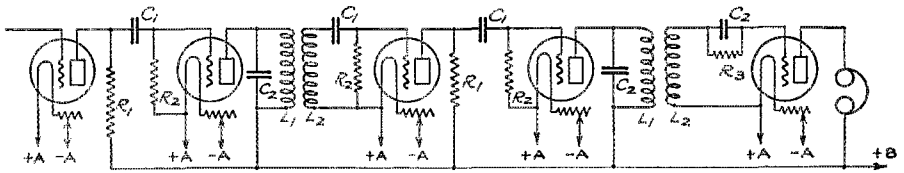
natural period is not affected by any of the other tuned circuits, but the "experts" completely ignore this first requisite. If the

things are loose coupled one gets real selectivity; if they are closely coupled any tuned circuit controls the set. This occurs regularly in most of the sets that are being built today.

By "loose coupling" I mean both electrostatic and electromagnetic.

Shock excitation from strong signals is overcome only by shielding and by grounding the shields. The shields, by the way, should not be around the set as a whole but around the *separate units*.

Don't expect to shield the set and then mount everything right on the shield. It takes special skill to do that. It is much easier to put into the bottom of the set



A composite long-wave amplifier. 1st, and third couplings by resistance, 2nd, and 4th, by tuned transformers. No oscillation control needed.

C_1 - .001 μfd, mica
C_2 - .00025 μfd, mica
L_1 - 250 turn duo-lateral coils
L_2 - 350 " " " "

R_1 - 50 to 60 thousand ohms
R_2 - 10 to 15 megohms
R_3 - 1 to 1½ megohms

FIG. 12

a one inch pine board (dry and well varnished) and mount the apparatus on that.

Conclusion

Bear down on the first two tubes. You can't amplify a signal until you have it. Couple things loosely, use low plate voltage, use wide spacing and little insulation, make the wires large enough, and solder the joints thoroughly.

SUPERHETERODYNE TROUBLE SHOOTING

*By Captain H. J. Adams**

Most things that appear to be very complicated at first glance will be found, in the final analysis, to consist of a chain or series of more simple things.

This is particularly true in the case of the superheterodyne receiving circuit. A standard (the word standard is used as this seems to be the usual number of tubes for a super) 8-tube set will be found to consist of the folowing circuits:

1. A modulator tube (more generally called a first detector) which receives incoming signals of varying frequencies from a collecting agency after first passing through a variable filtering circuit. The latter circuit is the selector by means of which the operator is able to pick out a certain station which is transmitting on a given frequency or wave length.

2. An oscillator tube, connected to a variable resonant circuit which is capable of generating a frequency different from all frequencies to be received in the modulator tube by the difference at which it is desired to amplify the resultant beat note. To put in a little more clearly, the beat note is the frequency difference between the output of the modulator tube and the output of the oscillator tube.

3. An ordinary three-stage amplifier circuit controlled by biasing the grids of the three tubes by means of a potentiometer connected across the "A" battery.

4. A filtering system to select the desired beat note from the amplifier and reject other frequencies, thus preventing other stations than the one desired being heard.

5. A standard detector tube circuit.

6. A standard two-stage audio amplifier circuit. The grids of the tubes of this amplifier may be biased with a potentiometer or by a separate "C" battery. The latter practice is believed to be better.

For the purpose of discussion we will take each circuit separately.

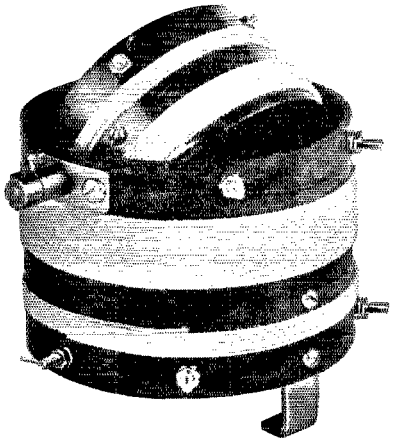
1—The Tuner, Fig. 13

There are three general types of modulator circuits. (a) where it is desired to use only a loop for receiving, (b) where it is desired to use only an antenna, and (c) where both are desired and provided for in a single receiver.

There is no loop set, regardless of the circuit, that will receive over the distance that a good set will cover connected to an antenna, all other factors being equal. True, many people living in a congested city are unable to erect an antenna, but those who can afford a set in the "super" class are people who spend a part of their time in the summer at a resort or camp where it is practicable to erect an antenna and the

*Signal Corps, U. S. Army.

difference in reception certainly warrants the combination set. Now for a few remarks concerning tuning circuits which really are filters. No matter how good a set or what circuit, unless the desired signal is able to trip the grid of the modulator tube, there will be strictly nothing doing. I have seen



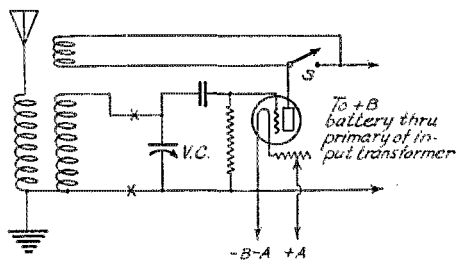
Branston Oscillator Coils. This coil set is mounted back of the panel, adjusted once, and then left alone. The movable coil is the plate coil, the large coil is the grid coil, and the small fixed coil is the pick-up coil which is put in series with the secondary shown in another figure.
(Courtesy Eastern Cycle Co., Htfd.)

many "supers" which never did and probably never will receive a signal from a greater distance than a thousand miles. *The answer is that they had an inefficient (rotten would be a better word) tuning device.* The balance of the circuit in most cases was fairly good but no distant station had a chance to force its minute quantity of energy through the poorly designed coupler, loop, "all loss" condensers, etc.

The tuning coils should be of negligible resistance and distributed capacity kept at a minimum. The coupling between primary and secondary coils should be variable and the minimum coefficient of coupling should be low (not more than 5%). This means that copper should be of ample size, certainly not less than No. 18, and bank wound or otherwise transposed to reduce capacity. There is no coil which will equal the efficiency of the air core coil. Pure collodion used with care to cement the turns of such a coil does not seem to do any harm. By that I do *not* mean to give the coil a *bath* in collodion. The leads from these coils should not be fastened to the shafts of the coils, as "hand tuning" due to body capacity is sure to result. Needless to say, perhaps, all leads should be kept as short as possible and as far from the panel, grounded shields, and each other as construction will permit. The primary coil should have a fundamental greatly lower than that of any station it is contemplated to receive from. Such a coil is generally called aperiodic, and consists of a very few turns of wire, certainly not more than ten, for a set designed for broadcast work. The tuning condenser should be of a capacity squared type for best results and the best that money can buy. Low loss in everything is the secret of successful superheterodyne construction. The grid leaks of this set should connect directly to the negative "A" post of the tube rather than across the grid condenser. A good heavy switch should be connected across the tickler terminals to short it out when loop reception is desired. The large condenser across the batteries is a radio frequency bypass and is necessary.

We now have a GOOD one-tube set by placing a pair of phones and B battery in series across the output terminals of Fig. 13 and opening the switch. The phone cords will serve as a by-pass condenser across the phones although if it was to be a permanent one-tube job, a .001 fixed mica condenser would be better. The set-up just described will be a real DX set and will have selectivity almost unbelievable if properly built. In addition to bank winding, the coils are pied in two sections spaced about three quarters of an inch apart to further reduce capacity. They are supported in special bakelite clamps of my own design which I believe are an improvement over those formerly used. Leads from the rotary coils are heavy pig-tail connections.

Here then is the first test on a "super". If you suspect the tuning unit of being at fault, connect a pair of phones across the output and the result is the answer. Take



A good tuner to start with
NOTE: *When loop is used remove apparatus to left of X, X, connect the loop to V.C and close switch S.*

FIG. 13

the oscillator tube COMPLETELY OUT OF ITS SOCKET BEFORE MAKING THE ABOVE TEST. When testing in this manner, the tube has become a true detector as the signal is brought to audibility and it is no longer a modulator. The action is similar, however, and if signals are brought in you may rest assured that it will

do the same when connected to the balance of the set.

2—The Oscillator, Fig. 14

This part of the set is really a modification of the present much-in-dispute single-circuit receiver. In a "super" this circuit is harmless as its wails cannot pass back through the modulator and get on the air. The energy from the tube is fed back by means of a large tickler coil to the grid, thus causing the tube to oscillate and to generate a frequency to which the oscillatory circuit formed by the coil and condenser is tuned. The tickler coil is not variable. The output from the modulator tube passes near to the oscillating grid coil and the difference between the two causes the beat note. The speech or music is here transfered to the new carrier wave which is of the order of 40 kilocycles. A large coupling coil is not necessary to pick up the output from the oscillaor. About three or four turns one inch in diameter is sufficient. Too large a coil will have a bad effect on the tickler coil in the tuner. The best way to tell whether or not this circuit is working correctly is to series a thermogalvanometer with the variable condenser and grid coil. If none is available and the balance of the set is working correctly, the removal of the oscillator tube will cause the loss of the station to which the set is tuned if the oscillator tube is on the job. If this tube is not working, it is possible that a nearby local station will still be able to force a weak signal through the set. Try switching tubes. When once working, there is very little that can cause trouble in this part of the set and it should be the last place to look for it.

Wind the plate and grid coil on a three-inch bakelite tube about four inches long and in the same direction. Leave a space about a quarter of an inch between the two coils. Connect the plate and grid of the tube to the center windings. Use a one-inch piece of bakelite tubing and wind four turns of wire on it in the same direction as the windings on the tickler coil of the tuner. Place this in the center of the three-inch tube and pivot it with a piece of quarter inch bakelite rod. Use pig-tail wire to connect this little rotor to the tuner output and the primary of the first low-frequency transformer of the intermediate amplifier. You may hear people say that it makes no difference what is used in the oscillator as it is a local circuit and any old thing will do. Nothing could be further from the truth. If you want real sharp tuning and efficient operation it is just as essential to use quality material here as in the rest of the set. The oscillator coil should be shielded from the rest of the set but do not get the shields too close to the coils. When working right, rotating the oscillator will produce a series of sharp whistles in the phones or loud speaker.

3—The Long Wave Amplifier, Fig. 15

The three-stage radio-frequency amplifier is not as critical or hard to handle as one for use at broadcast frequencies. Do not get the idea, however, that liberties can be taken with it. The transformers used must be shielded to prevent picking up long-wave telegraph signals and must be efficient. Air-core transformers are the best. They cannot be built as cheaply as those with an iron core as much greater amount of wire must be used in their construction. There is a vast difference in the quality of the received signals, however, in favor of the air-core type. Also there are no hysteresis losses in the air-core type. Air-core transformers are sometimes called "fixed tune" as the distributed capacity of the windings and their inductance form a circuit which is resonant to a given band of frequencies. However, at 40 kilocycles distributed capacity is not great. Furthermore, in my own transformers, each turn of the windings is transposed which cuts it down to a negligible value. For that reason they will amplify equally well at 30 and 60 kilocycles. This shows that there is not enough capacity present to do much "fixing." A well-designed amplifier of this type should stand

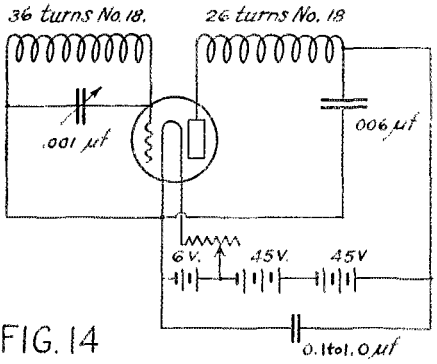


FIG. 14

THE OSCILLATOR

about a five-volt negative grid bias before breaking into oscillation. However, with the inferior tubes that have been dumped on the market lately anything can happen and the amplifier may not stand this much bias. Switching tubes around in a "super" often helps its operation. With C-301-A tubes about ninety volts on the plates is best. A large fixed condenser is used to furnish an easy path for the grid returns around the potentiometer which of course is a radio-frequency choke. This condenser should be of the order of 0.1 to 1.0 μfd. capacity. The tubes of this amplifier should not be nearer to each other than a space two and one half inches between them. All plate and grid leads should be short and

well separated from the other leads and from each other. All battery wires should be bundled together in insulated wire if possible. This makes a neat job and adds to the by-passing effect of the battery condenser. It is also beneficial to shield the battery leads as they are quite long on most sets.

The following are about all the troubles that can develop in this part of the set: broken or poor connections, a defective by-pass condenser around the potentiometer, a defective potentiometer, poor tube socket contacts, an inactive or worn out tube, low "A" or "B" batteries. There is one quick

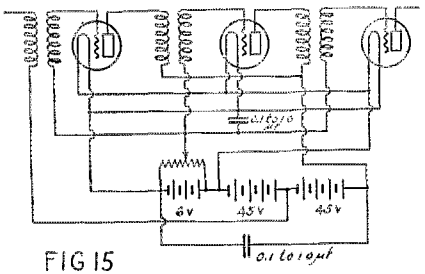


FIG 15
THE AMPLIFIER

test to determine whether or not the amplifier is working properly; disconnect the primary of the first long-wave transformer from the wires leading to it and connect an antenna and ground wire in their place. Move the potentiometer arm to the negative side until the amplifier oscillates. Long wave telegraph stations will be heard if the set is O.K. Sometimes a transformer that has been abused will have a broken lead. This can be determined quickly with a pair of head phones and a dry battery.

4—The Output Transformer

The filtering system is really the heart of the set. It is something that cannot get out of order, fortunately, if properly designed and installed. Of course the usual poor connections, high resistance joints and low batteries will cause it to fail just as in any other part of the set but they are things which will not require any particular skill to remedy. The filter which I use is a real filter and will improve the selectivity and volume of any superheterodyne set. Perhaps I am going to be accused of making a broad statement here but I am willing to submit one of the filters to any reliable party for test and comparison. [See pp.20-21, *QST* for July.—Tech. Ed.]

5—The Second Detector, Fig. 16

The detector circuit is standard and is shown connected to the filter circuit. It is best to use a larger grid condenser here to permit of the easy passage of the relatively low frequency output of the filter. In conducting tests it is well to test the last three circuits as one unit first, as mentioned before. A rather large by-pass condenser is placed in the plate circuit of the detector to prevent the radio frequency currents from entering the audio transformer which follows.

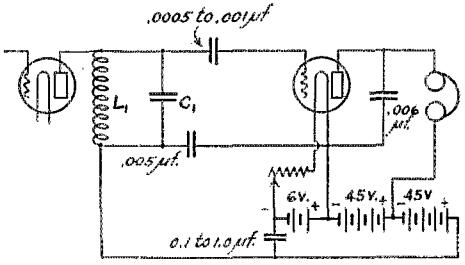
6—The Audio Amplifier

The two stage audio amplifier is no different from any other one. Filament control jacks are an asset in this type of set as most of the time only one stage of amplification is necessary and both tubes are on one rheostat. The best test for this part of the circuit is to connect the tuner output to the input of the first audio transformer with two long pieces of bus wire or bell wire, of course disconnecting the intermediate amplifier, oscillator, and detector from the circuit. Even tho the leads are very long, the detector-and-two-audio set which results will function very well on locals if everything is right in the tuner and audio amplifier circuits. One thing is sure: if the set howls, there is quite likely to be an open circuit of some kind in the audio amplifier.

For telegraph work, high-ratio audio transformers are all right but for voice and music DON'T USE THEM. A good ratio limit for music reception is about 4½ to 1. Audio transformers should be shielded for best results. Don't use junk material in this part of the circuit and expect to get away with it.

7—Parts

A few general points might be mentioned here. Don't use a tube socket that has a metal shell to hold the tube. All new tubes are doing away with the beautiful brass



THE SECOND DETECTOR
FIG. 16

band around the base and as a result the condenser which it made is being done away with. So there is no use putting it back with a metal socket. The best socket that I have seen so far is made of a superior grade of hard rubber. It has features which certainly ought to commend it to any radio man. This is the new socket made by the B. F. Goodrich Rubber Company of Akron,

Ohio. The spring contacts are of the wipe type and the tube does not have to be twisted to lock it in place.

One very important part of the super is generally overlooked. That is the tuning dials on the variable condensers. A real tuning dial on a plain condenser of the capacity-squared type is a combination that cannot be beat at the present time. I use the A.C.H. dials on my own set and by means of them can do real tuning. They have a ratio of 215 to 1 which is a real micrometer adjustment and is necessary on a Super which is working correctly. These dials are made by the A. C. Hayden Radio & Research Co., of Brockton, Mass. I am not mentioning the above articles from the standpoint of a salesman as I have nothing to sell at the present time, but when I find a real quality article I believe in telling about it.

Summing Up

To summarize, it is seen that each part of the set is really a fairly simple thing to build, adjust and operate. The usual rules of good construction must be followed of course but there is nothing tricky or difficult about the circuit. BUT first, last, and all the time, again I say, DON'T USE JUNK.

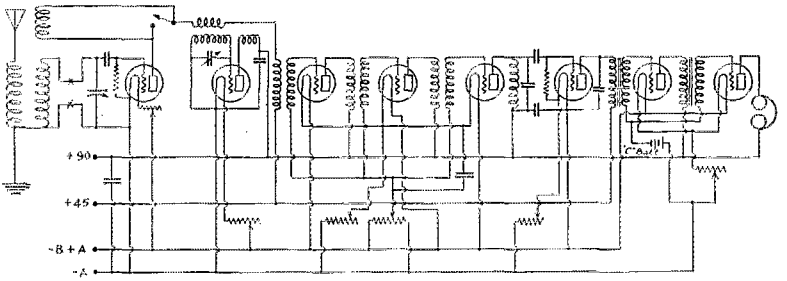


FIG. 17-THE DIFFERENT PARTS ALL CONNECTED TOGETHER AND SUPPLIED BY ONE SET OF BATTERIES

ANNOUNCEMENT

In the September issue will appear a number of curves showing the characteristics of super-heterodyne transformers now on the market and in addition an article entitled "A Study of Super-heterodyne Amplification." Concerning the last article it is only necessary to say that it is by H. A. Snow (former 3ZE) of the Radio Frequency Laboratories, Inc.

Power Tubes For Sale Direct

R.C.A. Establishes New Amateur Policy

ANY of you had trouble getting power tubes from your local dealer? Easy, fellows, don't flood the mails with your wails; things are looking brighter than they have for many moons.

Most of us who have ever bought power tubes know the difficulty of buying them locally, the tedious waits after our order was placed, the wrong type shipped, the breakages and refusal of dealers to replace, and the long, long months it has sometimes taken to get an adjustment from RCA.

Theoretically, we were supposed to buy from our local dealer, who bought from an RCA jobber who bought in quantity from the RCA—the same as any other merchandising plan—but it didn't work that way. Power tubes come high and in towns and villages where amateurs do not burden the land with their numbers, tube sales in anything over a UV-201-A are so small it does not pay the dealer to stock them and, in fact, many dealers do not even want to bother with orders. Notwithstanding RCA assurances that such a situation was remediable and local, complaints continued coming in from various quarters and apparently there were no prospects for more than temporary regional relief. With this in mind, the RCA was braced with the proposition of instituting direct sales to amateur customers—of power tubes only. After the usual correspondence back and forth the RCA came across to the idea 100% and will now sell direct to amateurs under certain restrictions necessary to protect

them from getting in a jam with their jobbers and dealers. Let us quote from their recent letter:

"This means that in general the radio amateur can purchase from us Radiotrons UV-202, UV-203, UV-203-A, UV-204 and UV-204-A (the latter two subject to certain sales limitations), where these tubes are not carried in stock by their dealers. Where an amateur applies to us directly for the purchase of such Radiotrons, he should always state that an effort has been made to purchase them from radio dealers in his locality and he has been unable to do so. The names of the dealers who did not carry them in stock should also be given. Permit me to say again that the Radio Corporation is very anxious at all times to serve the radio amateurs to the best of its ability and will do everything possible to make it easy for them to obtain any type of apparatus which is not usually carried in stock by radio dealers."

So that's that! Remember, though, you have some responsibilities before getting the tubes—you must find out if they can be gotten locally and if not, tell the RCA about it and where you tried to get them. From our point of view, we would as much prefer to buy our tubes from the neighborhood dealer as the RCA would like that method of tube distribution, since it speeds up the process all around, but until the dealer knows what sales in power tubes he's losing he won't carry them and we will buy direct. Referring back to the reservation in their letter covering UV-204's and UV-204-A's, this applies to the use of these tubes for other than amateur or experimental purposes and so far as we are concerned they are sold on the same basis as smaller power tubes.

Now, if you want a power tube (note we say "power tube" in every case; it does not apply to any types other than those specified in the RCA letter) here is the proper procedure which *must* be followed or you'll not get your tube:

1. Make *sure* you can't get it from local dealers with whom you ordinarily do business. You don't have to strap on roller skates and slide around to every gyp store, auto accessory palace or music shop which displays a mud insulator to prove they're in the radio business, but go to a couple of the best radio dealers and see if they have any in stock. Make a decent effort before telling the RCA about it. If you can't get it—

2. Write Radio Corporation of America, Sales Department, 233 Broadway, New York City, N. Y.

3. State clearly the type and number of tubes wanted. You might get a 20-KW water-cooled affair if you aren't careful.

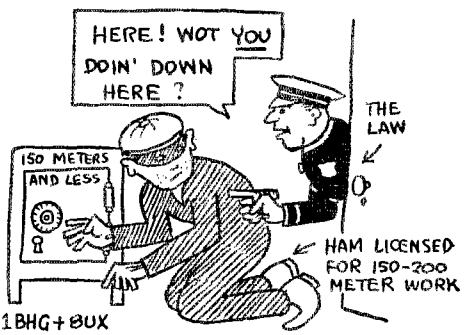
4. Be sure to send check or Post Office money order with your letter. No C.O.D.'s will be accepted. Your tubes will be shipped by express, the carrying charges to be paid by you at the time the tube reaches destination. Most firms prepay freight or express charges but the RCA has ruled otherwise with their tubes. However, this is not a large item in any event.

5. Important: state that an effort has been made to obtain the tubes locally without success and give the names and addresses of the dealers who didn't carry them.

Don't abuse a privilege, fellows; whatever our opinions of the RCA's past tube distribution methods—or lack of methods, as some of us will say—they are making an exception in their sales policy in order to get the tubes to us faster and to straighten out the kicks and friction which have grown up in many parts of the country. Let us do our part and see how it works.

No system is perfect; there may be tubes that do not reach the purchaser in perfect condition, or in twenty-four hours after he mailed his check, or of the type and number specified, and he will have to send them back for adjustment. We believe a reasonable attitude should be adopted and the difficulties of instituting a new policy recognized in cases involving such adjustments or replacements, but the advantages of direct sales will be more than offset if we are as unable to get fair and reasonable adjustments as was formerly the case when the broadcast boom was on. If you have such troubles, write us the facts. The RCA has stated it is "very anxious at all times to serve the radio amateurs to the best of its ability" and this will be a good opportunity to take them up on that proposition. Don't forget, however, to do your part and stick to the rules.

—*C.A.S.*



WE USED TO HAVE TO CHASE THIS FELLOW OFF THE 200-250 WAVES. NOW HE'S DOWN UNDER 150 METERS. CAN U BEAT IT?

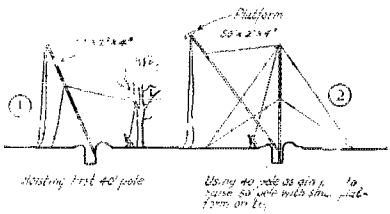
The Antenna At 9ZT

*By Don C. Wallace, 9ZT**

When one or two men put up a wooden mast over 60 feet high there is always some climbing. The plan used at 9ZT is as safe as any but no mast can be climbed safely unless the climber's nerves are steady and every bit of wood in the mast is CLEAR and SOUND.

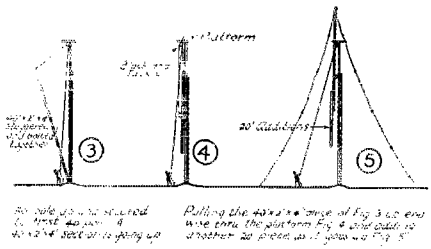
TO put up a 100-foot mast is easy—to have it stay there is different. In November, 1922, a gang helped put up a 100-foot mast. It blew down Thanksgiving day, as the Wallaces moved into their new home.

Using the fifty-foot stub for a support, 9ZT alone shot up another to 114 feet. It lasted a few days, then blew down the



day of the Trans-Atlantic tests. The present mast was put up and its 85 feet seemed a joke alongside the others. But this mast doesn't blow down, so it will be described.

A block and tackle was placed twenty feet up a tree. Two 22-foot 2 x 4's were bolted, stepped, and hoisted by means of the block and tackle. See Fig. 1. After guying this 40-foot mast, the block was transferred to the top of the 40-foot stick and used to pull a 50-footer alongside. See Fig. 2. The 50-footer had a platform at the top through which 2" x 4" pieces were lifted and bolted as they went through, the pole extending to the ground after

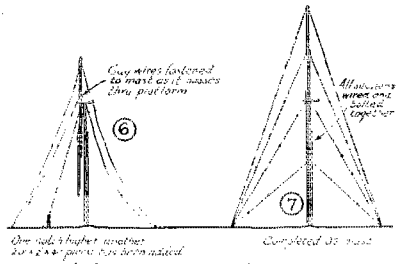


each piece was bolted on. This was easy, and as it is guyed every 20 feet it never was blown down. The guy wires are broken every 20 feet with porcelain knobs.

The other mast was to be 80 feet, iron pipe. The day for the hoisting was 12 below zero, so sixty feet for one man in such weather was enough. A friend helped for a half hour in coupling but cold feet literally and otherwise made a higher mast impossible on that day. Mrs. Wallace then thought 60 feet high enough for the front yard, so it has remained at 60 feet.

The flat top is of six wires 60 feet long, on 12-foot wood spreaders. 18" plate glass insulators are used throughout. This antenna system was put up nearly a year ago, using 7-stranded No. 22 enameled wire, and has withstood all Minnesota storms since that time. Enameled wire seems to "get out" for all who use it in the Twin Cities in contrast to the many old-wire aerials which don't.

A counterweight hung on the antenna hoisting rope is used to lessen strain on the antenna system. A heavy wind storm will



A ONE MAN 85 FOOT POLE

raise the weight, lessening the strain on aerial. Sleet then will not break it down. The pulley line is flexible galvanized cable (ordinary clothes line) and will not freeze to the block readily as rope. Thus the antenna remains taut without danger of over-strain.

*Winner Hoover Cup 1923.

Our Index

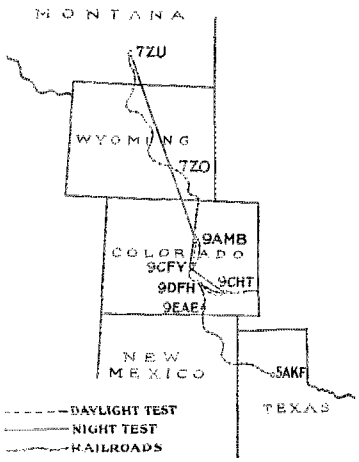
THIS issue marks the beginning of Volume VIII of *QST*. We have prepared an Index to Volume VII and it is now ready for distribution. A copy has been sent without charge to every A.R.R.L. member. Non-members may secure a copy by writing to *QST*, 1045 Main St., Hartford, Conn., and enclosing 4¢ in stamps to cover mailing.

Emergency Routes Tested in Middle West

REMEMBERING the terrific storm of two years ago when communication was wiped out for several days, amateurs in the Rocky Mountain Division held tests on June 1st to determine the workability of emergency communication routes by amateur radio.

The route over which these tests were held covered the territory between Montana and Texas and the stations taking part were located near railroad lines, insofar as possible. There were two tests, a daylight test and a night test.

The daylight test was only partially successful but shows that daylight work over storm routes can be carried on in certain localities, and over the entire route if



several more stations can be located between Denver and Billings. The test might have been successful from Casper south had it not been for 7ZO blowing an antenna series condenser. This put him out of the morning test and also accounted for his having to go on 220 meters instead of 150, the wave that he had notified Denver that he would be on, for the night test.

Denver stations could not hear 7ZO at Casper for the daylight test but at 11:45 A.M. 7ZO started a message to 9CFY at Colorado Springs according to schedule. This message was rapidly relayed through 9CFY, 9DFH, 9CHT, the latter receipting for it at 12:05 P.M. There was a lightning storm going on at Trinidad, the next relay point south, and 9EAE was unable to be on the air. The message stopped, therefore, at 9CHT. At 12:57 P.M. 9CHT started a reply northward from his station which reached 7ZO a few minutes after 1:00 P.M. This completed the daylight test.

More success attended the night test. At exactly 11:00 P.M. 7ZU started a message to 7ZO who sent it southward through 9AMB. However 7ZO was on 220 instead of 150, because of the blown condenser, and some time was lost before 9AMB picked him up. The message was relayed further south through 9CFY and 9CHT. Due to a misunderstanding in schedules 9EAE at Trinidad and 5AKF at Amarillo, Texas, were not on so the message was halted at 9CHT. At 12:39 A.M. 9CHT started a reply back which reached 7ZU at 1:10 A.M. The messages traversed the route in two hours and ten minutes through bad static and interference but was not garbled—the messages coming through exactly as started.

Though those tests were not as successful as they might have been, the results were encouraging and more tests will be held in the near future. The weak points in the relay system have been found and efforts will be made to cover the whole route from Montana to Fort Worth, Texas, in the next test. The present tests were carried on under conditions exactly as will be encountered in actual work. The entire division was in a weather upheaval, as the weather map for June 1st shows.

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

1—Before writing, search your files of *QST*. You will probably find the answer there.

2—Do not ask for comparisons between advertised products.

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

4—Put questions in the following form:

A—A *standard business size* (not freak correspondence size) stamped, self-addressed envelope must be enclosed.

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

C—Make diagrams on separate sheet 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 your diagrams.

F—Put your name and address on each sheet. *We can not spend time digging your address out of the callbook.*

G—Address all questions to Information Service, American Radio Relay League, 1045 Main Street, Hartford, Connecticut.

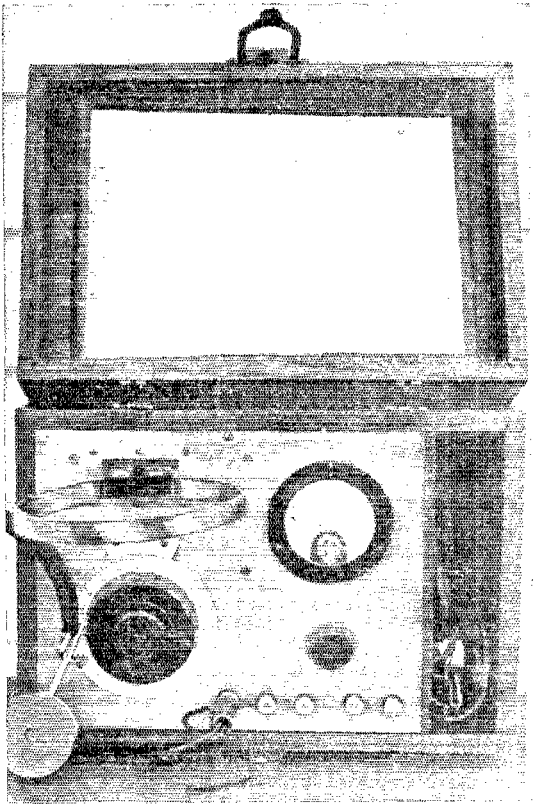
An Accurate Wavemeter

How to Build an Oscillator That Will Really Hold Calibration

*By Edwin Lee White, 3XD**

THE development of sharp constant-frequency transmitters and the policy of assigning to them definite frequencies necessitates a frequency meter or wavemeter for use in tuning. It should have an accuracy above that of the types now in general use.

The most convenient form for such a wavemeter is that of an oscillating receiving set but none of the usual kinds can be calibrated with any accuracy because of the factors discussed below.



The first difficulty in the change in frequency caused by changes in the coupling between various inductances. The obvious solution of this difficulty is the use of fixed coupling in the set and very loose coupling to the driver.

The second factor is the change in frequency caused by the variation in the input (secondary circuit) resistance and capacity. Some thought is necessary before this difficulty can be cured. The following considerations are of interest.

In the usual circuit the tube input (that is, the filament and grid) is connected across both grid tuning capacity and the grid tuning inductance. Therefore the effect of the tube may be considered from the viewpoint of either the capacity or the inductance. In this artcile the effects upon the capacity will be used as a basis of discussion throughout.

First an investigation was made with the aid of a galvanometer in the grid circuit of an oscillating receiver. It was found that the grid input resistance decreased with an increase of filament current. This was to be expected and its effect upon the frequency of the tube can be understood from the following.

The effective capacity of a parallel circuit consisting of resistance and capacity is:

$$C + \frac{1}{R^2\omega^2 C}$$

Where C is the value of the capacity, R the resistance, and ω is $2\pi f$. For proof of this see Figure 1. It is seen that a resistance connected across the capacity in a tuned circuit increases the effective value of that capacity. The resistance is of course the input resistance of the tube, that is, the resistance between the grid and the filament at working frequencies. Since this resistance changes when the filament current is changed it is obvious that the frequency of the oscillating tube will also be changed. If something is not done to prevent this it will be extremely hard to get the same frequency from the tube for a second time without careful readjustment.

The input capacity of the tube is the capacity of the very small condenser which has for its plates the grid on one side and the plate and filament of the tube on the other side. The plate and filament are taken together because they are connected by the B battery. As there is an impedance

*U. S. Naval Research Laboratory, Bellevue, D.C.

in series with the plate battery, the voltage on the plate varies in accordance with the grid voltage and the amplifying factor of the tube. The ratio of E_p over E_g approaches the amplifying factor of the tube as the external impedance approaches infinity. This ratio will be indicated by μ'.

A full discussion of this effect is given in "Principles of Radio Communication" by J. H. Morecroft, pages 432 and 440. The effective input capacity is:

$$C_{gf} + (\mu' + 1)\, C_{gp}$$

It is seen that any factor changing μ' will change the effective capacity and, since this is in parallel with the tuning capacity, the result will be to change the frequency of oscillation. Though μ is practically independent of filament temperature μ' is not, but changes with the plate current and the plate voltage, both of which are in turn dependent upon the filament temperature.

Solving the Difficulty

An oscillator set was built having the circuit shown in Figure 2. C was made large and L_g small since the variations in the input (grid) circuit would then give less percentage change in the LC product. By making C_g small and R_g high the effect of variation in the input circuit was further reduced. C_p was made large in order that the plate circuit impedance would be less affected by changes in the B battery or in the phones.

Attention is invited to the fact that the use of a grid leak and condenser reduced the effect of the tube upon the tuned circuit. This was amply demonstrated during experiments covering this problem and that

$$\frac{1}{Z} = \frac{1}{Z_1} + \frac{1}{Z_2} \qquad Z_1 = R \qquad Z_2 = -j\,\frac{1}{\omega C}$$

$$\frac{1}{Z} = \frac{1}{R} - \frac{\omega C}{j} = \frac{j - R\omega C}{Rj}$$

$$Z = \frac{Rj}{j - R\omega C} = \frac{Rj\,(j + R\omega C)}{-1 - (R\omega C)^2}$$

$$= \frac{-R + R^2 j\omega C}{1 + (R\omega C)^2} = \frac{R}{1 + R^2\omega^2 C^2} - \frac{jR^2\omega C}{1 + R^2\omega^2 C^2}$$

$$C' = -\frac{1}{\omega C_e} = -\frac{R^2\omega C}{1 + R^2\omega^2 C^2}$$

$$C_e = \frac{1 + R^2\omega^2 C^2}{R^2\omega^2 C} = C + \frac{1}{R^2\omega^2 C}$$

SHOWING THE TUNING EFFECT OF A RESISTANCE CONNECTED ACROSS A CONDENSER

FIG. 1

accounts for the fact that no revolutionary changes were needed to produce our final results.

Using two similar circuits, one as a driver, it was found possible to reproduce a beat note time after time. The ear could not detect any change in beat tone with the change in filament current in either tube. Finally the two sets were adjusted to zero beat and after a test run of 24 hours no change in this note could be detected.

This wavemeter has been in use at the writer's station for the past few months. It has been found useful not only in checking the wave-length of the transmitter but also as a heterodyne for checking the wavelengths of received signals.

Construction

For those that may be interested the following details of construction are given.

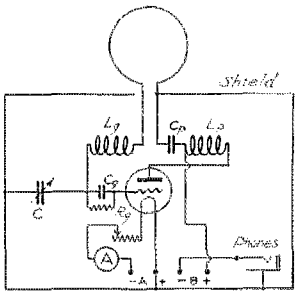


DIAGRAM OF CONNECTIONS

FIG. 2

The grid coil and tickler are wound on the same tube. The tube is painted with airplane "dope".

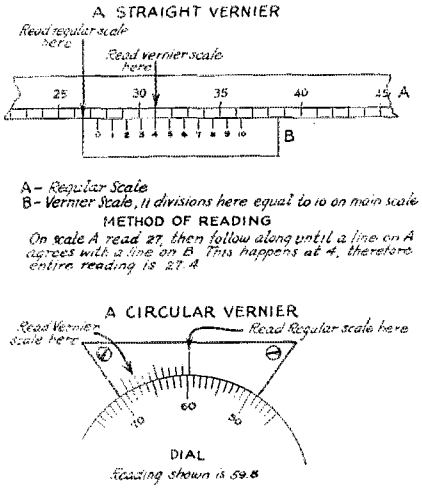
The grid coil consists of 12 turns of No. 12 double-cotton-covered wire. About one inch from the grid coil is the tickler which consists of 25 turns of No. 22 double-cotton-covered wire. A single-turn coupling coil is inserted in series with the grid coil at its grounded end, that is to say, near the filament end. This coupling coil is mounted on a plug set in a mica window to insulate it from the brass panel. The coil consists of one six-inch turn of half-inch copper strip.

The tuning condenser is a General Radio type 247 having a maximum capacity of .001 microfarads. An Accuratune geared dial having 100 graduations is used and reads against a vernier scale.[1] Eleven divisions on the vernier scale are equal to ten divisions on the dial, giving the possibility of reading to 1/10 of a dial division or 1/1000 of the entire scale. The grid condenser is .00025 µfd. and is shunted by a four megohm leak. A 201-A tube is used and receives its filament current through a Weston 0-300 milli-ammeter. The by-pass condenser is of .002 ufd. capacity and is mounted directly on the cardboard tube to make the leads short.

The number of turns on the tickler coil depends on the conditions of the particular installation and should be adjusted with the set completely assembled until the tube will just oscillate with the tuning condenser on

1—Please note that the term vernier is here used with its original meaning; namely, a device enabling one to read a scale accurately. The idea is further illustrated in Figure 3.

full scale. A wavemeter of this type should not be used with condenser settings much below one-third full scale as the accuracy of calibration is lost.[2] The set described has a useful range of 140 to 240 meters



VERNIER SCALES
FIG. 3

and is calibrated to one-tenth of a meter. It may be set to a greater accuracy but the graduations cannot be read any closer.

Calibration

The standard signals of WWV offer a convenient method of calibration and for all ordinary purposes are sufficiently accurate. If a better condenser is available than the one suggested the wavemeter should be sent to a laboratory for calibration.

2—It is customary at the Naval Laboratory to state transmitting waves *accurately*. We called them without results from 1XAQ because we were on 53 meters while they were listening on 52.

Short Wave Tests With Australia

AT the request of Mr. C. D. Maclurcan, president of the Australasian Radio Relay League, the A.R.R.L. has arranged a program of short wave tests in a determined effort to work two-way with Australia and New Zealand before the year is out. Two ten-day periods, one during the month of August and the other during the month of September, have been set aside for the tests.

The tests are not restricted to any one country, but are open to all. We would like to have every country in which there is amateur radio take part in the tests. A certain schedule for transmission and reception has been asked by Mr. Maclurcan and of course we must hold to that as closely as possible.

While the transmission from the standpoint of the U. S. amateur is somewhat restricted on short waves, it is quite possible that by the time the tests are to take place, we will have some short waves open for general amateur use—we're hoping. However, that should not deter us from our receiving. Thus far, we have not heard a good walloping signal from Australia or New Zealand, so it behooves us to get down to business and get that signal. Many of our transmitters have put strong signals into Australia and New Zealand on waves between 150 and 200 meters and we feel sure of two-way work if we can pick up a readable signal from them.

Mr. Maclurcan's station, 2CM, is a "100-watter" putting 2.0 amperes in the antenna on 120 meters. That alone looks good enough to us and should reach all parts of the North American continent. Then in New Zealand 2AQ, the station that worked Argentina, will be on about 100 meters, we believe. No doubt there will be many others on about the same waves.

No amateur should have to go begging for a short-wave tuner. February *QST* covers them completely—anything you want in the way of a good short-wave low-loss tuner is described.

The dates of the tests are: August 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20. September 7, 8, 9, 10, 11, 12, 13, 14, 15, and 16.

The hours remain the same each day. Australian and New Zealand amateurs will listen from 2:00 to 2:30 A.M., C.S.T., and they will transmit from 2:30 to 3:00 A.M., C.S.T. Attempts at two-way work are to take place each day beginning at 3:00 A.M., C.S.T.

It must be remembered that the above times correspond to about 6:00 P.M. in Australia and New Zealand.

It is suggested that a code word be transmitted as was done during the Pan-American Tests for identification.

This looks like our last chance to work Australia and New Zealand this year. So, gang, let's get the job done as it means one more step toward the "Round the World Relay" via amateur radio.

—F. H. SCHNELL,
Traffic Manager.

The Prevention of Radiation From a Radio Receiver

*By Dr. Lewis M. Hull**

THE "blooping" receiver has received much unfavorable notoriety. The elimination of all receivers which are capable of radiation is an impossible and undesirable solution of the difficulty because regeneration, active in one way or another, contributes largely to the signal capturing ability of most of the receivers used today. Wherever regeneration is present the possibility of local oscillation and radiation inevitably follows.

All the various forms of regenerative receivers employing a tuner directly-coupled to the antenna ("single circuit tuners") have received much abuse as radiation producers justly so. But all "three circuit" and "four circuit" tuners which can be thrown into oscillation also radiate to a considerable extent. Any coupling arrangement which passes a signal current *in* to the detector will also pass a locally generated current *back* into the antenna through the same coupling.

Radio Amplifiers Do It

Uncompensated radio frequency amplifiers also possess great capacity for mischief in the form of radiation. The writer has operated a two stage tuned R.F. amplifier from a loosely coupled double circuit tuner which when thrown into oscillation was reported to cause interference more than a mile away.

Also the Loop

The use of a loop with any type of receiver merely reduces the magnitude of the interference without suppressing it.

The Cure

The most obvious solution consists in the provision of a radiation muffler of some sort to be connected between the receiving tuner and the antenna. Early in 1923

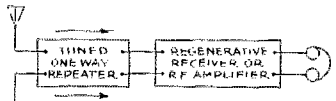


FIG 1 RADIATIONLESS RECEIVER

Stuart Ballantine suggested to the writer the use of an anti-regenerative stage of R.F. amplification for this purpose. It was later found by the writer that the use of an ordinary anti-regenerative stage between the antenna and the receiver is *not enough* to completely prevent radiation. In order to prevent oscillation in the succeeding circuit from reaching the antenna, all inter-circuit capacity couplings in the muffling device must be completely balanced out; in other words the muffler must constitute *a true one-way* repeater. It is not enough merely to prevent this stage itself from oscillating.

The Circuit

The basic arrangement of circuits in such a radiationless receiver is shown diagra-

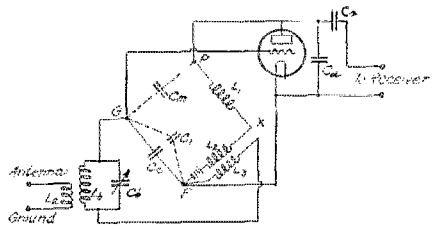


FIG 2 ONE-WAY REPEATER USED IN AMPLITUNER

matically in Figure 1. *If* the repeater is a true one-way device, the receiver can be made to oscillate without radiating. The problems involved are rather novel and a description of such a device, designed by the writer under the name "Amplituner" may be interesting.

The Amplituner

The circuit of the instrument is shown in Figure 2. It consists of a balanced bridge having two inductive and two capacitive arms. The incoming signal is impressed between grid and filament of an amplifier tube across the two opposite terminals G and X of the bridge. The amplified voltage in the plate circuit of this tube is impressed across the other pair of opposite terminals P and F. The capacity between grid and plate of the tube C_m and the associated wires constitutes one capacity arm. The capacity between grid and filament C_t is increased by a small adjustable parallel condenser C_c upon which the final adjustment for balance is made. Once the balance is attained the compensating condenser C_c is locked. The inductive arms consist of two coils L_1 and L_2 in series in the plate circuit of the tube. The lower terminal of the input circuit is brought to the same a.c. potential as the point X between coils L_1 and L_2 by the use of coil L_3 which is equal to and unity-coupled with

*Radio Frequency Laboratories, Inc.

L_2. The only reason for using L_3 is to keep the voltage of the plate battery B off the grid of the tube; if the battery were not present, the lower end of the input coil L_m would be connected directly to X. The theory of the bridge is simple. When the capacities and inductances are so chosen that the following relation is satisfied:

$$\frac{L_2}{C_m} = \frac{L_1}{C_1 + C_c}$$

then the bridge is balanced and no radio-frequency oscillation in the plate circuit of the tube can impress a voltage across the input terminals G and X. In other words, an oscillation of any type or frequency can be impressed upon the output terminals marked "TO RECEIVER", and the tuned input circuit L_m C_b and hence the antenna coil L_a is completely isolated from this oscillation in virtue of the balance existing between points G and X with respects to points P and F. On the other hand, oscillations induced in the input circuit from an incoming signal are impressed between grid and filament of the tube and are reproduced by the electron currents of the tube in the plate circuit in the form of an amplified voltage acting between points P and F, which in turn is passed on to the output or "RECEIVER" terminals through condenser C_2. C_2 has a relatively low reactance and serves merely as a stoppage condenser for the direct plate voltage. The internal plate-filament resistance of the

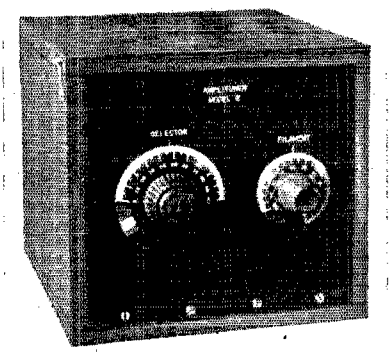


Figure 3. The Laboratory Model Amplituner. It has but one tuning control.

tube, acting between P and F is across two arms of the bridge and hence does not affect this balance. The internal grid-filament current is across one capacity arm but with a negative filament connection the grid-filament resistance is so high in practice as to exert a negligible influence upon the balance of the bridge.

In practice the Amplifier is required to do two things besides preventing the backward flow of current from the output terminals to the antenna: First, it must have a capacitive reactance between the output terminals which is equivalent to that of the "average" antenna in order to allow the direct connection to its output terminals of any receiver designed to operate from an antenna; second, when such a receiver is

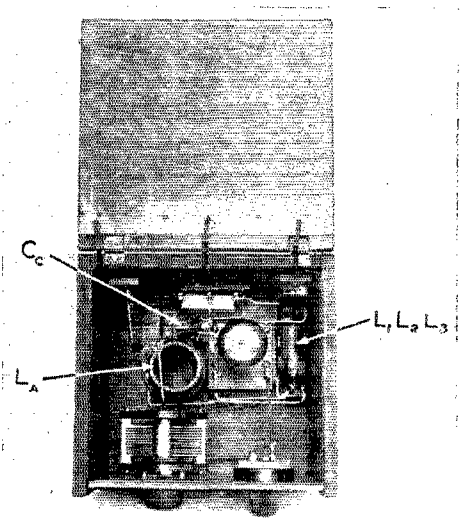


Figure 4. Interior of the laboratory model Amplituner.
The instrument is completely shielded with 10 mil copper sheet which is grounded, the coils being kept away from the copper.
Using the same lettering as in Figure 2,
L1, L2, and L3, the coils in the bridge arms.
La antenna or primary coil standing inside secondary coil Lb which is not labeled here.
Cc Balancing condenser.
Variable tuning condenser Cb not labeled but easily seen.

connected to the output terminals, the resonance load in the plate circuit of the Amplifier tube must be of such magnitude as to impress an *amplified* voltage upon this receiver. The provision of a suitable "antenna-like" impedance, which will allow the receiver to retain its original tuning characteristics does not necessarily mean a fulfilment of the second requirement. A design for the output circuit was finally selected which allows the Amplituner to be operated into *any* receiver whose tuner is designed to operate at wavelengths from 200 to 600 meters; the receiving tuner may be either single or double-circuit, tuned by either series or parallel condenser, or it may consist of a so-called "untuned" primary closely coupled to a tuned secondary, such as is used in commercial neutrodyne receivers. The design consists merely of the use of a continuous coil for inductances L_1 and L_2, having an inductance of about 500 microhenries, shunted by a capacity at C_3 of 500 μμf., which gives an effective

range of capacity between the output terminals of 300 to 450 μμf. between 200 and 600 meters. This r.f. choke, which comprises L_1 and L_2 is wound of #36 solid wire on a tube ¾" in diameter, the small size being mainly for the purpose of reducing the distributed capacity of the coil, since appreciable distributed capacities in L_1 and L_2 tend to destroy independence of frequency in the balance of the Amplituner circuit. L_3 is wound directly over L_2.

Figure 4 shows an inside view of the laboratory model. The coils are spaced from the copper shielding since this is at ground voltage. The shield might appear unnecessary and in fact the Amplituner circuit can be completely balanced without it. However it has been found that the whole body of the amplifier will pick up enough field from a nearby oscillating receiver to radiate oscillations which are appreciable at short distances. Even when the amplifier coils are wound in astatic form the effect persists. Therefore it was necessary to shield the amplituner.

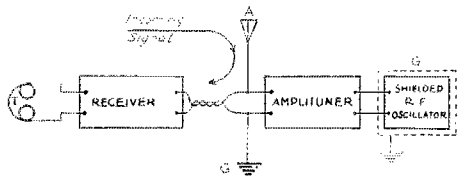


FIG 5-CIRCUIT FOR BALANCING AMPLITUNER

Operation

Obviously the antenna lead-in which goes to the amplituner should not pass close to the oscillating receiver which is connected to the output of the amplituner. The amplituner gives a voltage amplification of from three to seven depending upon the wave length.

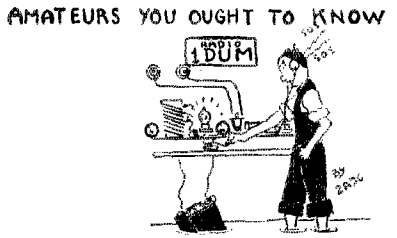
Adjustment

The method of balancing the amplituner brings out a very important effect, namely the change of intra electrode capacities in an audion tube when the electron current is flowing. In a commercial anti-regenerative amplifier (the standard types of neutrodyne—Tech. Editor) local oscillations may be prevented by balancing the tube capacities with the filament unlighted and neglecting the unbalance which follows lighting the filament. But the writer has found that this change may cause as much as 2 to 4 micromicrofarads difference in the grid-plate effective capacity of a receiving tube when the filament is turned to full brilliancy. This is sufficient partially to nullify the one-way action of the ampli-tuner, and to allow R.F. to creep back through the amplituner into the antenna. Accordingly the final adjustment is made as follows.

Final Adjustments

With the filament lit to full brilliancy the amplifier is placed in the circuit shown in Figure 5. The shielded oscillator represents an oscillating regenerative receiver. A receiving set is connected directly to the antenna as shown at the left. This set uses two stages of radio, a detector and an audio amplifier. Both this set and the amplituner are tuned to the wavelength of an incoming C.W. signal. The oscillator G is then tuned to produce a beat note with the incoming signal and the operator listens at the headset T while he adjusts the compensating condenser C_n (Figure 2) of the amplituner. The adjustment is made with a long handle so the operator can keep his body away from the amplituner. At some adjustment of C_n the best note between the incoming signal and the oscillator G disappears. This "null point" indicates a complete suppression of the backward flowing current from the oscillator G to the antenna. The amplituner then behaves as a true one wave receiver. This is of course an extremely sensitive method since the receiving set is connected directly to the same antenna instead of being on a separate antenna at some distance as would ordinarily be the case. For this reason it is possible to notice a slight shift in the position of the null point when changing wavelengths but in ordinary operation it is possible to make the adjustment at 350 meters and then to operate the amplituner from 250 meters to 600 meters without putting into the antenna enough energy to cause interference to other receivers on other antennas near by.

A shift of tubes does not cause appreciable trouble, provided the filaments of all are burned at full brilliancy. Once the balance is attained the compensating condenser is locked. It is important of course that the amplituner tube be burned at its rated voltage if perfect one way action is to be maintained but the value of the device as a radiation muffler is not seriously harmed from the standpoint of outside stations if the filament current varies the whole range consistent with good amplification.



THICKAZA PLANK, THE FIRST RADIO AMATEUR TO SEND AN SOS. THE WATER WAS ALREADY AROUND HIS ANKLES WHEN HIS MOTHER LET THE BATHTUB OVERFLOW.

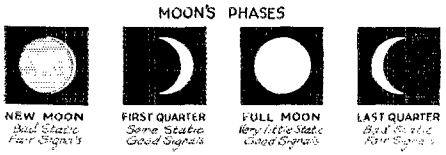
Experimenters Section Report

Lunar Effects

THE following is quoted from the A.R.R.L. weekly newspaper service of the date of March 25th.

"Radio reception appears to be influenced by the moon in some manner.

"The only observation made has been on European long wave transatlantic signals. The rules given below can accordingly be applied only to long wave signals traveling in a westerly direction across the Atlantic. Whether reception in the opposite direction is similarly affected is not known.



"In the tests that were made, best reception came during the period of a full moon. Generally the signal would not be particularly strong but there would be almost no static and very clear and steady signals would be recorded. During the new moon the static would be very bad but signals strength fair. During the first quarter both the signal strength and static would increase. During the last quarter the static would be very bad and generally louder than the signal.

"These observations do not take into account local disturbances such as thunderstorms nor do they cover fading, there being very little of the latter on long waves."

We should like to hear from all those interested in making observations on this particular phase of radio. If there is anything in the theory a series of concerted observations would clarify the matter.

Coil and Condenser Measurement

No problem in radio today is exciting so much interest or attracting so much work as investigation of coils. There is on hand quite a respectable list of those that are working on this particular problem and I believe it will be beneficial all around for those interested to request a list of the others. This should be done in accordance with the usual rules on correspondence for this department.

The runner-up in general interest is the measurement of variable condensers. A good bit of work has been done on this by various members and the Technical Editor himself also took a shot at it; the result of this work will prospectively be printed in *QST* a bit later. All those having measurements of any kind whatever that will be of general interest should be sure to get them in.

Coil Varnishes

Suggestions are wanted by three different experimenters as to various coil varnishes which they should test.

Helices

The ordinary helix is hard to put into good mechanical shape and at the same time get compactness unless edgewise strip is used. However, this stuff is very difficult to obtain and the price is quite high, a small helix sometimes costing as much as $10.00 or $12.00.

The old-fashioned spiral "pancake" wound of straight strip on a paraffined wooden frame should give as low resistance or lower, provided the turns are spaced by the width of the strip or more. This would seem to make up for the incenvenience of having to guess how much inductance one had added when putting in successive turns of different size. That diffiiculty will largely disappear as we go over to coupled circuits.

Some measurements on this work are desired and some useful dimensions urgently needed. Be sure to provide for plate and grid turns.

Working Together on the Antenna System

The following has the heartiest endorsement of the Technical Editor. If carried through as planned here such a system should get together an invaluable stock of information on antennas.

The scheme is best explained by quoting the following letter:

159 Essex Avenue
Gloucester, Mass.

Dear LQ:

Will it be possible to secure the coöperation of the Experimenters Department in gaining information on antennas?

If my request is at all reasonable I would like to secure the following information from as many stations as possible. I intend to compile the results in a concise form from which some idea of the proper dimensions of antennas for any location can be determined.

Here is what we want.

A. Resistance curve over a wide range. Tabulated data will do but there should be two or three checking values for each point.

B. Dimensions of antenna and counterpoise system. (be exact height, length, spread, spacing, type, etc.)

C. Geographical location, together with approximate composition of earth below the station. (Dry sand, ore, sea water, fresh water, etc.)

D. Kind of towers, length of guy wires between insulators and length and location of other wires nearby.

E. Good description of location with photographs and preferably with maps and dimensions showing promixity of wires, trees, buildings, etc.

F. Extremely important: Method of making the test and measurements, naming the apparatus used.

G. Miscellaneous, such as kinds of insulation, size and kind of wire, method of making joints, irregularities in the method or system of wiring.

We are working hard here to secure accurate results on several types of antennas at various heights. If others interested will forward their information we will get many varieties of locations and be able to draw more general conclusions regarding the effects of locations in woods, valleys, mountains, seashores, prairies and so on.

If we can secure the coöperation of many stations, our report to *QST* will be forthcoming at an early date.

Very best 73's,

Robert W. Hart, Radio 1RH
(President, Massachusetts Institute of Technology Radio Club)

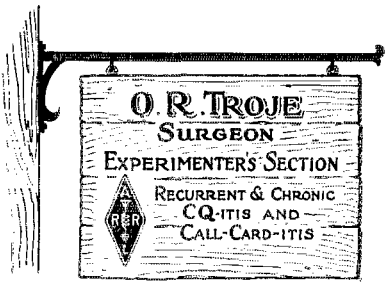
Canadian Wavemeters

Mr. J. H. Macdonald, Anyox, B.C., Canada, has a General Radio precision wavemeter type 224, serial number 103.

Mr. Macdonald offers to calibrate the wavemeters of any of the Canadian Division Managers who care to send them to him, providing they will pay shipment charges.

Official Surgeon

The Experimenter's Section has an official surgeon, Dr. O. R. Troje of Ensley, Alabama. Dr. Troje proposes to concentrate on major operations, such as the



removal of chronic CQitis. He is going to lay in a full line of wood-working tools and already has an axe.

Half and Double Waves

Mr. William N. Schick of Radio 2MU at 2723 Cooper Avenue, Brooklyn, N. Y., is working on the question of the appearance of half and double waves in radio transmitters and receivers.

Some general solution to the problem of preventing this kind of interference is very much needed and this undertaking should be supported by all members of this section with suggestions as to methods, assistance in person or by radio and such experimental data as are on hand.

Ballantine To Revise "Radio Telephony for Amateurs"

Particular attention of all members of the Experimenters Section is invited to the possibility that Stuart Ballantine will this summer revise "Radio Telephony for Amateurs" in order to print an enlarged third edition in the fall.

As this book has gotten to be the standard text of the radio amateur world, the Technical Editor wishes to invite communication regarding those things that should be particularly treated in the next edition. Naturally such suggestions are vastly more useful if they also state where the information may be obtained. This especially applies to that kind of experimental work in which most of the interest lies in the curves, data and other results obtained.

Address communications to the Experimenter's Section in the usual fashion.

Wavemeters

At this moment we are overwhelmed with articles about wavemeters but none of them meet the pressing need of the moment which is a meter that will go down to 3 or 4 meters and whose construction is such that it can easily be produced with a good deal of certainty that the range of the coils will fall just about in the same place each time. The only way to test such a design is to start out with two different condensers of the same make and to make two complete sets of coils, seeing if they check all the way through with some sort of accuracy.

The thing is possible because General Radio does it in their 247-W.

It is very likely that four and perhaps even five coils will be needed to cover the range from 200 meters down to 2 meters.

Line Escapes

A very urgent problem that gets practically no attention is the active hunting down and suppression of interference from power leaks, commutator sparking, brush discharges on insulators and the like.

I wish to make a strong appeal to all hands to get on this job and do all investigation possible during the summer while the weather permits and receiving conditions are none too good anyway.

Any number of power companies are only too glad to coöperate; quite a few of them have written us to that effect.

Is WNP On The Way Home?

THE month of June was the slimmest on WNP reports, but it seems that 9FB has taken a message from WNP. On May 31st at 12:27 A.M., C.S.T., 9FB reports hearing him with a CQ call. 9FB answered it and reports that WNP came back and gave him this message:

H P. MAXIM QST HARTFORD CONN
WE ARE HAVING GOOD WEATHER HERE NOW THAWED TODAY DAYLIGHT ALL OF THE TIME NOW TEMPERATURE AROUND ZERO NOW ICE BREAKING UP EXPECT TO START MOVING SOON ALL WELL
MACMILLAN

That message came to Hartford by way of 4RR, 3HG, and 1XAQ. The peculiar

WAITING FOR DON
The father, mother, sister and brother of Don Mix, WNP

part about it is that no other amateur reported WNP on this date and 9FB says he had some difficulty in copying him. We trust he has copied it correctly and that it is a bona-fide message, because it is good news to all of us who are anxious to see the crew of the *Bowdoin* back home.

June 9, 7EI reports WNP; and 3OE believes he heard WNP answer his call on June 17. 8ACM reports WNP on June 19.

There has been no confirmation of this message. If the Bowdoin were really homeward bound we should be working WNP regularly. Be sure and report any reception promptly to A.R.R.L. Headquarters.

We all look forward to good contact with WNP as soon as the *Arctic* gets under way and we hope that Mix will be able to get his outfit down on short waves when he knows how good they are for DX work. We are trusting "Bill" Choat, operator of the *Arctic*, to get this word over to him as soon as he is QSO WNP.

—*F.H.S.*

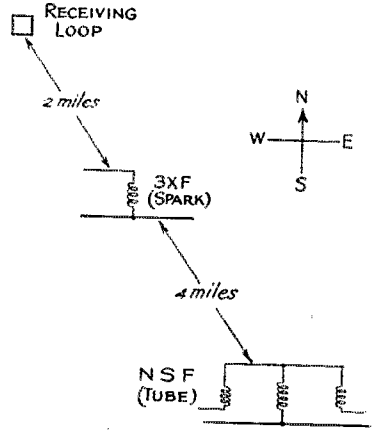
CONDUCTED BY S. KRUSE, TECH. ED.

A Transmission Freak

Mr. H. C. Smiley of Shawnee, Oklahoma, calls attention to the occasional phenomenon of hearing a spark signal only as modulation of the signal from some other station which is using tubes, the spark station being inaudible as soon as the key of the tube station is left up.

Mr. Smiley suggests "What is to prevent a spark from modulating the outgoing carrier wave of a tube station and so be carried along, not as the original spark wave but as a super-imposed modulation of the tube station's signal?"

The Editor is inclined to take stock in this. Some years ago at the Bureau of Standards the same thing was noticed with the signals of 3XF and NSF. At this time the three stations were in the position shown in the diagram. NSF was on 190 meters while 3XF was on 375 meters. When the loop was tuned to 375, 3XF was of course heard in the usual fashion. However if the loop was tuned to 180 meters, 3XF was heard only when NSF was send-



ing. The signal of 3XF could be heard very faintly at its natural tone when the receiving tube was not oscillating. If the detector was made to oscillate the signal strength improved materially but the spark

tone was lost. The sharpness of tuning corresponded to that of a modulated tube station and not to that of the original spark station, which was materially broader.

A check was made on this later by getting 3XF down on 200 meters, also by attempting to hear a harmonic from 3XF on 200 meters when he was tuned to 375. Both tests confirmed the idea presented by Mr. Smiley.

Hearing in the Dark

A new argument has just started around the question of whether one really can hear noises better in the dark than in the light.

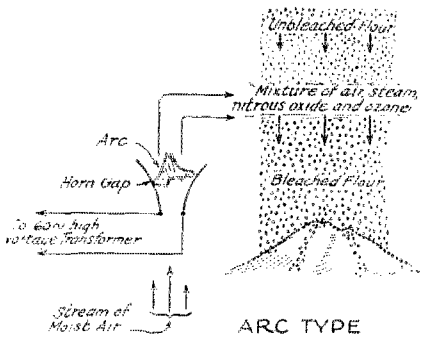
A number of operators insist that they can copy faint signals better when the lights are turned out.

Is there a physiologist in the audience?

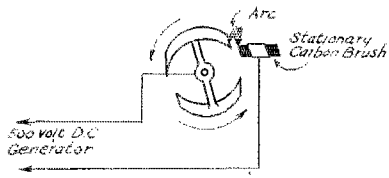
Power Line Chokes

To men living in the Upper Mississippi Valley, a "mill" is a place where wheat is ground into flour and not a place where steel is rolled or one where textiles are made.

The grand American demand for nice white "patent" flour with all the bran removed and even the starch bleached dead white has forced flouring mills to install bleaching devices. Quite a few of these are electrical and create savage radio interference when they are operating. One type consists of a rotating contact maker operating with a 500-volt direct current generator. The breaks are between a moving copper segment and a carbon brush. Another variety operates a 60-cycle arc in a horn gap.



ARC TYPE OF FLOUR BLEACHER



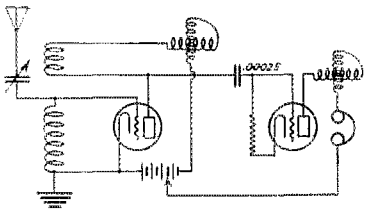
ROTATING BREAKER TYPE OF FLOUR BLEACHER

Both of them can be subdued by a device suggested by our old friend M. B. West. It is dead simple: just put in each side of the supply line a choke consisting of 5 pounds of heavy double cotton-covered magnet wire on the original spool. The interference is much weaker and is put up on a high wavelength where it does no harm.

A Convertible Circuit

Mr. Everest of 1ARE suggests a circuit in which a radio amplifier can be cut in or out by the simple process of turning one filament rheostat.

Referring to the diagram one will see that whenever the first filament is turned on there is in action a radio amplifier with tuned plate circuit, the tendency to oscillate being controlled by the tickler of this tube. This makes a good spark or phone receiver.



When it is desired to receive C.W. one turns out the first filament, sets the second tube into oscillation with the plate variometer and immediately you have a loose coupled circuit of good amateur design.

Dead Spots

The response to our repeated requests for information on the location and nature of dead spots has at last begun to take effect. The response is still not exactly enthusiastic but it is encouraging.

If a sufficient number of detailed contributions can be gotten during the next six or twelve months we will be in position to know whether some testing might produce useful results.

In the meantime it will be greatly appreciated if you can stir up the men you work with, talk to by radio, or correspond with, and ask them to send in reports, preferably with maps and as much detail as possible.

Audio Transformers Again

We have a great plenty of suggestions as to things that might be tried toward producing audio-frequency transformers with a high peak but we seem to have very few who have the equipment and the opportunity to work on the problem understandingly.

More About Low Loss Coils

By S. Kruse, Technical Editor

IT is surprising that most amateurs (and most commercial designers also) are unable to understand that a good condenser is wasted unless used with a good coil.

Even the best coil is not good when compared to a fine condenser. This is all the more reason why the greatest care should be taken in building tuner coils.

Coupled Resistance

No matter how good a coil is one can ruin it by coupling closely to the antenna. There is always a tendency to do this because low loss tuners are sharp and it is hard to find things with them. However to gain the full advantage one should not get the primary closer than an inch or so from the secondary and can frequently work with coupling as loose as a foot or eighteen inches, as is done at 9XAX-9ZT and 9MC.

Wire Sizes

As stated in previous articles the resistance of a short-wave tuner coil is usually as much in the insulation near the wire as in the wire itself. Still there is a *definite* advantage in large wire in some parts of the circuit.

There is not and cannot be an answer to fit all cases. Ticklers for non-oscillating tuners had best be wound with a comparatively small wire such as No. 26 to reduce the tuning effect when the coil is moved to and from the secondary. However, if the tuner is made to oscillate for continuous wave reception there seems to be a definite advantage in using larger wire in the tickler.

Large wire in a secondary coil is very much worth while. It is doubtful if this needs to be carried to any size above No. 14 double-cotton-covered, however. Even then large wire is of no use unless a coil of low losses is constructed and then kept very well away from other parts of the set.

The wire to be used in the primary depends entirely upon the antenna system.

If a ground connection is being used there will be no noticeable gain from using large wire in the primary. When receiving with a good counterpoise system there may be an advantage in using sizes as large as No. 14. This too is worth while only if the primary is tuned to the same wave as the secondary.

Insulation

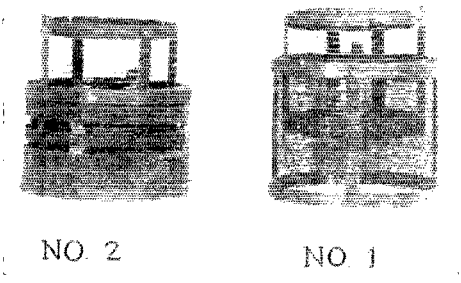
The insulation is mainly there to space the turns. Therefore enameled wire is entirely hopeless—the insulation is too thin. Single silk or cotton are nearly as bad. the double covered wires are the best. Something that will beat any of these is ordinary every-day "annunciator" wire which has several thick wrappings of cotton with paraffin soaked into it.

Basket and Spaced Coils

It is rather doubtful if any of the special windings have lower resistance than a single-layer coil with spaced turns. Certainly the difference is not a large one. The excuse for basket-weave coils and the like is not lower resistance but lower distributed capacity. Here one gets on somewhat thin ice because it can be argued that a reduction of distributed capacity is certain to reduce the losses.

In general one can look for equal results from a basket-wound coil and a single-layer coil as long as they are made equally well.

It is possible to make very poor coils of *both* kinds. Basket-weave coils frequently develop a short-circuited turn while being stripped off the pins on which they were wound. The coil then tunes broadly and it is not easy to locate the shorted turn. The spaced-turn single layer coil does not get



Low-loss coils made by C. B. Graves, Marblehead, Mass.

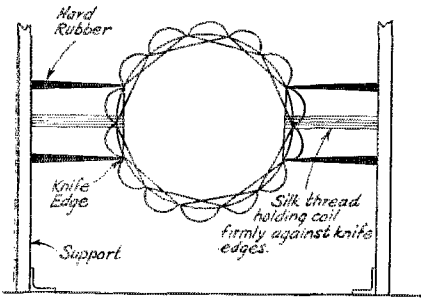
"These coils are practically springs supported by narrow strips of insulating material glued into place with a collodion mixture. Only about 10% of the wire touches anything but air.

Number 1 is an input tuner. Primary (inner coil) 22 turns bare wire spaced 1/8 to 1/4 inch. Secondary (outer coil), 5 inches diameter, 80 turns No. 22 insulated wire, tapped if desired. Tuning range 200-600 meters. This pair of coils also makes a good r.f. transformer. No. 2 is a feedback combination. When using No. 1 and No. 2 together for a regenerative tuner the outer coil of No. 2 is put in the plate circuit and the inner coil is put in the grid circuit in series with the outer coil of No. 2. This gives the well-known advantage of a split secondary, that there is no inter-action between the tickler and the antenna coil.

The clearance between the inner and the outer coil of each pair is 1/16".

into this particular difficulty but has other weaknesses.

If either the basket coil or the spaced single-layer winding is wound on a tube with thick walls and then daubed with floor varnish the result is a poor coil. If either kind is wound of double cotton covered wire on a thin waterproof tube (not over 1/16"



Method of supporting basket-weave coil used by K. M. Ehret, Oklahoma City.
It seems probable that just as good results would be gotten by sticking the coil to the supports with airplane dope.

thick) the coil will be at least fair. Finally if either sort of coil is wound "in air" and supported by sewing together with waxed thread the coil will be good electrically. To prune down the insulating material in this fashion and still make the coil solid is a thing that takes skill and thought.

Pancake Coils

Pancake coils are good if they are built on very good material—the thinner the better—and attention is paid to the need for large wire in the tuned circuits. Most pancake coils use wires 5 to 10 sizes too small, wind them with single-covered or enamel wire and sometimes even do such foolish things as using an untreated fibre or wooden form.

Deep Windings

Bank windings are inferior to single layer windings in the secondary circuit of a short wave tuner. This is assuming that the two types of winding are equally well made. It is of course possible to make a single layer coil so badly that it will be even worse than a bank winding. This statement is correct for both amateur and broadcast receivers. On longer wavelengths single layer coils become so enormous that their field includes much solid material and the losses become very high. Above 1000 meters bank and other deep coils are almost certainly better.

Honeycomb, duo-lateral, and Giblin-Remler coils are materially better at short waves than are the bank windings. It appears, however, that a very carefully made single layer coil will give a definite improvement over all of them, providing it is used with a good condenser. The convenience of plug mounting is one of the main arguments for the coils just mentioned. However, these plug mountings are in effect small fixed condensers whose losses are higher than one might wish.

Shape of Coils

Our readers seem much worried about the proper proportion of diameter to length of receiving coils. With ordinary tuners a single layer coil will automatically have favorable proportions. If the diameter is very much increased the distributed capacity will go up rapidly because it is roughly proportional to the diameter. If the coil is made very long and slim, the distributed capacity will go down but the inductance for a given length of wire will also go down. The best proportions seem to be near the region in which the diameter and lengths are somewhere near alike. The condition is not very critical and a coil is good if its length is anywhere from ⅔ to 1½ times the diameter.

Varnishes and "Dopes"

It seems from the correspondence that we have not been emphatic enuf in our remarks about coil varnishes. The *only* excuse for coil varnishes is to keep moisture out of the coil. *No varnished coil is ever entirely as good as an untreated coil—if the untreated coil is dry.* However, the difference can be made very small by using a good varnish. A bad varnish will run the resistance up badly and will *not* keep out moisture. Prepared shellac is often bad, being loaded up with glue and the like. Ordinary varnishes are not good, especially if put on thickly.

We are constantly being told that heavy varnishes are O.K. since they are used constantly in such tuners as the Navy's SE-1420c and CN-240. Do not forget that these tuners work mainly at medium and long waves, also that something must be sacrificed in ship's apparatus to get absolute moisture-proofing.

Some paraffines are good coil dope but tend to collect moisture. The material called cerasin is somewhat better. The best all-around varnishes appear to be the airplane dopes. These are usually made of a cellulose compound dissolved in acetone, ether, or a mixture of the two. When using the brush with this varnish, work quickly for it dries fast. Fully as good a way of putting the "dope" on is to spray it on with an ordinary atomizer. This must be done carefully; do not hold the coil too close to the atomizer and do not put on too much varnish.

Forms and Tables

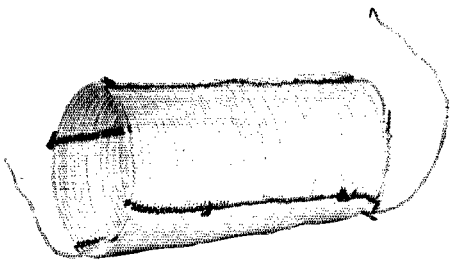
The main idea in all low-loss coils is to keep away from solid materials. The worst thing of all is to wind a good coil on a heavy composition tube. However, any heavy tube is bad—stick to the idea of using

a very light tube. A cardboard tube, well baked out and then waterproofed with airplane dope, is as good as anything. Reread Mr. Hassel's excellent advice on this point.

Some more extreme forms of coils are shown in our illustrations.

Corrugated Paper

Don Canaday of Cleveland Ohio suggests a very simple way of keeping the coil off the surface of a tube so as to reduce the losses. The scheme is to varnish the corrugated



LOW LOSS COIL MADE BY MR. MANDLY OF HARTFORD

The coil has 81 turns, a diameter of about 4 inches and a length of about 9 inches. It is wound of No. 14 wire which happens to be cotton-covered although enameled would be just as good for this kind of winding. The cords are lightly treated with colodion to make the whole thing firm.

The coil is used in the Rice circuit described in QST with the negative A battery connected about 3/5 of the way down. In this circuit and with a condenser of 500 micro-microfarads (.0005 microfarads) connected across it a tuning range of approximately 190 to 425 meters is obtained.

paper that comes around vacuum tubes and then to lay it on the winding form with the grooves running lengthwise. The simplest way of varnishing the paper is to dip it. Be sure the varnish is thin and has dried hard before the paper is used.

Home-made Tubes

A. H. Cain of 9MC manufactures his own tubes from tarred paper roofing. This did not sound good but seems to measure up rather well. The paper is cut into a strip and heated with a blow torch while it is being wound on a form. The turns stick together firmly and the tube is ready as soon as cool. Nothing simpler, provided you don't try it on a tin can that has a rim at each end so the finished tube will not come off. (We did.)

Keeping "In the Clear"

No matter how good a coil may be, it will not perform well if slapped up against a panel. The effect is about equally bad with a metal shield of ordinary type. Many of the tuners now on the market cheerfully ignore this. While we are on that subject it is fair to say that most of the metal-panel shields one sees these days are evidence of poor design. There is such a thing as good shielding but that does not excuse a metal (or metal-backed) panel with coils crowded against it, sometimes within an inch of the panel.

More International Intermediates

SINCE the announcement in December, 1923, *QST* of the adoption of the International Intermediates for identifying amateurs in various countries, the system has come into general use wherever amateur radio thrives, except Great Britain in which case variation was necessary on account of governmental objections.

Several additions have been made necessary by amateur activity in countries not reckoned with when first assignments were made. They are as follows:

B—Belgium
C—Newfoundland (calls do not conflict with Canada)
D—Denmark

Some amateurs have asked why more assignments have not been made, notably in South America; the answer is, there are only a limited number of initials open and we must proceed with caution, assigning where there is enough activity to warrant it but holding back until development shows a real necessity. It was realized the present international intermediate scheme had its limitations but, as previously stated, it is hoped the next International Radiotelegraphic Convention will consider the question and officially adopt a system applicable to amateurs of all countries and so take the matter into its own hands.

Correspondence is now being exchanged with several South American amateur bodies on the possibility of zoning the countries similar to the division of Canada and the United States into Radio Districts, such that one or two initials would serve all South American countries, the distinction between countries being indicated in the numeral prefix of the call.

For instance, the intermediate "R" might be assigned to Argentina, Uruguay, Chile and Brazil, all call letters in Argentina beginning with the numeral "1", in Uruguay "2", in Chile "3" and in Brazil "4". If anyone heard 1AX using the intermediate "R" he would know it was an Argentinian amateur, 2WW with intermediate "R" a Chilean amateur, and so forth. This would conserve much-needed initials for assignment to countries widely separated, at the same time causing no confusion in South American call identification. Whether this arrangement

will be adopted depends on the South American amateur opinion and no conflict with governmental restrictions. As far as we know, the several South American governments have not made definite amateur call assignments and if the amateurs themselves get the jump on the situation, they will probably have little trouble inducing their governments to assign calls in accordance with this zoning system when the time comes.

—*C.A.S.*

Financial Statement

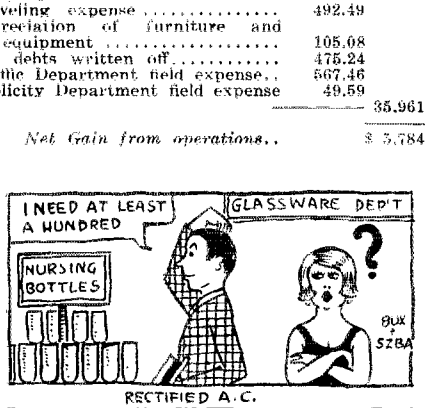
IN accordance with instructions of the Board of Directors the following statement of revenue and expenses of the A.R.R.L. for the three months ended March 31, 1924, is presented for the information of the membership.

K. B. WARNER, *Secretary.*

CONDENSED STATEMENT OF REVENUE AND EXPENSES

Quarter Ended March 31, 1924

REVENUE		
Advertising sales	$22,352.21	
Newsdealer sales	9,324.45	
Newspaper syndicate sales	141.00	
Dues and subscriptions	10,691.42	
Back numbers, etc.	493.01	
Emblems	606.10	
Interest on bank deposits	154.81	
Bad debts recovered	166.50	
		$44,729.53
DEDUCTIONS		
Returns and allowances	1,825.42	
Reserve for returns	799.25	
Exchange and collection charges	5.24	
Discount 2% for cash	353.25	
		2,983.16
		41,746.37
EXPENSES		
Publication expense	13,160.84	
Salaries and commissions	15,320.07	
Newspaper syndicate expense	201.10	
Forwarding expense	498.25	
Telegraph, telephone and postage	1,594.65	
Office supplies and general expenses	2,952.39	
Rent, light and heat	545.28	
Traveling expense	492.49	
Depreciation of furniture and equipment	105.08	
Bad debts written off	475.24	
Traffic Department field expense	567.46	
Publicity Department field expense	49.59	
		35,961.84
Net Gain from operations		$ 5,784.58



RECTIFIED A.C.

Tests With FL, Eiffel Tower

WHILE our President, Mr. Maxim, was in Paris during the month of March, the French Government asked if the A.R.R.L. would assist in conducting some short wave tests. Mr. Maxim gladly offered our coöperation in any tests that might be carried out from FL.

General Ferrié, of the War Ministry, and Colonel Delcambre, Director of the National Meteorologic Office, proposed that tests be sent from FL on wave lengths of 115, 75, 50 and 25 meters; also that meteorological reports be sent from FL on 115 meters, daily. In addition, it was suggested that we amateurs secure the weather reports sent out by our naval stations and transmit them for reception in France. The French government is interested in determining the reliability of short-wave signals, fading, consistency, and audibility. Probably the tests will be similar in nature to the A.R.R.L.-Bustan Fading Tests of 1920.

FL did transmit during the months of May and June, but unfortunately signals were very weak and heavy static prevented any general reception. Once or twice during May, FL's signals were very loud and several amateurs heard them. Since that time there has been nothing outside of a very weak signal that has been heard by a very few amateurs.

No definite schedules were received at Headquarters, but schedules were picked up from FL while they were being transmitted—it was only by good luck this happened. Because of the limited time, it wasn't possible to include these schedules in any issue of *QST*, but mimeographed forms were mailed to all amateurs who responded to the broadcasts and circular letters which were sent out from A.R.R.L. Headquarters.

We don't know just what the program will be from now on, but no doubt FL will continue to transmit. Our contact will have to be considerably better before we can hope to do much through the heavy static season, but we ask each interested amateur to drop a card to A.R.R.L. if he wishes to receive copies of the schedules for future months. As far as we know, transmission from FL will be on wave lengths between 25 and 115 meters and the present program includes a daily transmission of weather on 115 meters at 6:20 A.M., 5:00 P.M., and 10:00 P.M., C.S.T. We believe this daily weather bulletin will continue and we have been asked to forward copies to the U. S. Weather Bureau, Washington, D. C., when it is possible to copy it.

—*F.H.S.*

A Tuner That's Different

A Reinartz-Type Tuner That Goes From 30 to 550 Meters

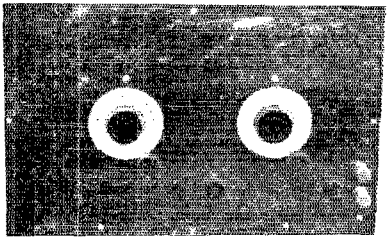
By John V. Baker, 1BIS

THE usual method of changing the wavelength of a receiver is to insert a loading coil in *series* with the grid inductance. My method is just the opposite; a short-wave coil is connected in *parallel* with the grid (secondary) portion of the main coil. This extra coil has fewer turns than the main coil and the combined inductance of the two in parallel is less than that of the smaller coil alone. By using different sizes of shunt coils, it is possible to move the range of the tuner downward as desired without changing the tuner itself.

The circuit, shown in Fig. 1, is a simplified Reinartz. This is nothing new.

The Coil System and Wiring

I believe the method of supporting the coils and changing the wavelength range is new. Fig. 2 is a sketch showing the method of mounting the main coil. The leads from the tuning condenser to the filament and grid binding posts on the socket are of No. 14 hard drawn copper as shown. It is

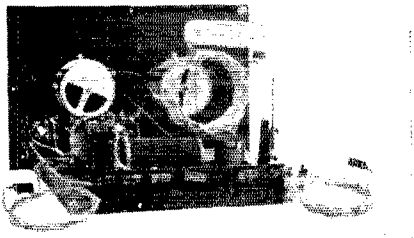


thus supported about two inches above the baseboard, clear of all apparatus and without using any material except the connecting wires. The primary consists of 3 turns and is wound right over the secondary, next to the filament tap. This can be seen in the photograph but is not shown in Fig. 2.

Two angles of No. 14 hard drawn copper wire are soldered to the leads which support the main coil near the rear of the horizontal portion of the leads. Their free ends stick up about ½" and form short "prongs." The short-wave coils are wound in the same manner as the main coil and have Fahnestock clips to their ends. When the short-wave coils are used they are clipped on to the short upward-projecting prongs, thus putting the coil in parallel with the grid (secondary) part of the main inductance.

The waves above 225 meters are reached by shunting the main coil with various Micadon Type 601 condensers which, like the small coils, have been equipped with Fahnestock clips.

The additional coils do not seem to



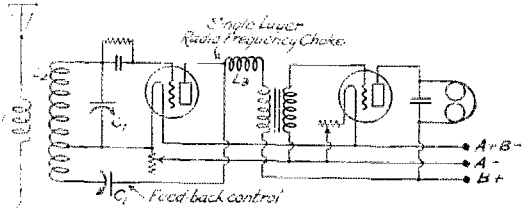
affect the feedback, the set oscillating as easily and steadily at 30 meters as at 200. This applies only to UV-201-A and C-301-A tubes. Some other tubes will not work below 70 meters.

The Coils Themselves

The receiver has two 250 μμfd General Radio geared-vernier variable condensers, one to tune the grid (secondary) circuit and the other to control the feedback. Body capacity effects are eliminated if the connections are made as shown.

The main inductance is basket-wound with No. 16 D.C.C. wire, using a winding form of thirteen ⅛" pins set in a four-inch circle. The main coil has 32 turns with a tap at the 20th, giving 20 turns in the grid circuit and 12 in the plate.

The radio-frequency choke, seen lying flat on the base of the set, consists of 250



C_1 – General Radio Vernier Variable Condenser, 250 μμf. max. capacity
L_1 – 3 turns No. 16 D.C.C. over L_2
L_2 – 32 turns basket wound 4" diameter, tap 20 turns from grid end.
L_3 – 250 turns No. 30 S.S.C. on 2" diameter tube.

FIG. 1 RECEIVER CIRCUIT

turns of No. 30 single cotton-covered wire in one layer on a two-inch tube. In the photograph a lead crosses this coil diagonally. This is the lead going from the plate of the detector tube to the feedback condenser.

The three short-wave coils are made of the same wire as the main inductance and are wound on the same form but contain 5, 10 and 15 turns respectively.

Approximate Wavelength Ranges

The wavelength ranges are as follows.

With 5 turn coil	30 - 70 meters
With 10 turn coil	35 - 110 meters
With 15 turn coil	40 - 150 meters
Main coil only	70 - 225 meters
With 250 μμfd. Micadon	190 - 290 meters
With 500 μμfd. Micadon	250 - 380 meters
With 750 μμfd. Micadon	370 - 430 meters
With 850 μμfd. Micadon	410 - 550 meters

Operation

I believe the use of coils in parallel rather than in series gives lower losses. It certainly lowers the direct current resistance of the grid circuit and my method of attaching the shunt coil does not introduce any extra losses in switches or additional leakage paths across the tuning condenser. The method of mounting the inductance on its own connection eliminates all insulating material from the field of the coil.

However, it will be found that even with the shunt coil located as far from the main inductance as it has been shown, there is still some coupling, as a wavelength change occurs if the connections of the short-wave coil are reversed. These coils should be marked so that they may be placed with the same side always to the front.

If the fundamental of your antenna system is within the wavelength range of the receiver you will need the full capacity of the feedback condenser to maintain oscillation, and even this may not be enough. I

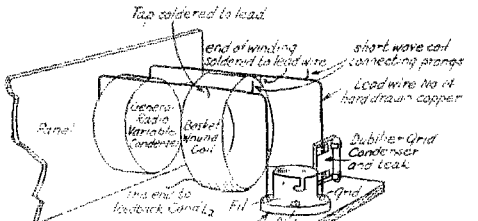


FIG. 2

use a loading coil in the antenna circuit to bring its wavelength just above the upper limit (220 meters) of the receiver. My antenna has a fundamental of 120 meters. I prefer this to a series condenser as a condenser small enough to lower the wave of the antenna below the working range reduces the signal strength too much.

Other Parts

Just to the left of the radio frequency choke is the Chelsea audio amplifying transformer which feeds the amplifier tube. This tube also is a UV-201-A. On the panel near the feedback condenser may be seen

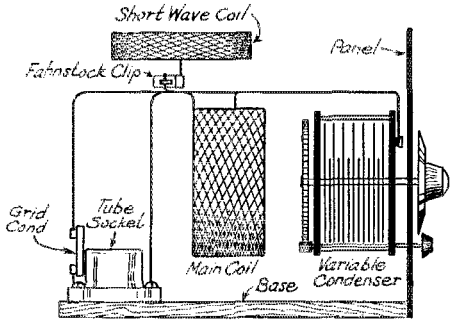


FIG. 3 END VIEW OF RECEIVER WITH SHORT-WAVE COIL IN USE

the small General Radio 30-ohm rheostat which controls the filament.

Other Sets

The same scheme for reducing the wavelength range can of course be applied to other kinds of sets. This is a convenience where the same set must be used on the broadcast and the amateur band. The change does not injure the set, nor require cutting and drilling of the panel.

Amateur Radio to the South Sea Isles

UNDER command of Captain A. J. Duken, the S. S. Bigbill is sailing for the south seas on a four year expedition, in the interest of the Deep Waterways Commission. This information came too late to allow time for us to get complete details on the radio equipment the "Bigbill" will carry—but watch for it next month.

E. C. Page (9BP-9XBF) of Evanston, Illinois, is the operator selected from the membership of the A.R.R.L. Page is one of those enthusiastic hams who spent many a night in the earlier days right after the war in getting a spark transmitter that was one of the best in Illinois. He never did seem to stop tinkering with it, but always was after greater efficiency — persistency was his long-suit. 9BP was among the first ones to put a kick behind a C.W. signal when he shifted from spark to C.W., and when he secured his experimental license (really before that) he had one of the best signals on short waves that came

out of the ninth district—Page always had a good station that reached out. And he knows his receivers too.

Now he is going to have the joy of operating under the call WHU, using most any wave-length necessary for experimental work. That means practically all amateur communication will be "experimental work." So fellows, here is one more chance to keep an ear out for another ham, and when you hear WHU on waves between 100 and 200 remember that Page (9BP-9XBF) is at the key. More about WHU next month—sorry we couldn't have more dope for you.

—*F.H.S.*

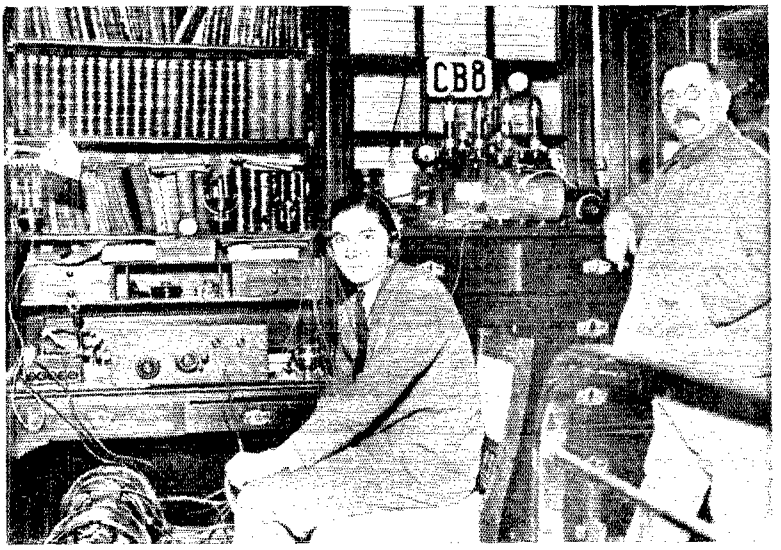
More on the Pan-American Tests

LAST month we recounted the list of stations which were successful in logging CB8 in the Pan American Tests and this month we list the calls of stations heard in South America, as reported up to press time. CB8 has the best report. In each case where a code word was transmitted, the call has been verified from logs sent to A.R.R.L. Headquarters.

May 20/21—1XW, 1AC, 1XAM, 1XZ.
May 21/22—Canadians 1AR and 1BQ. 3ABD, 1XZ, 8BPA, 9UA, 3OH, 4IZ, 1AW. (1AW was not in operation during the tests.)
May 23/24—1BCR, 9UA, 1CPN, 3YO, 4IZ, 6CGW, 4CB, 9ZT.
May 24/25—1AC, 2XI, 8CYI, 9AIM, 9CCS, 3CKJ, 8BCP, 6CGW, 1BIE, 9ZT, 5MI, 4IZ, 6AMK, 4BNU—probably 3BNU.
May 29/30—1XW, 8XBP, 1CR, 1BIE, 4OQ, 1ABF, 6APW, 9CJM, (3BWJ worked CB8).
May 30/31—1XAK, 4IZ, 8YN, 1XZ, 8AAJ, 1GC, 1BVL, 1BIE, 1BOQ, 1XW, 8ZW, 5AIR.
May 31/June 1—4CR, 3AQ, 6CGW, 4AF, 1XU, 1XW, 6AJA, 9ZT.

Pierre J. Noizeux, Villa Eliza, (F.C.S.) Argentina.

May 11 to 14 (before tests started), 1AFN,



A NEW PICTURE OF CB8

Here are the Messrs. Braggio at their station at Bernal, near Buenos Aires, the only South American station to be heard in North America during the tests. Our hunch about their transmitter was wrong—they have a new one using four UV-203-A's working into a beautiful vertical cage aerial a hundred feet high.

3XAQ, 3OT, 1XAH, 2XN, Canadian 1AR, 9ZT, 1XU, 8XS.
May 21—1XW, 8XS.
May 22—Canadian 1BQ, 8XS, 3ADB, 1XAE, 1XZ, 9EKY, 2LE, 9ZT, 8APW, 8AJW, 9BMU, 4PK, 4IZ, 1KA, 8AP.

Eduardo Vigano, en Mercedes, Buenos Aires.

May 22—4IZ, 4BF, 3BWJ.
May 25—3CJN, 6CGW.
May 30—1BIE, 6CGW, 1BOQ, 1ABF, 9ZT.

Ignacio M. Gomez, Buenos Aires.

May 22—1XZ.

R. Y. Jones, Sao Paulo, Brazil

May 22—1XZ, 9CII, 8ABS.
May 24—9ZT, 1BCR, 1XZ, 8VE.

1XZ was copied in Australia with code word verified.

That completes the list of calls reported up to date, but any additional lists will appear in the first available issue of *QST*.

'Twas a good job, fellows, and we congratulate and thank you for your coöperation. It was worth while, after all, to make use of the old set before you let 'er accumulate the summer dust, eh!

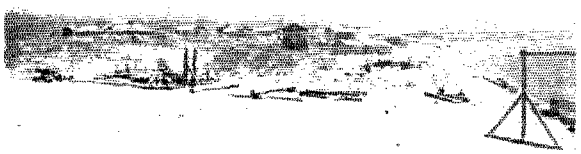
—*F.H.S.*

Vermont will hold its first A.R.R.L. Convention at Poultney, Vt., under the auspices of the Poultney Executive Radio Council, Geo. R. Town, Pres., on Saturday, August 9th. All are invited.

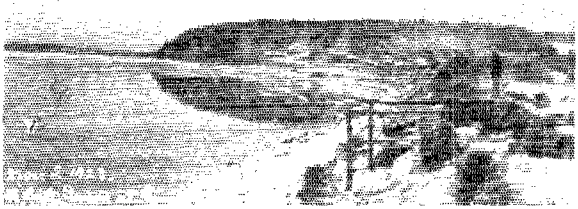
New one on 9AQR. He tried to work a power leak, thinking it was some unlicensed station in his near vicinity, sending very slow and asking it to "please QRT". Hi!

AN A.R.R.L. JOB IN THE FAR NORTH

THE RADIO INSTALLATION AT CHRIST CHURCH MISSION, ANVIK, ALASKA, DESIGNED AND ASSEMBLED BY A.R.R.L. MEMBERS.



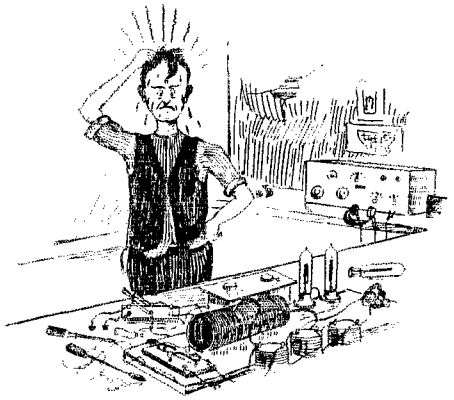
THESE photographs are of the village of Anvik, Alaska, on the Yukon River, where Rev. John W. Chapman, D. D., priest in charge of the mission, has an amateur station designed by H. F. Mason of QST's staff and built by Robt. Waskey, 7UU,



and Otto Johnson, 7FD, A.R.R.L. members in Seattle. The transmitter was illustrated and described on page 29 of *QST* for last September.

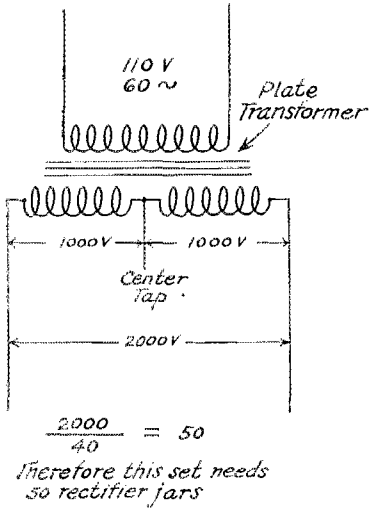
Top: General view of the settlement. Center: a late season at the little village in a bend of the Yukon; Nov. 2d and almost no snow. Bottom: The radio station and the girls' schoolhouse, showing the two 50-ft. masts which support the 2-wire inverted-L aerial.

Transmitting Hints



The Number of Jars

I have dictated it so often that I hear the sentence at night and still there are plenty of rectifiers that are built in cheerful disregard of the plain fact that "There



must be one jar for each 40 volts". When *will* this gang learn that and quit burning up perfectly good electric power in fireworks?

Filter Condensers

Assistant Chief Engineer Frank Conrad of the Westinghouse Electric & Mfg. Co. suggests that the quickest way to purchase the Westinghouse oil-filled filter condensers is through your local power company.

These condensers, which were advertised on page 75 of May, *QST*, can be obtained in the following sizes: 1 microfarad 3500 volts, and 3 microfarads 3500 or 4500 volts. house Electric & Mfg. Co. and ask for page 57.11 of their catalog.

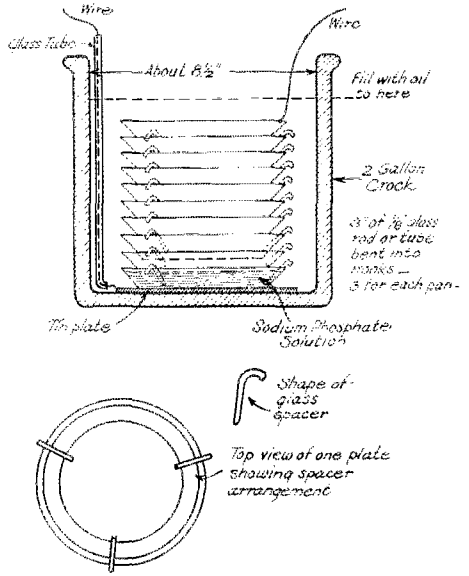
Good high-voltage filter condensers of the dry type are made by the National Electrical Condenser Co. at New Haven, Conn. Sizes to suit all amateur conditions are available and the units are giving very satisfactory service in a number of amateur stations near Hartford. When writing tell them who gave you the address.

Home-Made Filter Condensers

In the January number of *The Radio Experimenter* (official organ of the Wireless Institute of Australia) there appeared a description of a high capacity filter condenser whose efficiency and convenience is not up to that of the purchased variety but which at least costs considerably less and can be made by anyone.

The pictures tell the story almost completely. When the dishes are being stacked one-half inch of saturated sodium phosphate solution is poured into each one. When the plates have all been stacked the crock is filled with transil or other insulating oil so as to seal the condenser. The condenser will have to be formed just as aluminum rectifiers are, not only the first time but every time when it has been allowed to stand without use for several days. However, it is self-healing after a puncture and can be depended upon to handle 1500 volts with safety.

The materials required are, 1 two-gallon crock with dimensions as shown, 10 aluminum milk dishes which will go into the



crock with half an inch to spare all around, one pound of sodium phosphate, enough

and provide a half an inch of solution for each dish except the top one, two gallons of transformer oil, and twenty seven pieces of one-eighth inch glass tubing or rod. The tubing should be in three inch pieces and bent in a gas flame to the shape shown in the drawing.

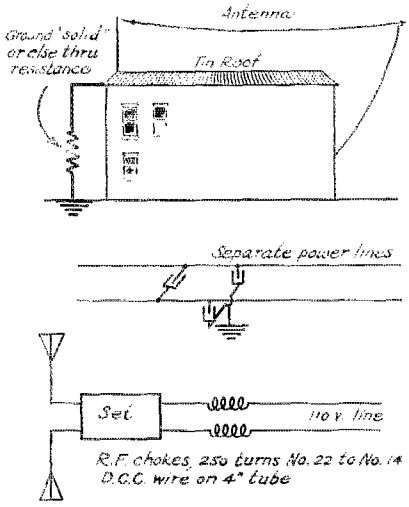
The Double Wave

Many stations have interference from a nearby transmitter operating on one-half the wavelength on which they are listening; that is, a 200-meter transmitter interferes on 400. While this will happen to some extent with a perfect C.W. transmitter whenever any tube in the receiving set is allowed to oscillate, things are made much worse if the tubes at the sending station are being forced and if a direct coupled transmitter is used. Just the same we wish to repeat that a considerable proportion of the trouble is due to the use of receiving sets in which one of the radio amplifier tubes is oscillating weakly. Generally the owner of the set does not suspect that this is going on.

"Harmonics"

About nine times out of ten the so-called "harmonics" from an amateur station are caused by radiation or re-radiation from a power line, a tin roof or the guy wires of the antenna mast.

They can generally be cured, or shifted



RADIATION & RE-RADIATION CURES

to a harmless tune by one of the stunts shown in the drawing.

Where this does not do the deed you may have real harmonics which can be recognized because they are exactly one-half, one-third, one-quarter, and so on, of your main wave. If they are strong it is a sure sign that you should get rid of your old-fashioned transmitter and put in a loose-coupled one.

The Filament Center Tap

The only way to get a real filament center tap on a transformer is to fit the transformer out with two secondary windings that are exactly alike, that are connected in series and that preferably are located the same way with respect to the primary winding. An excellent arrangement is that of the Thordarson filament transformer. You do *not* get a center tap when you wind 100 turns and tap at the 50th turn.

The Filament Rheostat

There is no advantage in having a center tap on a filament transformer secondary and then putting a rheostat in series with the filament and throwing the center tap away off.

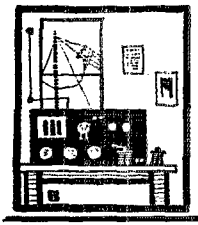
The rheostat belongs in the primary. Perhaps some day we will be able to buy rheostats that are made to go in that circuit. In the meantime use anything that will do the job but put it in the primary. *Practically every station description that we get is wrong in this respect.*

Delta Hams to Convene at Memphis

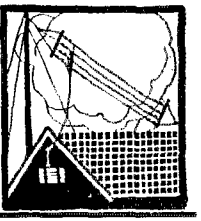
THE Delta Division Convention this year will be held in Memphis, Tennessee, on August 27th, 28th and 29th. Headquarters will be at the Memphis Chamber of Commerce on West Monroe Street, where amateurs will be in charge of registration. Large signs placed over Main Street will show the way from the registration rooms to the convention hall.

The convention will be a humdinger! Entertainment will consist of various stunt parties, prize contests, a banquet on the second night of the convention, speeches, and a full fledged 100% Mystery Night that will surpass the one at Chicago last year. There will be a Wouff Hong initiation and something else about which we are not talking. Stations tours—to ham stations, of course—and many other things to give the visitors a good time are on the program.

Save your nickels, fellows, and come to "Radio Heaven" on August 27th, 28th and 29th.

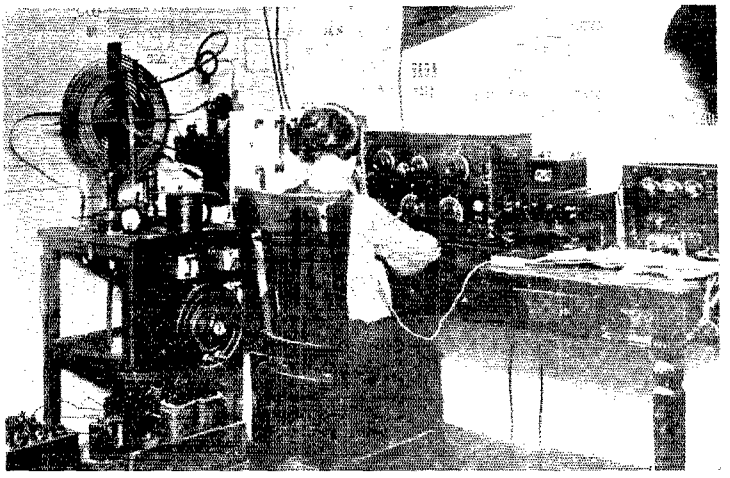


Amateur Radio Stations



5AMH, Birmingham, Ala.

Description by L. E. Hughes, the Chief Op.



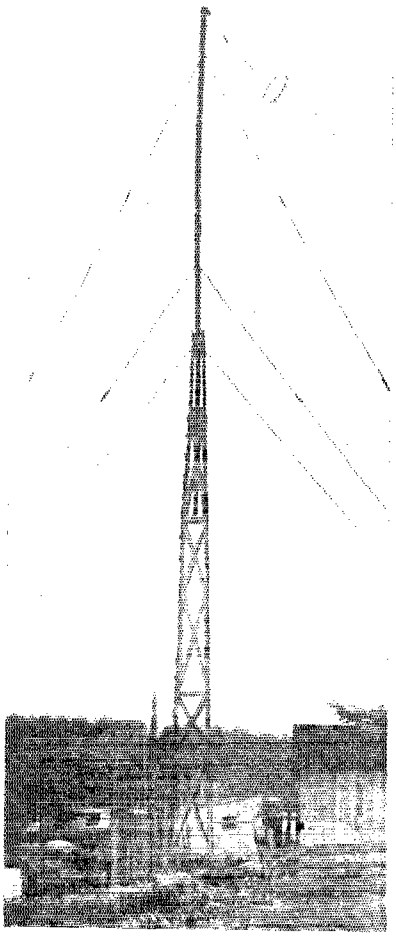
Nope, we haven't seen 5AMH listed in the Martian "Calls Heard" columns, nor have we even rattled the diaphrams of a Jap's headset; fact is, we've never done anything sensational that we recall except rope in the OW and introduce her to the key. Now instead of looking daggers at me every time I go near the old set she puts on the phones, gets all het up with enthusiasm, and shouts "He's comin' rite back, lemme work him!" F.B.

The station is located at 231 Grace Street. Our debut into the radio world took place in 1910, when we carefully assembled and connected, according to the illustrations and diagrams in the catalog, one spark coil, one pair of zinc spark balls, one strap key and four dry cells. The receiver was even more elaborate and consisted of a coherer, tapper or decoherer, polarized relay and a thirty-five ohm receiver. We then started in to wreck the ether (as the mail order house admitted it would) but the aforesaid ether refused to be wrecked. We passed undaunted through the hazards of the spark coil days and emerged with a 1 kilowatt Thor—but then the war came on and we shut down.

But that's that. The accumulation of the present transmitter required a lot more ingenuity and diplomacy. After explaining to the children why a five-cent school lunch was much better for them than a ten, and kidding the madam into wearing her last summer's hat, we invested sixty berries in a couple of UV-203's. Like methods were pursued in the purchase of other needed equipment.

The plates are now fed from a Radio Corporation 1500-volt transformer through a 60-cell rectifier and a real "he" brute-force filter. A good rectifier and filter, in our opinion, is of prime importance. Our rectifier consists of 60 cells with heavy aluminum and lead strips 6" x 1-⅛",using borax solution with a quarter inch of medium grade automobile oil to prevent creeping and evaporation. We see to it that every cell works perfectly. The main filter choke L_4, is of the closed core type with five pounds of No. 28 wire on either leg.

One coil in the positive and one in the negative lead. Three microfarads of condenser are placed across the line on each side of L_1. An additional open-core choke of like size, L_2, helps smooth out the ripples.



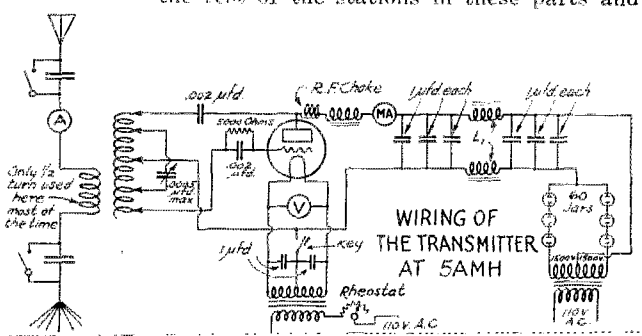
The coupled Hartley circuit is used, and the fundamental of our antenna is 170 meters. We actually work on 173 with a ½ turn in the secondary and transfer four amperes into the antenna with 150 mils plate current. The helix is a pancake affair with sixteen turns of 1-inch brass ribbon, 18" in diameter.

The cage antenna is composed of six wire, 50 feet long, on 3-foot copper hoops, 85 feet high with a 70-foot, eight-inch, cage lead. The counterpoise consists of ten 115-foot wires fanned to 50 feet, eight feet above the earth. Besides the counterpoise we have a real ground of buried galvanized iron, fanned in several directions for 100 feet. This ground was used exclusively the first part of the winter and west coast stations were worked repeatedly.

But lest we forget—our mast—it was built complete on the ground, the tower part being 52 feet long. A five-inch by five-inch by fifty-foot box-constructed pole was placed inside, guys and pulley placed on, and the whole raised by means of a 32-foot gin pole. The tower was then made fast on its concrete base and the 50-foot pole was raised 35 feet making a total height of 85 feet above the state of Alabama. Guy insulators consist of pieces of two by two by eight inch oak boiled in paraffin. The antenna insulators are made from large size glass towel racks, eighteen inches long, two used in parallel where greater strength is required. The mast and antenna seems to hold its own against the high winds, although the neighbors mutter something about moving and the guy next door whose garage is within its shadow now parks his bus all night in front of his house.

The receiver last winter was a variometer set but has since been replaced by a low-loss two-circuit affair which goes down to eighty meters. An extra variometer set is kept handy for use on the higher waves. Both work into the same three-stage amplifier. The neighbors complain about the Western Electric power amplifier, so it is seldom used on code signals. A 200-ampere-hour A battery and a 125-volt storage B battery is installed. Either may be charged from the same rectifier by throwing the proper switches.

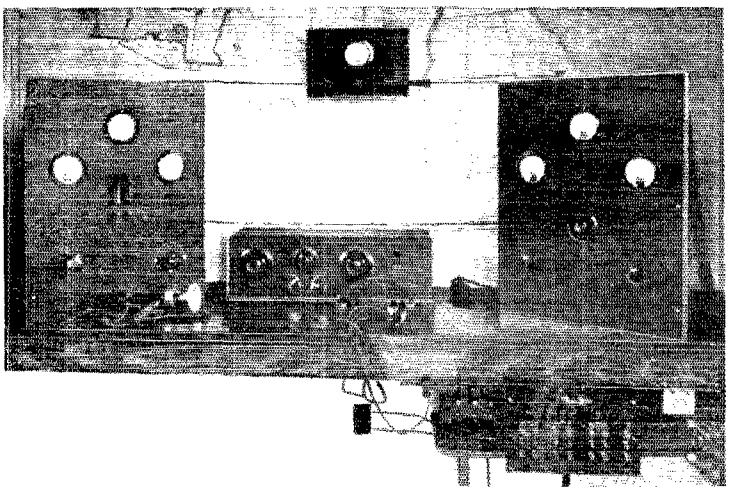
We've always tried to conduct 5AMH on the Golden Rule plan and to be of as much service to the public as possible. All traffic is carefully handled, and most important of all—DELIVERED. In fact "We Deliver Em" is our motto. During the month just passed we delivered in our city alone 121 messages. Our traffic total stands well with the rest of the stations in these parts and



no spurious messages are accepted. During the Atlanta radio convention in December a 120-word story of the convention was received from 4EB and was in print within an hour in a local paper. Also a two-way message was handled with 5EK of Memphis every evening for two weeks during the serious illness of a child in that city whose relatives were in Birmingham. During these two weeks the longest elapsed time for a return answer on any evening was twenty minutes. We had rather handle one message of that character per month than a thousand "pse qsl," etc. Most credit belongs to 5EK for this work as he kept doggedly at it when QRM was terrible in Memphis.

As for our DX we've not much to brag about, although we do work Canadians with surprising ease. About forty different Canadians were worked last season—a large number in broad daylite in the afternoon. The best worked DX was to Canadian 5GO and Canadian 4CL, with New Zealand our best heard DX. All districts, both Canadian and U.S., were worked; also Mexico, Cuba and 43 states. Something like 1500 stations were worked last winter.

8SP, Fairmont. W. Va.



This station is jointly owned and operated by Albert G. Kisner and Edward C. Jones, Jr., and is located at Fairmont, West Virginia.

There are two transmitters, one being a CW-ICW-phone set used for short wave work with four 5-watt tubes, and the other and main transmitter being a set using three 50-watt tubes. The reversed feedback circuit is used in both sets.

Most of the records made by the station have been accomplished with the larger set. During the transatlantics of last winter 8SP was copied repeatedly in England and France, as well as many times since then. It has also been heard by ships in the North Sea, Pacific, Arctic, North Atlantic and South Atlantic Oceans; and amateurs in Holland, Hawaii, Northwestern Canada, Mexico and all of the United States have also reported hearing its signals. The best record was made when the station was copied by a ship off Tahiti, 6400 miles distant.

This station has several unique features in its construction and layout. The antenna, for instance, is in the form of a triangle. It consists of a 28-inch diameter horizontal cage 35 feet long and about 80 feet high with a 7-inch diameter cage leading from each end of the horizontal section to the station house, centrally located below. The lead-in comes directly to a panel carrying the antenna ammeter and a switch for connecting the antenna to either transmitter.

The elaborate "Round's round ground" consisting of 12 big cast-iron boilers buried deep in a circle about the station, which used to be responsible for 8SP's old spark sounding like a boiler factory, has been replaced by a counterpoise. The counterpoise consists of two 8-wire fans under the antenna.

(Concluded on page 57)

INTERNATIONAL Amateur Radio

Italian ACD at Sea Testing With Amateurs of Four Continents

Through the courtesy of Miss E. M. Zandonini of 3CDQ we have the following information on a most unusual series of short wave tests.

Two vessels of the Royal Italian Navy are leaving on a long international voyage on June 20th. One of these vessels, the San Marco, carries a short wave transmitter operated by Adriano Ducati of the well-known Italian amateur station ACD. The call of the San Marco is IHT, and we expect to hear Mr. Ducati's own call tacked on to it as a personal sign.

The ship is a large naval vessel so there is ample space for antennas and counterpoises. An almost vertical cage antenna will be used and tests will be made with a variety of transmitting circuits on wavelengths from 40 to 120 meters. The power will be ample; according to one report it is 10 kilowatts. The receiving sets will be a superheterodyne, a set using four stages of radio amplification, and the old reliable detector and one step audio set.

Starting at 0000 G.M.T. July 1, to possibly October 31, the Royal Italian Navy will transmit from their Rome station (IDO for 100-meter work) on 100 meters to San Marco, IHT. The San Marco will transmit on the *even* hours, G.M.T., and IDO, (Rome) on the *odd* hours G.M.T.

The itinerary is as follows: June 20, Venice, Italy; July 1, Genoa, Italy; July 5, Gibralter, Spain; July 14, Dakar, Africa; July 28, Rio de Janiero, Brazil; August 20, Buenos Aires, Argentine; September 13, Montevideo, Uruguay; September 25, Bahia, Brazil; October 10, Teneriffa Island, Africa; October 15, Cadiz, Spain, October 24, Naples, Italy.

We certainly envy ACD the journey but since we can't go along let's do all possible to keep QSO with IHT-ACD. It will be an excellent chance for us to do long distance reception on the short wavelengths.

Reports from amateurs hearing IHT-ACD or the station at Rome should be sent to Commander E. Sommati di Mombello, Navale Attaché, Royal Italian Embassy, Washington, D.C., with a copy to A.R.R.L. Headquarters; or, you can send your reports to Headquarters direct and we will forward them to Commander Mombello.

The Australians Size Us Up

Well, fellows, the Australians have us sized up as a bunch of "duds" when it comes to short-wave reception, despite the late racket about low-loss tuners. Three years ago we bragged about how Paul Godley went to England and showed the Britishers how to receive short-wave signals. Now we can grin on the other side of our face, for Messrs. Maclurcan and Davis, on their recent trip to San Francisco aboard the R.M.S. *Tahiti*, have shown us up badly by copying, while the ship lay at anchor in San Francisco bay, the signals of both Mr. Maclurcan's 8-watt and his 100- watt transmitter at Sydney, Australia!

Their impressions of the American "ham", his habits and surroundings, together with a summary of their voyage and the prospects for two-way transpacific work with the U.S., are told in Mr. Maclurcan's report in *Radio* (Australia) for May. He says a good many things the American amateur can profitably take to heart and we reprint parts of his report below.

A description of the apparatus used aboard the Tahiti, the preparations for the voyage, and a report of the first part of the trip were told in "The Eastward Voyage of the Tahiti" in the May *QST*.

"After leaving Raratonga we experienced some trouble reading the 100-watt set through QRM from American amateurs. Many of these could be read by their generator or A.C. hum only, and hundreds were very QSA. On several occasions the code messages from Australian 2CM was easily received from the eight-watt set on 235 metres, but impossible to pick up from the 100-watter on 185 metres. This wavelength seems to be the most popular one for American 'hams'.

"While on the subject of QRM, we were astonished at the number of Yanks who do nothing else but call CQ for long periods. On several occasions we made a point of listening to some of the strongest to see if anyone answered them or whether they worked any traffic. No, sir! They were simply QSL-card-hunters and who knows,

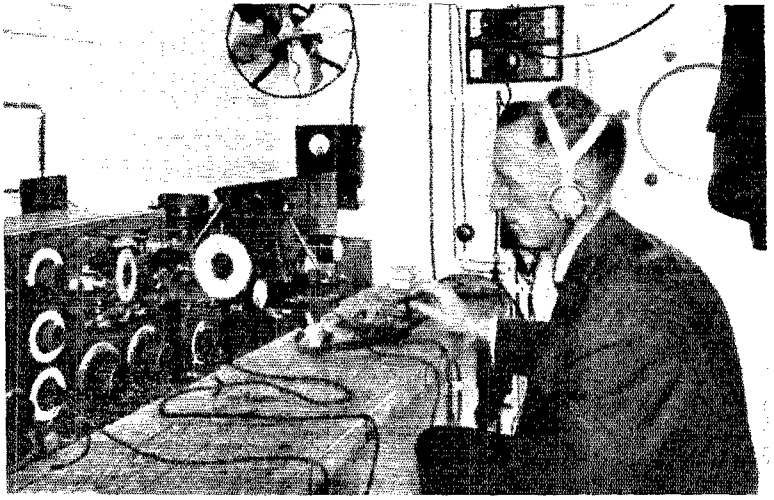
perhaps, had no receiving sets. As a result of this QRM, we radioed instructions to Mr. Cooke at Australian 2CM to raise the wavelength of the 100 watter to 230 meters. After this we had no trouble in getting him.

"But no wonder the signals of the Yank Hams were QSA. We were astonished to learn of the amount of power they put into their tubes. They do not rate their power as we do, by the actual plate input, but according to what power the manufacturer of the tube rates it.

"For instance, we visited the station of 6AWT in San Francisco. He employs a single 250-watt valve. His power is therefore described at 250 watts. But his plate voltage was 6,000 and current 900 milliamps. 5.4 kilowatts plate input power! We were told that 6KA's power was ten kilowatts. If so, no wonder we hear him in Australia!

"One of the principal things we wished to find out during this trip was why no Australian station had been definitely logged in the U.S.A. Some of our transmitting stations were known to be very efficient and many of us were logging Yanks whose power in the aerial was supposed to be no more than ours. Obviously the best way to find the trouble was to send over a receiver and operator, used to Yank logging, to try and pick up Australian signals. As you have already read, 2CM's signals were heard by us in 'Frisco under unfavourable circumstances and, although we notified many U.S.A. "Hams" of the times of transmission, and had also written ahead to *QST*, giving the schedules, no U.S.A. amateur succeeded in hearing 2CM, so far as we are aware.

"Now, the amateur over there has a great deal with which to put up. The QRM at amateur wavelengths is, at all times, indescribable. At the same time, they are not as used to receiving weak signals as we are in Australia. As a matter of fact there has been in the past little need for them to be. They have all the power they reqire to cover America with loud signals, and until quite recently there was little incentive to reach out. We, on the other hand, were for many years allowed only to receive, and all there was to receive was the rest of the world, for there was little doing in Australia. Hence we are able to successfully handle tuned radio frequency amplification which the Yanks consider of very little more use than the ordinary regenerative detector. We know how wrong they are there, however.



Mr. Chas. Maclurcan on the iob at 2CDM, the experimental station aboard the R.M.S. Tahiti.

"I am quite convinced that there is little hope of working with the U.S.A., as things are at present. It will be necessary for us to adopt transmitting circuits that are adaptable to quick wavelength changes, work on wavelengths away from QRM, and increase our signal strength considerably. As we are not allowed much power by the authorities, we must depend on increased efficiency for the louder signals. This will probably be done with specially constructed sets to operate on wavelengths about 100 metres, with large aerials and series condensers. By the time these alterations are effected we will hope that our friends across the pond are more intimately acquainted with radio frequency amplification. Then the rest is easy.

Bound for Home

"The homeward voyage was very pleas-

ant throughout and Australian 2CM's signals came through nightly to cheer us up. Particular attention was given to taking audibility readings of the signals. This had been somewhat neglected on the way over, as we were more concerned with receiving the test code messages.

"On our return to Wellington we had a fine reception, and were given a most enjoyable supper by the New Zealand Radio League of which Mr. P. Evans is the president.

"We arrived back in Sydney on Saturday, April 19, well and happy. The whole trip had proved most successful, interesting and entirely worth while. It is probably the first time in history that an experimenter has been in the unique position of hearing and measuring the signals from his own radio station, for a period of over six weeks, and it is hoped that many improvements in the station will result therefrom."

Joker in New British Regulations

The new regulations pertaining to amateur radio in England, which were reviewed on page 52 of the July, *QST*, carry a clause that has aroused much concern amongst the English amateurs. The part in question reads, "Messages shall be transmitted only to stations in Great Britain or Northern Ireland which are actually coöperating in the licensee's experiments and shall relate solely to such experiments."

In commenting editorially on this most important restriction, *Wireless World and Radio Review*, the Official Organ of the Radio Society of Great Britain says, "We opine that in inserting this condition the Post Office has been controlled to a certain extent by other Government Departments. It has evidently been considered inadvisable to give amateurs a free hand to conduct experiments and exchange of experimental messages with amateurs abroad. Of course, if such a regulation is enforced and no exceptions are made, then it is good-bye to transatlantic and long distance tests of every kind, and the possibility of amateur links round the world and connections with all parts of the British Empire is an achievement which will have to be abandoned at the moment when amateur transmitters are realizing what great possibilities lie in this direction.

"We cannot believe that it is the intention of the Postmaster-General to put any such interpretation on the new regulations and we are confident that responsible bodies of amateurs or individual amateurs will still be authorized, as in the past, to conduct experimental tests with stations abroad."

We also hope that this regulation will not be enforced. If it is enforced, however we are wondering just what kind of a fence will be used to restrict the signals of British experimenters to Great Britain and North Ireland.

Swedish Amateurs Making Progress

"Amateur work has until recently been practically prohibited in Sweden, but in the last few months about 30,000 receiving and 30 transmitting licenses have been issued by the government," according to a letter from Mr. Bruno Rolf, Secretary of the Svenska Radio-Klubben (Swedish Radio Club). Though this organization is only 17 months old it has 1,600 members and is growing fast. It is a non-commercial organization, like our League, and is taking steps to coördinate the work of the transmitting amateurs in order to avoid the confusion consequent to regulationless operation.

The first Swedish amateur to reach beyond the borders of his country was Dr. G. Alb. Nilsson, Skolgatan 5, Lund, Sweden. Dr. Nilsson was heard in England when transmitting with .25 ampere in his antenna, power being obtained from four receiving tubes with 250 volts D.C. on the plates. The Swedish Telegraph Department has decided that amateur stations in the future shall have SM as the first two letters of their call. Dr. Nilsson's call is SMZV.

Leon Deloy, French 8AB, has been heard in Brazil, making him probably the first European amateur to have the signals from his station heard in South America. This is a fine addition to Mr. Deloy's already long list of DX records.

Tests on C.W. and voice being conducted by the Marconi station at Poldhu, England, on 94 meters have been copied at noonday by East Coast amateurs. These tests were being made using the Marconi "directed ray" method of transmission. This consists of placing a large number of wires near the antenna to act as a reflector and direct most of the energy in one direction, in the same manner that a beam of light is reflected by a reflector. Transmission over a greater distance for the same power is claimed because the transmission can be concentrated in the direction of the receiving station. It is rumored that work on the construction of the high power link in the British Empire wireless chain in Australia has been halted pending the results of these experiments.

Leon Deloy, French 8AB, in a letter just received says he will be off the air until October. There is no need, therefore, of writing him for summer schedules as there are none. He'll be back with full power in the fall, though.

Hamanalysis

By Stanley M. Mathes

Lt. Comdr. Mathes, ex-70E and former Northwestern Division A.R.R.L. Director and leader of the 7's, has had a wide experience in amateur organization. In this article he gives constructive suggestions for the improvement of radio clubs which we believe club officials will find very useful.
Editor.

ORDINARILY, as the summer months advance, the outgoing correspondence from radio club officials is freely inpolated with remarks or inferences that as the attendance has dropped off so greatly, we are thinking of discontinuing club meetings for the rest of the summer." And usually they do. Why? It is the purpose of this article to discuss the subject in a business way, for the running of a radio club is a business, although it is the most unremunerative and the task of the officers the most thankless in existence.

Invariably a radio club is a one-man proposition. It stands or falls directly with the interest and diligence of the chief executive and indirectly with that of the various committees which he appoints to assist him in its conduct. The members generally adopt a "let-George-do-it" attitude and follow the standard set for them by the officers. It then devolves upon the officers to analyze the condition of the club at all times and to anticipate the lulls in interest and provide suitable substitution in the regular routine to preserve club enthusiasm at a high level.

This analysis must start with the characteristics of the membership. It will be found that after division of this personnel into classes and the appointment of committees to care for the interest of each class, radio club attendance will quickly become a question of the efficiency of committees. This will by no means lessen the need for vigilance on the part of the chief executive nor his responsibility in the selection of committeemen.

In almost every radio club we will find four distinct classes of members. This statement is qualified by the term "almost" because there are clubs composed exclusively of one class. Naming them in order we will find:

Operators.
Experimenters.
Broadcast-listeners.
Social members.

This division is made with no intention of casting aspersions on any particular class, but as the interests of each are so widely separated we must deal with them individually.

The Operator

To this class belong those who are primarily interested in traffic. They have mastered the code, constructed their stations in accordance with the latest approved circuits, and dependably handle the amateur traffic which is the life-blood of the League. Because of their operating schedules, these men are continually interested in traffic records and radio activities.

REMEMBER THE FIRST RADIO CLUB MEETING YOU EVER ATTENDED?

Their club attendance is usually insured because at the club meeting they can exchange station topics with their fellows operators, obtain the latest information from the experimenters, hear the objections of the

tivities of the social members. Then also there is that ever-latent fear that if they do not attend some local rule inimical to their activities may be passed by the other factions, and they are usually there to see that it does not happen. Inasmuch as the foregoing reasons bring the operator regularly to the meetings, he is generally neglected in the club curriculum. This is one of the big mistakes of club management. Remember that he is the backbone of Citizen Radio. His position is the embodiment of the ambitions of each and every member interested in radio communication. His is the privilege attained through constant endeavor of talking back with the other fellow through the ether, and of all of the other classes of membership he is the most important when the nation's honor is at stake.

While it is fully realized that the American Ham is as loath to standardization of stations as the American woman is to the standardization of Easter bonnets, an effort should be made to determine the best circuit adapted to the locality and until a better one is solved he should be urged to adopt it. To this end it may be necessary for the club to assist him financially in the purchase of some needed part. Such finance could take the form of a loan to be reimbursed by him over a period of such length as would not embarrass him.

Again, in these days of internationl amateur communication, practice in the reception and transmission of three and four letter code groups will be found worthy of study. Until the settling of the international language problem we can find an excellent medium for the exchange of intelligence through the use of the "PRB" or International Code of Signals. While its use requires ciphering and deciphering, and the transmission of the code groups in message form, it is precise and practicable, cheap and efficient, available to everybody and, above all, it is international. Every station holding international communication be equipped with a code book, and the club should see that each operator in its membership has ample opportunity to familiarize himself or herself with its use. A practice table should be provided in the clubrooms if possible and the operators trained to send and receive by code group. This is what they will encounter if ever they become commercial or government operators, so that we owe it as a national duty to bring it to their notice. Communication is one of our first lines of national defense.

The Experimenter

This class is composed of mixed characteristics. It is the technical, semi-technical and non-technical part of the membership interested in delving into the mysteries of what makes radio work and why. Many of this class are licensed operators, quite a few are BCL's, and a few are the beginners who think that they have found out something new when it really is as old as the sun. The operator-experimenters are most vaulable, as they were compelled to become thoroughly acquainted with the theory of radio before being granted their licenses. Since that time they have gained a wealth of wisdom and their laboratories furnish the material on which radio in all of its form rests today. To the experimenter a transmitting circuit is of importance primarily as a generator of the power with which he deals. He is not particularly interested in the communication of intelligence by radio except for reports of the results of his experiments. Co-operating with him in the reception field are the BCL's who have graduated through the different stages of reception of voice until they are capable of intelligently conducting experiments and can explain the phenomena they encounter. They are mainly interested in voice reception on the broadcast waves, but after a certain point is reached in their development they become either operators or operator-expermienters.

It is this class that produces the technical discussions at club meetings. Their interest should be fostered through a regular program of talks and a weekly report of experiments and new developments. An annual, semi-annual or monthly prize of some piece of apparatus should be offered by the club for the best technical paper produced, a regular board of judges having previously been appointed for determining the merit of discussions. Subjects for experimental work may be obtained from headquarters of the American Radio Relay League, and the programs for the technical discussions planned and calendered as much in advance as possible to permit full publicity. Advantage should be taken at all times of opportunities to entertain any available technician in the electrical or radio field, and to obtain from him an address on any subject of club interest.

The B.C.L.

The individuals composing this class are the real plastic material of which the two former classes are made. They have been attracted to the game through the music, lectures and what-not provided by the broadcasting stations, and are just entering into a hobby that they do not yet understand but which they are willing to learn. The B.C.L. is the most serious subject with which the radio club has to deal. The club is the school in which he can be made into a real dyed-in-the-wool ham or a selfish ignorant outlaw. It has been somewhere stated that "a little learning is a dangerous thing." No place is this more true than in our B.C.L. If permitted to stay away from the club he will deteriorate into a selfish unreasonable egotist, bitter in his denunciation of all who dare to differ with him, but if cultivated and encouraged to attend the club meetings where he hears the other fellow's views,

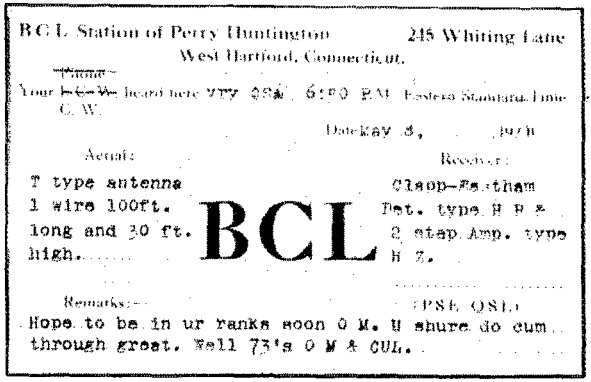
his great broad sense of American justice will soon exert itself and he will evince a desire to learn the code so that he too may enjoy the privileges that the others enjoy. It is at the club that he soon finds that his experience that "a galena detector vibrates much better than a silicon crystal" is but a step in the game that we have all gone through, and that others ahead of us found that same thing true but in a different way.

The Club should enquire at every meeting for the names and addresses of any person in the community newly interested in radio, and should take steps to have them visited and invited to attend the club meetings. Publicity should never be neglected, and meetings o the club should always be announced in the news items of the papers on the day of meeting.

The Social Member

Odd as it may seem, there are individuals who belong to a radio club for no other reason than to attend the various dances, picnics and suppers. They usually do not turn up at meetings unless there is a goodly promise of free eats after the business session, but they always turn out in force at the annual dinners and usually break up perfectly good hamfests through their demand that everybody clear away the tables and dance. Because of his wicked-foot propensities the social member is generally condemned by the majority of radio-club members, but the officials should remember that this class annually enriches the exchequer with his dues and that maybe sometime, somehow, someplace, he will be really and truly bitten by the bug and that he can be moulded into some sort of useful material. As the treasury will permit, such social functions as can be engineered should be encouraged. Once a month if possible a social session should be held at which all members should be present and all grouches put away in the closet and the hatchets buried. Clubs will even find that they have talent enough to put on small sketches and acts that can drive club lessons home to members who would never get it in regular meetings.

Many readers will say, "that's all very well, but who is going to pay for it?" And this remark brings us into an entirely new field—that of financing a club. But the purpose of the article was to analyze the personnel and we will only close with a few suggestions for maintaining the attendance. Of course it costs money And as long as the motto of the club is "Let George Do It," the president will have to do the worrying as to where the money will come from. But with a little support from the members, which can only be obtained through first keeping their interest in the club meetings, the question of finance can



How The BCL's Are Coming Along Towards The Amateur Game. We See Many Cards Like This These Days. It's A Good Sign.

be overcome. For instance, a club can stage a small amateur show in most communities, where almost the entire proceeds are profit. Then there is always the *old standby* of popular subscription. It may be that we don't like to do that, but then its business, and the running of a radio club is a business.

AMATEUR RADIO STATIONS

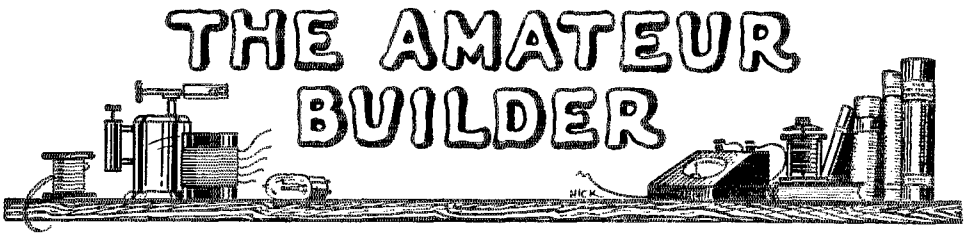
(Concluded from page 51)

The same rectifier is used on both sets. This rectifier is built of 60 tall glasses with 5 inch by 1-½ inch pure aluminum plates, suspended one inch from lead plates of the same size in a saturated borax solution. This rectifier consumes only 15 watts on no load at 1500 volts and shows no signs of heating after hours of use. Suitable switching arrangements are provided for connecting the rectifier to either transmitter with or without the filter and with the correct transformer.

Both transmitters are built up behind panels. The set using three 50-watt tubes in parallel causes a current of 3-½ amperes to flow in the antenna circuit, the plate input being 350 milliamperes at 1200 volts. The sockets for the three tubes are arranged on the circumference of a circle, so as to make the leads as short as possible. The set using four 5-watt tubes is used at present for low wave relay work, and experimenting.

The receiver shown has been superseded by a 50 to 225 meter short wave set similar to the one described in the December, 1923, *QST* which "gets 'em all."

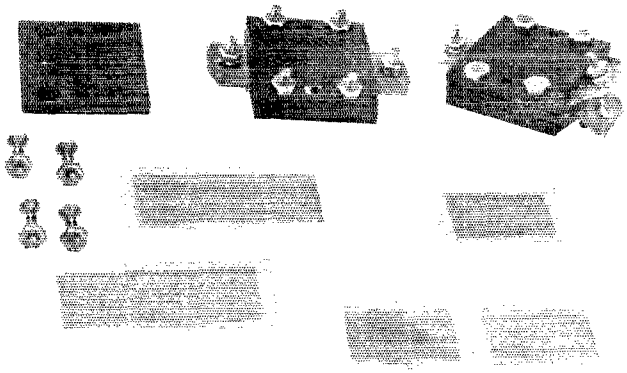
Convenient switching controls, mirrors on the walls to observe filaments of tubes without being annoyed by the light, tube rack, a large map of the U.S. to facilitate routing of messages, and the orderly arrangement of the station add to its features.



FIXED CONDENSERS FOR SENDING SETS

By H. F. Mason, Dept. Editor

SMALL fixed condensers find many uses in an amateur station. There is hardly a transmitter hook-up that does not call for at least two condensers having a capacity of around 2000 μμfds. (.002 μfd.) and with sufficient insulation to withstand about twice the plate voltage and sometimes more. How to make such condensers is the main purpose of this article, but sufficient information is also given so the experimenter can build condensers with various capacities and for voltages to fit his specific needs in both receiving and transmitting circuits.



You are probably already familiar with the general construction of a fixed condenser. It consists of several sheets of insulating material, usually mica, stacked up with a sheet of tinfoil between each two pieces of mica. Alternate sheets of tinfoil extend a little beyond the mica on either side and are connected together to form the two terminals. The capacity of the condenser depends on the thickness and material of the dielectric or insulation, and also on its effective area. The effective area may be defined as the area of dielectric actually between the conducting sheets. It is denoted by the shaded area in Fig. 1. The effective area required for a given capacity may be divided between several small sheets of material or can be made up of a few large ones, whichever is most convenient. The voltage that the condenser will stand safely without puncturing the insulation depends on the thickness and material of the insulation.

Mica is one of the best and most useful insulating materials known. All mica is not alike, however; that which comes from different parts of the world varies in electrical properties and in appearance. The best kind to use is India ruby mica, which is transparent and firm and has a slightly pinkish tinge. Other varieties are perfectly satisfactory for low frequency work, but high radio frequency current imposes strains on solid dielectric that requires the best material. If India ruby mica is not obtainable, the best you can do of course is to purchase the mica in clear, transparent sheets from one of several radio mail order houses who supply it especially for making condensers. Occasionally it can be had at a hardware store. If you are fortunate enough to have at your disposal an old mica transmitting condenser from a spark set, fine! The mica in it will serve the purpose admirably. You can use the tinfoil out of it too.

A Simple Micrometer Caliper

After obtaining the mica you will want to check up on its thickness to be sure it

will meet the voltage requirement. This should be done carefully, as a single thin spot in a piece of mica may allow the condenser to puncture. A simple micrometer caliper for measuring the mica can be made easily in a few minutes. As shown in Fig. 2 it consists of nothing more than a small 100-division dial fastened to an 8-32 screw which works in a suitably shaped piece of brass, bakelite or other material. The end

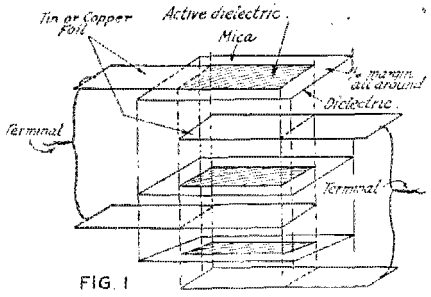


FIG. 1

of the screw should be carefully rounded off with a file.

To use, advance the screw until it just touches the clock and set the dial at zero. Now turn the dial to the left, insert the mica between the end of the screw and the block, and advance the screw until it just touches the mica. Now read the dial. Using a dial that has 100 divisions per half circle and an 8-32 screw, every ten divisions on the dial will be equivalent to almost exactly one and one-half thousandths of an inch.

The right thickness to use is hard to estimate because the voltage the condenser will be called upon to withstand is not known. A pretty good rule for sending set condensers is to design them for twice the plate voltage and to provide a liberal factor of safety besides. Mica will safely stand 500 volts for every one-thousandth of an inch thickness. Because of keying surges and such it is well to use mica four or five thousandths of an inch thick in sending set condensers generally. Condensers for receiving sets can be made of much thinner mica.

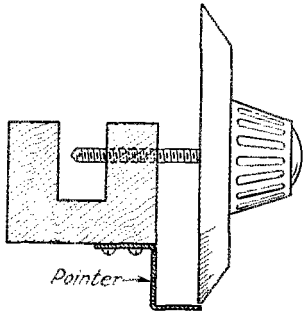
The material for the conducting plates should be ordinary tinfoil. It should be clean and free from wrinkles. The easiest way to cut many pieces of it to the same size is to fold a large sheet of it into a pile somewhat larger than the pieces you require, then trim the edges of the stack with a very sharp knife. The pieces can now be separated with the aid of a knife point and each piece individually smoothed out on a piece of glass.

Figuring the Capacity

If you wish to construct condensers for different voltages and having different capacities than the ones to be described, the table below will be of assistance. This table gives the capacity per square inch of effective area for mica dielectric of various thicknesses.

Thickness in thousandths of an inch	Micromicrofarads per square inch
1.0	1124.
1.5	750.
2.0	560.
2.5	450.
3.0	375.
3.5	322.
4.0	281.
5.0	225.
6.0	187.

As an example of the use of this table let us compute the dimensions for a 1000 μμfd. (.001 μfd.) condenser for a receiving circuit, using mica one and one-half thousandths of an inch thick. From the above table the capacity will be 750 micromicrofarads for each square inch of active dielectric. Dividing 1,000 by 750 gives 1.33 as the total number of square inches of active dielectric necessary. This area can be divided between as many individual pieces of mica as you wish, just so the total effective area in the completed condenser is right. Be sure, when cutting the mica, to make the pieces large enough so there will be a small margin at the edges of the tinfoil. This margin need only be about $\frac{1}{16}$ inch for receiving condensers, but should be increased to $\frac{1}{8}$ inch or more for transmitting condensers as there may be a tendency for a spark to jump around the edge of the mica from one piece of tinfoil to another. After deciding the principal dimensions and getting the material on hand and cut to the right size, the condenser can be assembled in the same way as those described below. Means should



A SIMPLE MICROMETER CALIPER
FIG. 2

be provided for clamping it permanently and tightly.

It does not seem possible to build condensers of mica and tinfoil exactly to a

predetermined capacity. So many things influence the capacity that condensers made in this fashion can hardly be expected to be accurate. As an instance, sometimes the capacity can be varied a good deal just by tightening or loosening the clamping screws. Fortunately, fixed condensers usually do not have to be accurate in their capacity so this is no drawback.

Two Good Designs

The construction of a 2000 μμfd. (.002 μfd.) condenser for transmitting circuits

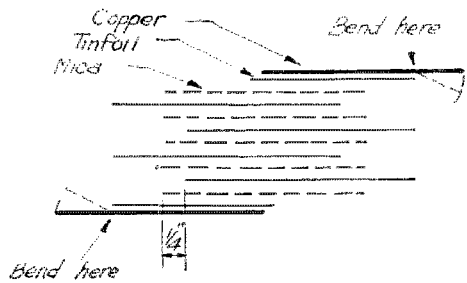


FIG. 3

using 5-watt tubes is shown in Fig. 3. The materials necessary are 4 pieces of mica 1¼ by 2 inches and about 3.5 thousandths of an inch thick, five pieces of tinfoil 1 by 2½ inches, and two pieces of ⅞ by ¼ inch bakelite of the size shown in Fig. 4, together with four 8-32 flat-head machine screws with nuts for clamping the condenser after assembly. Two pieces of copper sheet 1 by 2 inches are also required. These are placed next the top and bottom pieces of tinfoil as shown in Fig. 3 and are bent back and squeezed in a vise to serve as a support for the fragile tinfoil connecting lugs. The top and bottom pieces are lapped a little over half-way, as otherwise the capacity of the finished condenser might run over the desired value. Two 6-32 screws through these pieces of copper form the terminals.

A condenser, also of 2000 μμfd. (.002 μfd.) capacity, but capable of standing twice the voltage of that described above, can be made by reference to Fig. 4. It is suitable for use on sets employing 50-watt tubes or 250-watt tubes. The method of putting this condenser together is different from the above but not difficult. This condenser is really two 4000-μμfd. (.004 μfd.) condensers connected in series but assembled as one unit.

For its construction the materials required are, 32 pieces of tinfoil 1 by 1½ inches, 20 pieces of mica 1¼ by 2 inches and about 3.5 thousandths of an inch thick; also two pieces of bakelite 1⅞ by 2 inches with holes drilled as shown, together with four 8-32 flat-head machine screws with nuts for clamping the condenser after assembling it. Four pieces of copper sheet 1 by 1½ inches are also required for holding the tinfoil lugs in place. Two 6-32 screws through the copper and tinfoil lugs form the terminals.

Putting Them Together

There are a few tricks to learn in putting together a mica-tinfoil condenser. It has been found that mica condensers in short-wave transmitting circuits have a tendency to rattle and this causes the mica to flake off and eventually puncture. If there are any air pockets between the tinfoil and mica there is liable to be brush discharge at this point that will cause the mica eventually to puncture. Tightly clamping the condenser will not lessen this trouble noticeably. The best method for the amateur builder is to dip each piece of mica in melted beeswax before putting the condenser together. After the condenser is assembled it should be clamped as tightly as possible and held over a stove until the beeswax in it becomes thoroughly heated and begins to ooze out. Then tighten up the clamps again and set it away to cool. This will force out most of the air and allow the wax thoroughly to permeate the condenser.

When you start stacking up the pieces

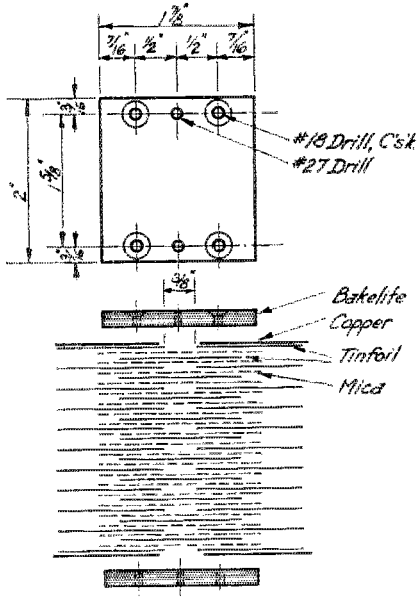


Fig. 4

of tinfoil and mica for a condenser, a warm soldering copper will come in handy for melting the beeswax on the mica just enough to make the pieces of tinfoil and mica stick together. It is sometimes easier to stick one piece of tinfoil to each piece of mica by this method first, then stack up

(Concluded on page 63)

Strays

Some good suggestions regarding the impregnating of coils of fine wire have been submitted by Mr. D. P. Bennett of Philadelphia. Yellow beeswax should be heated to a temperature not in excess of 390 degrees Fahrenheit. Keep the vessel in which it is being heated filled to a depth of at least four inches if possible. The vapors given off in heating ignite very easily, so keep it covered and turn out the flame while dipping. If you have no thermometer, heat until a very faint haze of smoke starts to raise, but watch it carefully.

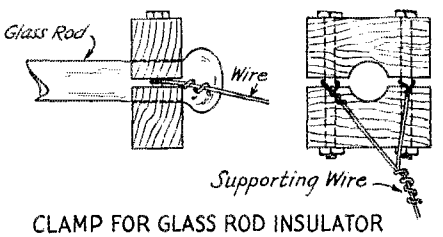
Now about the dipping. The idea is to boil all of the moisture out of the coil. Dip the coil into the wax and keep it moving slowly. In a few seconds bubbles will rise to the top of the wax. Keep it in until there are no more bubbles rising. If you want to be sure, reheat the wax and dip again. This process will absolutely drive all moisture and 99.9% of the air out of a coil, at the same time insuring a binding that is hard to break down.

Don't get impatient if you write a letter to the author of an article in *QST* and do not receive a reply by return mail. Mr. Iversen received 245 letters regarding his recent article on the Meissner transmitting circuit, and after Mr. Reinartz's last article appeared in *QST*, he received over 700 letters. These letters usually have to be answered in one's spare time and *it takes time.*

The same applies when writing to *QST* headquarters for information. If we tried to answer all letters the day they were received there would be no *QST*.

The long pending litigation over basic honeycomb coil patents that has kept these coils off the market for several years has at last been settled. The basic patents, No. 1,490,040 and 1,490,041, now belong to the Coto-Coil Co., of Providence, R. I. We may expect these coils to re-appear on the market, which will be good news to those interested in receiving sets using this type of coil.

Glass towel bars make fine antenna insulators, but trouble is sometimes had in clamping the ends satisfactorily and in attaching the wires. 5WO suggests a method which is much simpler than the one described by Mr. Atkinson on page 39 of the April *QST*, but is possibly not so good mechanically. The sketch is self-explanatory. A solid block of wood 2 by 3 inches



CLAMP FOR GLASS ROD INSULATOR

and one inch thick, two $\frac{3}{8}$ or $\frac{1}{4}$ inch bolts, and the glass rods, are the only requirements.

At the last Third District Convention practically the entire program of the banquet, with speeches, tin horns, and everything was broadcast from WOO, through the kindness of the Wanamaker store management. This is the first time that this has been done and the gang wish to express their appreciation to those who made this possible.

"Kits" in General and One in Particular

The day of making your own radio set seems to be passing into one where you assemble your own set. A number of kits of parts have recently come upon the market and seem to be finding great popularity, probably because the average constructor does not care to do the necessary detail work to make his own parts and would rather pay the manufacturer for doing it.

The latest kit that has come to our attention is the one that contains parts for the "Superdyne". There are two versions of it, A, which contains only the coils and condensers and sells for $20.00, and B, which has everything needed in it. The larger kit sells for $60.00.

Mr. Hiram Percy Maxim, president of the A.R.R.L. and inventor, was conferred the honorary degree of Doctor of Science by

Colgate University at its 106th commencement recently. This new honor comes at a time when Mr. Maxim's work in behalf of amateur radio is beginning to secure world-wide recognition. It was his ardent interest in uniting the amateurs of the world that led to his election recently as president of the Temporary Committee on Organization of the International Amateur Radio Union.

SOS to Manufacturers

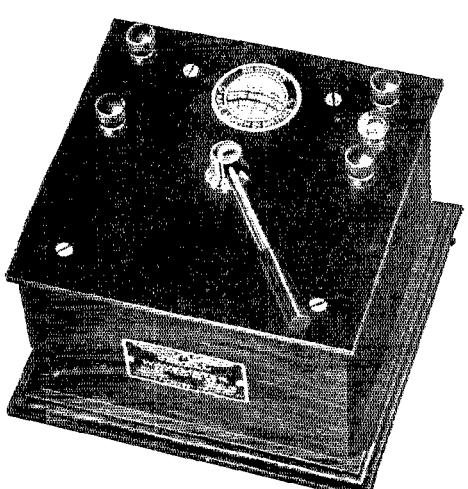
Does anyone know where we can get rheostats suitable for the primary circuits of our filament transformers? What's the use of good Acme and Thordarson transformers with a center tap on the secondary when the rheostat-makers insist on supplying us with rheostats that will go in series with the secondary and make the center tap useless?

Give us primary rheostats.

If you know of any errors in the call book, or of any amateurs who have moved or had their calls changed, be sure and notify the Citizen's Radio Service Bureau, 508 South Dearborn St., Chicago, Illinois, who are now issuing a monthly supplementary list to their call book. By doing this you will help everyone concerned. Thanks.

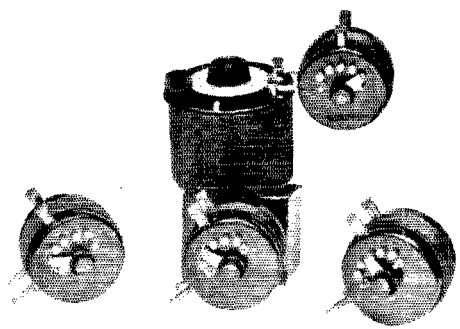
To meet the demand for wavemeters for use on amateur wavelengths, two prominent manufacturers are now making meters that are fine for amateur work.

The Jewell Elec. Instrument Co., 1640



Walnut St., Chicago, Ill., are supplying their Pattern No. 90 wavemeter with a special range of from 140 to 230 meters, which gives a good open scale. An error of less than 2 percent is usually obtained.

The well-known General Radio combination instrument type 247W has been improved so as to have still more uses. The original 247W, shown standing on the small wooden box was a 150 to 550 meter wavemeter, wave trap and neutroformer.



In addition the condenser could be used separately.

There have lately been added the three coils shown below which may be bought separately. Taking these coils from left to right we have the 247W¼, 247W½ and the 247W2. When substituted for the original coil the wavelength range is shifted to one quarter, one half and twice the original range. The four ranges are 37.5-125, 75-250, 150-500, and 300-1000 meters.

The scale stamped on the dial is accurate to 3% but more accurate calibration may be made if desired.

F. A. Myers of Philadelphia suggests that experimenters connect an ordinary 15- to 50-watt lamp in series with their B battery. This will not only prevent the B battery from becoming entirely short-circuited in the course of experimentation, but may also save a few tubes, as there is always the danger of getting the B battery connected across the filament accidentally.

Some time when you need a low-loss coil in a hurry, wind the coil single layer fashion on a square form. Then slip the wire from the form and it will have enough back spring to it to stagger the turns and the coil will appear somewhat like a basket-wound coil. By carefully tying it with string, a good imitation of a basket wound coil will be had.

Canadian 3WG, 25 Robinson Ave., Guelph, Ont., urges a quiet discouragement of the use of compensating wave keying on amateur CW sets. The "backwash" doubles the QRM from a station, not to mention the extra strain on the transmitting tube caused by its being in continuous oscillation.

1XL, the General Electric Co., must not

be making electrical apparatus any more, for I saw a sign in our local general store yesterday that said "1XL clothes pins and washing powder sold here."

—8DLI.

Just by way of showing one of the things amateur radio is good for, the *Milwaukee Journal* prints a daily column of news items received from surrounding towns by amateur radio. The calls of the stations handling each item is given, with a statement at the top of the column to the effect that the items were transmitted and received by A.R.R.L. members. FB! The Milwaukee Amateurs' Club is responsible for this as usual.

On May 10th the California Interscholastic Track Meet was held at Taft, Calif. The results were transmitted by amateur radio through 6AKZ and 6PL to the editor of the Hollywood school paper in record time. It was a fine piece of work as there were no pre-arranged schedules and the message was one of 355 words.

Following an unusually successful get-together of the amateurs of the Second District, sponsored by their Executive Radio Council early in June, John L. Reinartz, 1XAM, was awarded the Council Radio Cup for 1923. This cup is presented annually by the Second District Council to the amateur who has contributed the greatest advance to the radio art for the current year. Reinartz was awarded the first cup for his work on short wave transmission, which led up to the first two-way amateur transmission with Europe last winter.

The news that Dr. Deforest has won a decision in the court of Appeals in the District of Columbia, recognizing him as the originator of the regenerative receiving circuit, evidently is not yet the end of the long-pending litigation over this patent. The Radio Corporation of America is aiming to protect their licenses, dealers and distributors and evidently intends to make it a fight to the finish. The case will be reopened in the Circuit Court in New York soon, it is believed, after which it may be carried to another court in Delaware, and after that the next step will be the Supreme Court.

3BEI says the plate of his detector tube is getting very rusty from receiving so many damped oscillations. Another reason why there should be no spark sets.

Through an error the subscription rate of Dutch "Radio Wereld" was given incorrectly on page 57 of the May issue. It should have been given as, single copies .25 florin. Yearly 10 florin.

AMATEUR BUILDER

(Concluded from page 60)

these pieces in their proper order. This is especially true of condensers having many layers of tinfoil and mica.

Several completed condensers and parts for them are shown in the photograph at the heading of this article. The one in the center is the kind just described. The one at the right consists of two of these condensers, separated by a piece of ⅛ inch bakelite and having one terminal made common to both condensers. Such a combination is useful in full-wave self-rectified transmitters and for filament by-pass condensers. If care is taken in the construction of these condensers and the information above is followed, you will be surprised how hard it is to blow one of them.

Hook up with the gang

MURDOCK Radio Phones are especially designed for DX reception. Equipped with powerful magnets and sensitive diaphragms—they reproduce distant, elusive signals with exceptional clarity and volume. The new improved headband makes them as comfortable as your hat. All parts are permanently embedded in moulded insulation—which preserves the efficiency of the 'phones for years.

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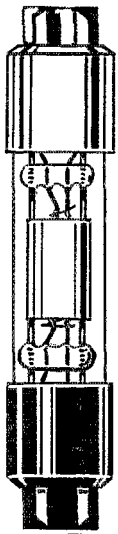

10,000 Miles With One Myers

A New Zealand amateur got Alabama (10,000 miles) on one Myers Tube—heard the signals and messages perfectly. Reported by Radio News.

This performance indicates that there is no limit to long-distance reception with Myers Tubes. Their design is right.

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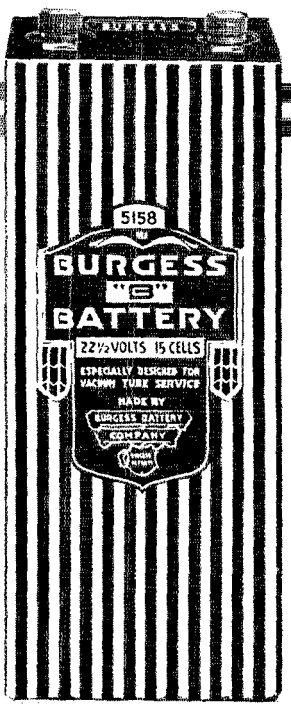
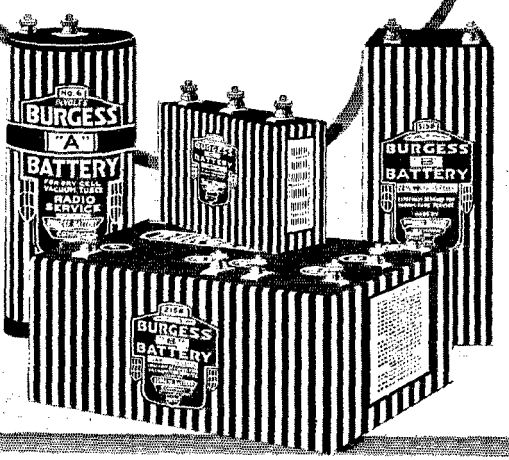


WHERE weight, table or cabinet space is a factor in your selection of Burgess Radio "B" Batteries, buy the Burgess vertical "B" No. 5158.

It is right at home in any position in your cabinet. Its sturdy compactness is almost a necessity in portable receiving sets.

Its height, width and weight coincide exactly with the double strength Burgess Radio "A" Battery. You are sure to be pleased with both the convenience and service offered by such an assembly of "A" and "B" Radio Batteries.

"ASK ANY RADIO ENGINEER"



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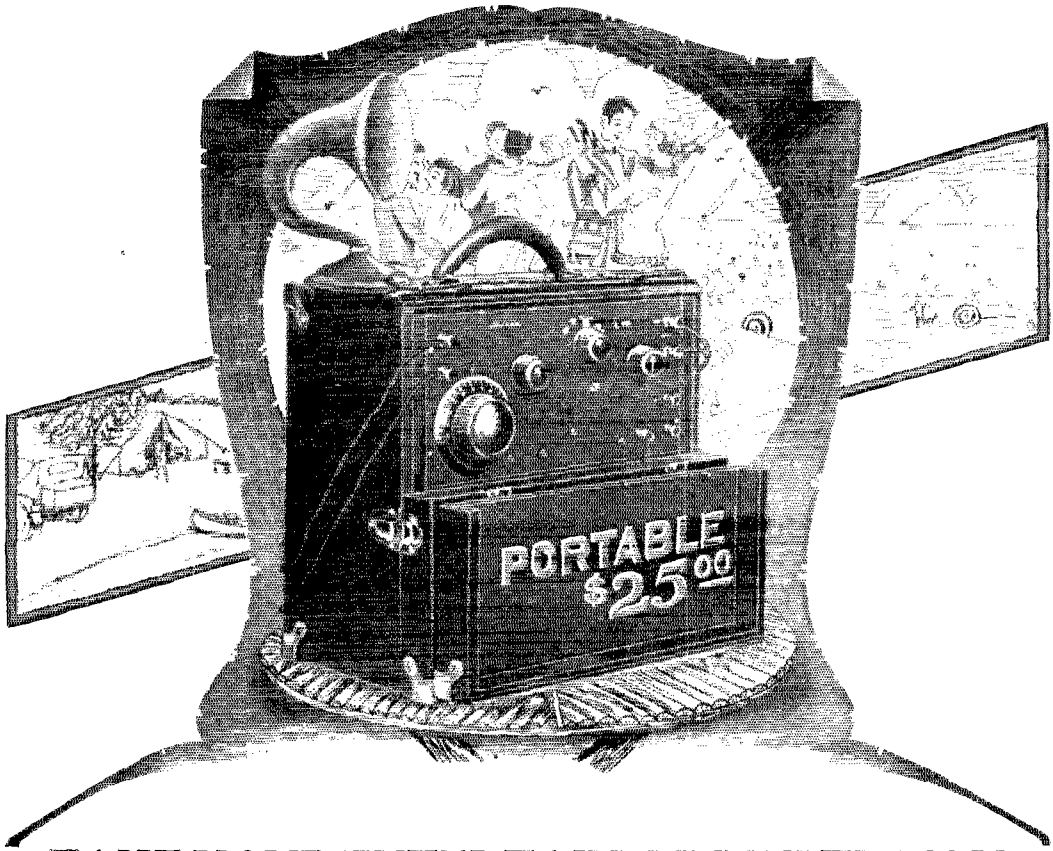

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The Crosley Portable is the Ideal Set.

The joys of the journey will be made more complete if you take your entertainment with you in the form of a Crosley 51-P portable radio receiver.
Somewhere—almost any hour of the afternoon, evening or night there is a concert, a jazz band or a funny story being broadcast that you can tune in.
The Crosley Portable is the exceptional two tube receiver—Crosley 51—built into a leatherette covered carrying case with space provided for headphones and dry cell batteries for use over a reasonably long period of time with the popular dry cell tubes, making it all self-contained.

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Crosley Owns and Operates Broadcasting Station WLW

RADIO AMATEURS TALK 7,000 MILES FOR 2 HOURS

Argentinian and New Zealander Establish What Is Declared a Record for Non-Professionals.

BUENOS AIRES, May 24 (Associated Press).—Carlos Braggio of Bernal, near here, and Ivan O'Meara of Gisborne, New Zealand, radio amateurs with 7,000 miles of South American continent and Pacific Ocean between them, conversed for two hours by radio Thursday morning, establishing what is claimed to be a world's amateur radio record.

Braggio, who knows English, had spent most of the night unsuccessfully attempting to get some North American amateur to answer the signals of his station, CBZ8, when at 4 o'clock in the morning he was amazed to receive an answer from the other side of the globe —O'Meara's station, 2AC.

The amateurs opened a conversation which continued until 6 o'clock, when Braggio told O'Meara he had been up all night and wanted to go to bed. The New Zealander answered that he was sorry because it was only 9 o'clock in the evening at Station 2AC. Later on Thursday Braggio received a congratulatory cable from O'Meara, confirming the conversation.

In connection with the radio communication test inaugurated this week with the United States, Argentine amateurs are unable to understand why they are able to get signals from North American amateurs while the latter apparently are unable to get theirs, although some of the Argentine stations are more powerful than some of the American ones which have been heard.

It is believed that many of the powerful broadcasting stations operating in the United States nightly interfere with the Argentine waves. In the future Braggio will try sending on a 120 meter wave-length at 3 A. M., Eastern Standard Time.

Argentinian and Jerseyite Exchange Radio Greetings

Special to The New York Times.

HARTFORD, Conn., June 2.—Two-way radio communication by amateurs between North and South America was attained for the first time last week by Norman R. Weible of Collingwood, N. J., and Carlos Braggio of Bernal, suburb of Buenos Aires. The feat was checked and verified today by the American Radio Relay League of this city, which tonight announced that Weible and Braggio had a twenty-minute connection on short wave lengths just before daybreak last Friday.

Braggio heard the New Jersey amateur calling him, and at 4:15 A. M. sent the following: "GM greetings and congratulations QRZ QRK."

Weible immediately replied in Spanish, "Saludo, Amigo de America del sur QRK."

A letter dated May 21, received today from E. J. Simmonds, an English amateur, stated he had heard the South American station transmitting.

The Radio Sensation!

The new American Brand Worm Drive Vernier Condenser, with a HUNDRED to ONE ratio Worm Drive geared vernier adjustment.

This is the highest ratio gear adjustment ever developed on Variable Condensers. With this adjustment the plates may be moved so slowly that the motion is hardly noticed by the eye.

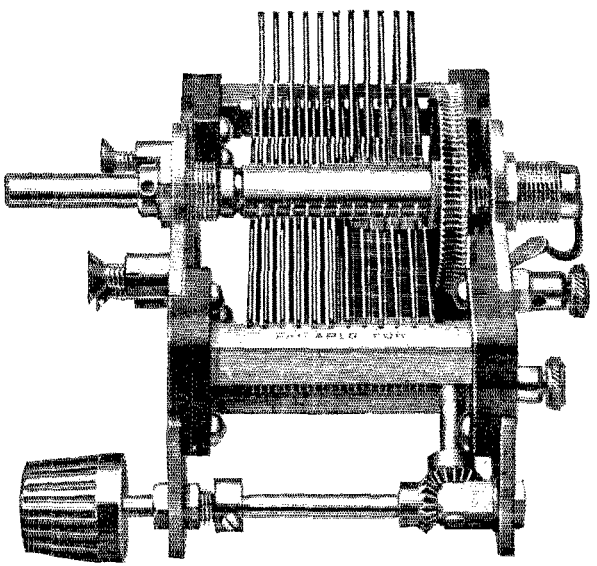
A remarkable micrometer adjustment of the entire set of movable plates can be obtained. This wonderful achievement is of special importance to the radio fan seeking distant stations.

Another tremendous exclusive feature—the back panel of American Brand Condensers is adapted for the mounting of any coil desired for use in the set. A. B. Condensers are made from finest heavy brass. The plates are perfectly flat and will never get out of line. Plates and supports are in natural finish, keeping radio frequency losses at a minimum. Mechanically and electrically a perfect job.

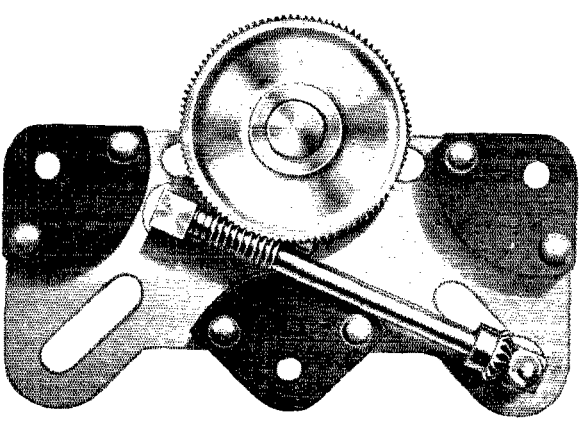
And the price of this Super Brass Plate A. B. Condenser with Worm Drive Vernier (23 Plates .0005 mfd) is only $5.00. 13, 17 and 44 plates with or without Worm Drive Vernier at proportionate prices.

Please ask your dealer to show you this wonderful condenser. If he can't do so, write us for descriptive illustrated folder—and send us your dealer's name.

Note to Dealers:—If your Jobber can't supply you with A.B. Condensers write us.



The 100 to 1 Worm Drive



PATENT APPLIED FOR

AMERICAN BRAND CORPORATION

8 West Park St., Newark, N. J.
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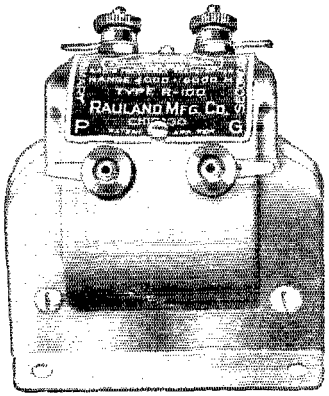

Why this new All-American Long Wave Radio Frequency Transformer, in its handsome nickeled shield at $6, is the finest amplifying instrument to be had at any price for Super Heterodyne, Ultradyne and all straight radio frequency and reflex circuits:

(1) Highest amplification, without distortion, of any transformer on the market; for wave lengths 4,000 to 20,000 meters. (2) Quiet in operation; shielded to prevent inter-stage coupling or reaction. (3) Stable; free from any tendency to oscillate. (4) Windings specially designed to eliminate capacity; properly treated to exclude humidity. (5) Every transformer "circuit-tested" for accuracy and precision—to insure uniformity and highest efficiency. (6) The best long wave transformer that can be made. Built and fully guaranteed by the largest exclusive makers of transformers. All the better dealers recommend the All-American.

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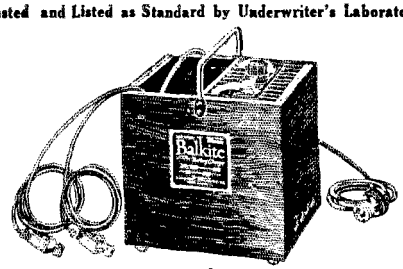

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Like their name, significant of quality. Durable and powerful. Bring in distance with a maximum of volume and clearness.
Type 200....5 volts, 1 Ampere Detector Tube.
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to work in Radio Frequency. Especially adapted for Neutrodyne, Reflex and Super-Heterodyne Sets

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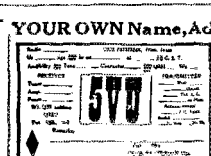

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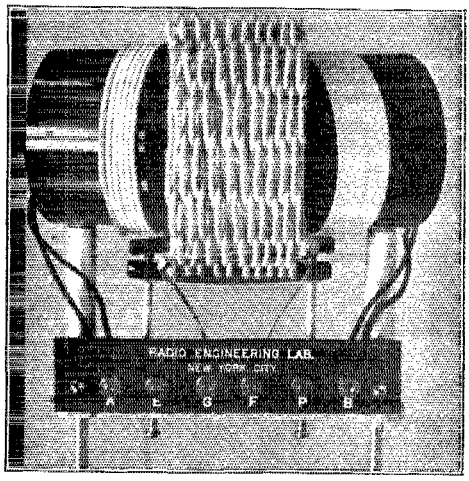

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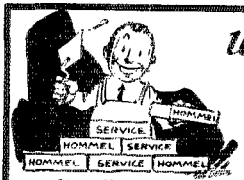

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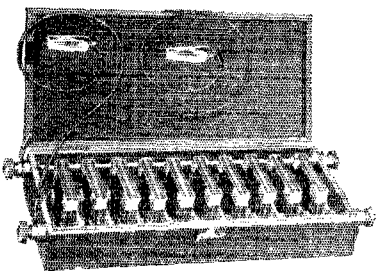

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Know the capacities for all circuits—don't guess them. The Peerless Kondenser Kit eliminates the purchase and use of wrong condensers by enabling the experimenter to determine in advance the exact capacities required for best results.

By means of the flexible leads and clips provided it is a simple matter to determine quickly and accurately by trial what capacity gives the best results at any point in a circuit.

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FULLY GUARANTEED

Peerless Condensers adaptable to all mountings.

They are provided with taps for soldering.

THE KONDENSER KIT

includes

10 thoroughly tested constant capacity low loss mica condensers

2-.0001 mfd.	1-.001 mfd.
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Total capacity .0126 mfd.
Adjustable in .0001 mfd. steps.

Peerless Condensers can be used with—

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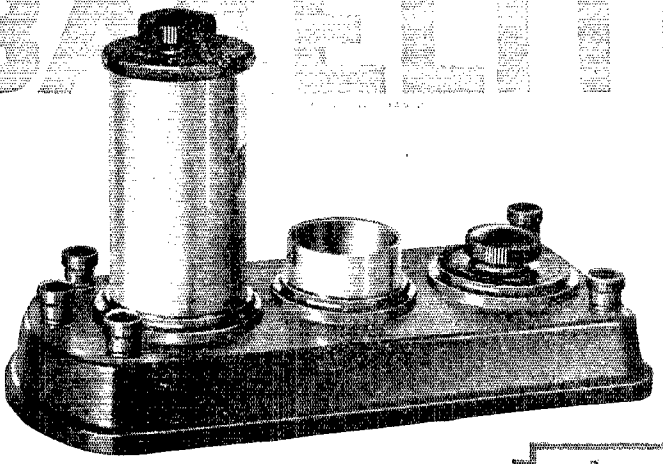

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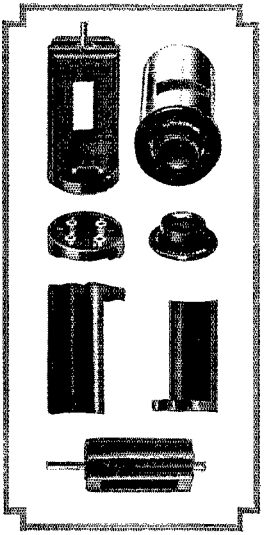

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Wouldn't you like to become a member of the American Radio Relay League? We need you in this big organization of radio amateurs, the only national amateur association that does things. From your reading of *QST* you have gained a knowledge of the nature 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.

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American Radio Relay League,
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NEUTRODYNE and One Step complete except batteries. Write Merle Coulter, Rockwell City, Ia.

RADIO CORP TRANSMITTING PARTS—all brand new and guaranteed. 0-1500 DC voltmeter, $10; 0-5 thermoammeter, $6; 0-500 milliammeter, $6; ½ mfd. 1750 volt filter condensers, $1; .002 mfd. 6000 volt mica condenser, $1.50; 325 watt transformer, $11.25; 750 watt transformer, $15; chopper wheel, $1.50; 40 henry choke, 300 MA, $8; mercury variable condenser, $1.25. 2 AHO 58 North Sixth, Newark, N. J.

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TRADE 5x8 printing press 6 fonts type; want CW apparatus or MG. Ed. Harris, Hugo, Okla.

BARGAIN—Grebe CR8 $65; 2 UV202 Radiotrons $10; Used only a few hours. 2ADC.

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FOR SALE—German Transmitting Tubes, 500 Watt output, $75.00; 250 Watt output, $60.00; 50 Watt output, $21.00. Limited Supply. Morsemere Engineering Research Laboratories, Grantwood, N. J.

FOR SALE—Three Kellogg variable vernier condensers, II plate—$4.50; 23 plate $5.50; 43 plate $6.00. Also two Bradley ohmeters $1.25 each. One Single circuit receiver mostly Kellog material $18.50. All material is brand new. Gaylord Knight, Athens, Tenn. 5AQR.

FOR SALE—*75 ft. standard Whittlesey Steel Mast* in use only eight months in A-1 condition with masthead pulley winding up reel and cable $150.00; photograph on page 60 of June QST. Photo on request. Four UV 203 tubes used very little, guaranteed O. K. $20.00 each. Radio 8BCA, Galion, O.

WANTED—Units RT and AR in good condistion for RC receiving set—F. J. Goodwine, West Lebanon, Ind.

SELL—One Acme inductance with all taps soldered $6.00; also one Tuska inductance tapped every turn $2.50; Oscar Rosel, St. Ansgar, Iowa.

TELEFUNKEN 30 WATT POWER TUBES type RS5C II, filament 2 amperes, 9 volts: plate .05 amperes, 1000 volts; Price $16.00. 50% discount on the following Radio Corporation apparatus: chopper wheel, all types of condensers, filter reactors, magnetic modulators, rheostats transformers, meters (hot wire 0-2½, 0-5, thermocouple 0-2½, 0-5, $10. milliampere 0-250, 0-500, $10. 0-1500 volt $15.00). All new and in original carton, genuine R.C.A. apparatus, unconditionally guaranteed. Sent C.O.D. or money order prepaid. Inquiries invited. Arthur Beyer, 106 Morningside Drive, New York City.

5 A-Q-C- PRINTS Q-S-L CARDS. 500 TWO COLOR CARDS $4.00. SAMPLES ALL DISTRICTS 10 CENTS. CURTIS, 5AQC, 1109-A EIGHTH AVENUE, FORT WORTH, TEXAS.

ORS A.R.R.L. is certificate proficiency. List our students holding this appointment also records rapid progress, quick success free. Dodge Radio Shortkut, Dept. S.C. Mamaroneck, N. Y.

GENUINE SILICON Transformer steel cut to order 25 cents lb. 10 lbs. and over, 4 cubic inches, weight 1 lb. postage extra. Geo. Schulz, Calumet, Mich.

C.W. TRANSFORMERS. New Radio Corp transformers in their original cases. UP 1016, 750 watt, for 1 or 2 50 watt tubes—$15.00. UP 1368, 325 watt, for 1 to 4-5 watt tubes—$10.00. W. M. Derrick, 58 North Sixth, Newark, N. J.

$5.00 NEW UNITED States Aviators leather Helmet with Head-Phones and Microphone, cost $25. Postage free. Send at once, limited supply; other Radio Bargains. Weil's Curiosity Shop, 20 S. 2nd St., Phila, Pa.

SELL—one Atwater Kent AF amplifier, type TA, $12.00, one pair Elwood 3,000 ohm fones, $2.50. All unused. NO COD'S. 7AJT. Basin, Wyoming.

SELL—following all brand new and guaranteed. 75 watt Acme Transformer mounted, $10; RCA ammeter 0-2.5, $4.; 2 rheostats for 5 watt tubes $1.50; 1 pair Stromberg Carlson fones, $5.00; R.C.A. filter reactor $8.50; R.C.A. 325 watt transformer slightly used $15.00. 8CMH, Sligo, Pa.

FOR SALE—4 stage R.F. amplifier and detector with 5-UV 199 tubes and Baldwin C phones. Hears all U.S., England, Honolulu, Mexico and Canada. Very cheap; need money; J. A. S., Pittsburg, Okla.

PARAGON RA ten tuner, detector amplifier all complete like new for fifty seven dollars and fifty cents. Guaranteed. Unusual bargain. H. Livingston, West Plains, Mo.

TRADE ANYTHING—What have you, What do you want. Dept. X, General Merchandise Brokerage, Box 641, Atlantic City, N. J.

BARGAIN—Brand New Grebe CR3-Det. and 2 step amplifier complete with three new tubes, fones, B. batteries, storage battery and loud-speaker. First $100 takes it. Battery charger $5.00. General Electric ¼ H.P. 110 volt a.c. motor $20.00. What have you? F. J. McLane, Jr., 32 Underwood St., Fall River, Mass.

BUILD THAT EDISON "B" Battery Now. First class large Edison Elements, 5c per pair postpaid. Write for prices on welded elements. Arthur Chapelle, Woodburn, Oregon. 7NX.

WANTED—6 volt dynamotor to deliver 500 volts. 8ARG.

HAMS—GET our samples of those neat THREE color call cards. Also radiograms, letterheads, envelopes, etc., Hinds & Edgarton, Radio Printers, 19 S. Wells St., Chicago, Ill.

RCA UP1368 Transformer and UP1653 Reactor both $25 or trade want studio microphone 4RU.

EDISON CELLS FORSALE A10's $4; A6's $2.50. ELEMENTS IN GOOD CONDITION. JUST THE THING TO BUILD THOSE B BATTS WITH. TEAR 'EM DOWN URSELF AND SAVE CASH OR TYPE A ELEMENTS 4c PAIR. I PAY POSTAGE OR EXPRESS CHARGES. BERNARD STOTT, 60 PALLISTER AVE., DETROIT, MICH.

FOR SALE—Western Electric 1000 volt generator, half KW; a big husky, with double shaft extension. Complete with pulley and rheostat. 9AZH.

RADIOFAN'S HOUSE-CLEANING. Considerable accumulation of serviceable parts. I don't need now, but you do. Ask me what I have; mention your requirements. H. Dill, Box 370, Hingham, Mass.

"ESCO" Dynamotor, Primary 32 Volts, Secondary, 750 Volts 150 Watts, New $56. Western Electric Microphone 284 W New $4.00; UP414 Modulation Transformer New $6; Hot Wire Ammeter 0-5 New UM533, $5.00; 2 five Watters new $7. All guaranteed. Windisch Electric Co., Louisburg, Kans.

TRANSMITTER, TWENTY watt panel mounted instrument of highest quality, three Jewell meters, General Electric power transformer, General Electric Osc. transformer, a REAL relay system, key and all complete for $69.50. This transmitter has worked Panama, Canadian and Porto Rican stations and 9 districts. Guaranteed. Worth $125.00. (9DO) H. Livingston, West Plains, Mo.

GERMAN RECEIVING TUBES $2.40, with socket and ballast tube; filament 4/10ths ampere, 5 volts; plate 40-60 volts. Excellent detector, good amplifier, fine for experimenting, add postage. Arthur Beyer, 106 Morningside Drive., New York City.

AUDIOTRONS!!—Double Filaments. Have few, absolutely "OLD TIMERS" here "OMS" that are impossible to get, strength uncompared. Positively Original—with adapter. Guaranteed by me and new. What do you OFFER me? 3BOV. S. Strobel, 3923 N. 6 St., Phila, Pa.

FOUR New Westinghouse BX Radio Frequency ammeters 0-2.5 six fifty each. Want one 0-5 ammeter. Also UL 1008 inductance. E. Grissinger, Wilmerding, Pa.

BAKELITE STRIPS—for sub panels and antenna insulation to 5" wide any length 3/16 inches thick 100 square inches and over 1 cent square inch, postage 2 lbs. per 100 sq. inches. Cash with order. Give length and width when ordering. Geo. Schulz, Calumet, Mich.

$10,000 WORTH OF RADIO Transmitting, Receiving Sets, and Parts, bought from U. S. Government Aircraft Department. We sell at reduced rates. Send 2c stamp for list and prices. Mail orders answered. Weil's Curiosity Shop, 20 S. 2nd St., Phila., Pa.

FOR SALE—100 watt set complete, never used. R. Greenwald, Shannon St., Van Wert, Ohio.

BUILD YOUR own Edison Element Storage "B" Battery and save money. Complete kits with rectifier ready to assemble. Nothing extra to buy. 140 volt 1¼ ampere type "A", $15.25. 100 volt, $11.75. 140 volt 2 ampere 4 plate type "G", $17.25. 100 volt, $14.00. Other sizes to order. Type "A" elements 5c. Type "G" 3c. ¾x6" container 3c. Separator ½c. No. 20 pure nickel wire 1c per ft. Complete 6 plate type "G" cell 15c. 3 ampere hour capacity. Just the thing for that transmitting battery. J. Zied, 530 Callowhill St., Phila. Pa.

SELL—1500 V, 450 G. E. Motor Generator Grebe "13" (new) Fresh No. 2156 Burgess B's at $2.00. 8 tube E.I.S. Co. super-heterodyne. Chesaning Elec. Co., Chesaning, Mich.

NEW MAGNAVOX $27. prepaid. Moon Loudspeaker, Amrad Semi-mounted variometer, homcharger, real receiver complete and lot receiving dope. 30 QST's Sell or want CW apparatus or C-Melody Saxophone, Banjo. Pacific Radio News and all Radio Magazines or QTC? Describe. Tnx. Herald Beckjorden, Forest City, Ia.

480 WATT 32 volt generator fine for farm lighting or battery charger $25 Five tube Neutrodyne $59. 12 to 350 volt WE Dynamotor $14. Shaw, Marathon Texas.

FOR SALE—Three 5 watt Cunningham tubes four dollars each, hardly used. Two UV 1716 transformers (iron cores) 30,000 cycles at $5.00 each never used. One radio frequency coupler for same, (variable setting) at $5.00; never used. One UV 716 A. T. Transformer at $5.00 badly used. B. H. Tibbets, Mason City, Ill.

AMRAD "S" tubes, improved, $8.00, Myers and Radio Corporation tubes $3.95. Apex Audiotrons $3.25, type 202, $4.00. Prices cheerfully quoted on transmitting and receiving apparatus. George Voigt, 56 Maiden Lane, Maspeth, N. Y. Dept. Q.

ESCO MOTOR GENERATOR—150 watts, 500 volts, 10 volts, 80 watts. Ring Oiled. .Cost $104. Sell $85. New Radiola super-hetrodyne complete $255. Cutler & Ellis, Sullivan, Indiana.

WANTED IMMEDIATELY—Genuine Old DeForest tube (round type) and Fleming valve. What have you? All letters answered. Peter Kailus, 5042 West 23rd St., Cicero, Ill.

SELL—Ten A Loudspeaker, hundred dollars; 5 UV 202 Radiotrons new, four fifty each, W. Bradley, 48 Jeffrey Ave., Jamaica, N. Y.

NEW GE—0-150 Milli-Ammeters, panel type $2.75. Navy CN 113 A Receiving SET for crystal or audion attachment. Brings in DX Broadcast, Ships and Arcs Cost $150. Price $21.50. Detector and 2 stage Amplifier with Acme Transformers $16.50. NAVY SPECIAL CN (998) 50 to 600 meter Receiver, An Audion can be attached. Cost $500 Price $50.00. NAVY CF 753 tuned 1000-10000 Meters, Cost $500 Price $50. NAVY 1500 Volt Dynamotor $32.50 shaft for pulley $3 extra. 400 volt 200 watt Sperry Dynamotor runs on 6 volts, at 12 volts gives 700 volts $22.50. 53 ft. Portable mast $20. 500 cycle hand generator can be belt driven $22.50 These prices include shipping charges. George Eaton, 1915 South Twelfth Street, Philadelphia.

SELL—Benwood CW Inductance, $6.50; Big CW Panel, Drilled, $2.00; Two Rheostats, used in 10 watter, $1.50 each. Federal Microphone, $3.00.—9BUK.

WILL TRADE—Special built DeForest Ultra Audion receiver (detector and two stage audio) and brand new Grebe RORN Radio Frequency Amplifier never used, Wanted; Three stage Power amplifier with tubes. Write today. Lock Box 43., Dante, So. Dakota.

TRANSMITTING AMATEURS Attention—Don't leave those costly tubes and meters lying around to be broken. Mount your transmitter on panel. Looks better, works better. QST says so. It's easy to cut those peep and meter holes with my panel tool. Cuts smooth hole one to five inches in diameter; only $2.50 postpaid or C.O.D. Homer H. Malcomb, Whitewater, Wisc, 9EKH.

CONDENSERS AND SUCH—Brand new Radio Corp parts in original boxes. UC1806 mica .002 mfd. 6000 volt condenser, $1.50; UC 1015 mica tapped antenna condenser, .0003, .0004 and .0005 mfd. 7500 volt $2; UC1803 Tank circuit condenser, .000025 mfd. 10,000 volts, $.75; UC1831 Mercury variable transmitting condenser, .0012 mfd. 4000 volts, $1.25; UC1866 paper filament bypass condenser, two section, with midtap, $1; UC1846 double section tank circuit condenser, $1; SA Lightning switch 600 volt, 100 ampere, $1.25; PX 1638 Chopper wheel and brush, $1.50. W. M. Derrick, 58 North Sixth, Newark, N. J.

4-5 WATTERS @ $5; 6 volt 60 ampere Storage Battery good condition $10; 0-15 volt Jewell Voltmeter $6; 0-100 New General Radio Milliammeter, $7; 0-5 New General Radio Ammeter, $6; 8KI, 268 Auburn Ave., Pontiac, Michigan.

GENERAL RADIO WAVEMETER—174B except 70-1500 meters. Grebe 13, both brand new. 1/30 HP Emerson and ¼ HP Dayton new and ¾HP G.E. used motors, all 110 A.C. General Radio wave trap, Amrad changeover switch, RCA chopper wheel and UP 1806 condenser. Baldwin fones, set E.I.S. super-het transformers. Everything guaranteed perfect. NO REASONABLE OFFERS REFUSED. F. G. Tallman, Jr., 158 Harrison St., East Orange, N. J.

SALE—Acme CW Inductance. Perfect condition. $5.00. 5JR, Stephens Croom, 1001 Augusta Street, Mobile, Alabama.

FOR SALE—¼ H. P. Sink Motor $20., .01 MFD Dubilier Condenser 25,000 volts $15., Aluminum Benwood Rotary $5., T. & H. Oscillation Trans. $5. All in fine condition. George B. Faunce, 30 Caloris Ave., Millville, N. J.

PURE DC HOUNDS, use Radio Corp parts at these prices. New stuff in original packing. UP 1626 25 henry 160 milamp. choke, $6.50; UP 1653 30 henry 160 milamp. choke, $7.00; UP 1627 40 henry 300 milamp. choke, $8.00; UP 1654 50 henry 300 milamp. choke, $9.00; UC 487 ½ mfd. 750 volt filter condenser, 75c; UC 489 ½ mfd. 1750 volt filter cond. $1; UC 1873 choke trap condenser .01 mfd. $1. W. M. Derrick, 58 North Sixth, Newark, N. J.

ANY LICENSED HAM CAN after memorizing Code our way (15 minutes) quickly increase speed. Many long anchored at about 12 jumped few hours to 25 per. Corroborative reports free but please give call. Dodge Radio Shortkut, Dept. SC, Mamaroneck, N. Y.

1ST GRADE Radio Apparatus For Sale Cheap. Write for Bargains. 3 BOV.

EMERSON 550 volt 200 watt direct current generator. Will sell to highest bidder. Raymond Rathert, Cresco, Ia.

THREE CIRCUIT TUNER, Detector and two stage. First $50.00 takes it. 9BIT, Seaton, Ill.

FOR SALE—2 W.E. Fiftys, $20. each; 1 R.C. Fifty, $18; 2 "S" Tubes, $5 each. 2CVS.

FOR SALE—Grebe CR-9, $60; Grebe RORN, $25. Both in perfect condition. M. L. Muhleman, Bronxville, New York.

HAMS—We wish to announce that we can make 12 hour shipment on OHIO BRASS Insulators, No. 12 ENAMELED WIRE, SHEET LEAD & ALUMINUM and all other ham needs. Now is the time to rehash the old set and give 'er life. Write us your needs and we will give you prices and HI SPEED SERVICE. 8BIN, 1407 First North St., Syracuse, N. Y.

1 TUBE REINARTZ $10.00; Crosley XJ $45.00; Chopper with motor and rheostat $7.00; George McKay, Xenia, O.

REMLER, GIBLIN and DeForest coils, new mounted only few left as follows—100-150-200-300-400-500-1000 turns half list price. Postage extra. Geo. Schulz, Calumet, Mich.

IS YOUR NEUT RIGHT?—To revitalize unneutralizable Neutrodynes, we devised this Kladag Coast to Coast Circuit. Uses same panel, etc. as Neut, except three less parts. Merely rewire. Success certain. Necessary stabilizer, 22 feet gold sheathed wire, circuit and complete, simple instructions, $5.00 prepaid. Many have already rebuilt their Neuts-and written wonderful testimonials. Thousands will do it. Be FIRST-have the finest five tube set in your neighborhood, revitalize others' Neuts. Description, etc., 10c. Radio Lists, 2c. Stamps accepted. Kladag Laboratories, Kent, Ohio.

BUILD THAT Superheterodyne and get ready for the winter radio programs, Branston kits, $35.00; Radiola III at $35.00 with headphones and two tubes. Send two cents for circular. Cash with the order. Amateur Radio Supply Shop, 525 Park Ave., Kent, O.

WESTINGHOUSE MOTOR Generators. 12 Volt D. C. motor, 350 volt D. C. Generator. New, $10. Box H, QST.

TWO CUTTING Washington 32 volt D.C. Motor-Generators 100 volt; 8.5 ampere; 500 cycle; Bargain; R. Van Benthuysen, 178 Centre Street, New York.

1-ZE MATTAPOISETT, MASS. has a 2K.W. special Acme plate supply transformer, it has a primary for 110 volts. The secondary has a centre tap and also voltage taps for 2, 3, 4, 5, and 6 thousand volts either side of the centre. He will sell this Brute for $40.00. He also has three brand new 50 watt radiotrons at $18.00 each. First money talks.

158 GENUINE Foreign Stamps. Mexico War Issues. Venezuela, Salvador and India Service, Guatemala, China, etc., only 5c. Finest approval sheets 50 to 60%. Agents Wanted. Big 72-p. Lists Free. We Buy stamps. Established 20 years. Hussman Stamp Co., Dept. 151, St. Louis, Mo.

MAKE $120 WEEKLY IN SPARE TIME. Sell what the public wants—long distance radio receiving sets. Two sales weekly pays $120 profit. No big investment, no canvassing. Sharpe of Colorado made $955 in one month. Representatives wanted at once. This plan is sweeping the country—write today before your county is gone. OZARKA, 853 Washington Blvd., Chicago.

RADIO GENERATORS—500 volt 100 watt $28.50 Battery Charging Generators $8.50, High Speed Motors Motor Generator Sets, all sizes. Motor Specialties Co., Crafton, Penna.

$12. EACH takes Ohio or Wagner synchronous 110 volt sixty cycle eighteen hundred R.P.M. motors built in ¼ H.P. frames. Can be used as power motors. Highest quality ⅛" x 6" test tubes $3.00 gross. Perforated hard rubber separators 1¼c. No. 20 99% pure nickel wire $1.50 per hundred feet. Kimley Electric Company Inc., 2665 Main St., Buffalo, N. Y.

LOCAL RADIO representatives wanted for special work at convenient hours. Full information. Maitland Roach, 2905 Columbia Ave., Philadelphia.

HELP—LOW Loss set, amplifier $30.00; 100 watter $90; 8MO, STAHL, Birmingham, Mich.

MANY BEGINNERS ANCHORED AT about 5 per now thank us for License. Qualifying records 100 Licensed Students free. Dodge Radio Shortkut, Dept. SC., Mamaroneck, N. Y.

CHEMICALLY PURE aluminum 1/16 thick, 80 cents; 1/8 inch thick $1.60 sq. ft., postage 1/16 2 lb. 1/8 3 lbs., extra. Geo. Schuiz, Calumet, Mich.

METERS—METERS—METERS—Brand new Radio Corp meters, in original boxes. UM 579, 0-1500 volts DC, $10.00; UM 578, 0-500 volts DC, $8.50; UM 576, 0-500 milamps. DC, $6.00; UM 575, 0-250 milamps. DC, $5.00; UM 581, 0-5 thermoamps., $6.00; UM 580, 0-2.5 thermoamps., $5.00; UM 533, 0-5 hotwire amps., $2.00; UM 530, 0-2.5 hotwire amps., $1.50. W. M. Derrick, 58 North Sixth, Newark, N. J.

FOR SALE—Panel CW transmitter—wired for 100 watt fone, 100 watt I.C.W. and 200 watt CW using the Heising system of modulation. Bargain $190.00; 1 submarine chaser Western Electric transmitter complete, never used still in original crate $275.00; 1 soft Western Elec. 250 watt tube $45.00; 1 500 volt, 100 watt motor generator, double commutator, 214 bars, motor 110 volts A.C. $55.00; 1 C.N. 240 long wave Navy tuner range 1000-10000 meters bargain $75.00; 1 I.P. 500 Navy tuner (S.E.143) range 250-6800 meter bargain $130.00; All Radio Corporation transmitting material 50% off list. Money talks fellows. Radio 2AGD.

FOR SALE—Western Electric power amplifier with three 216A bulbs and horn $75.00. Grebe 13 short wave receiver 80 to 300 meters $50. R.C.A. 1016 power transformer 1500 to 3000V $25.00; 375 V 75 Watt transformer with fil. windings for 2-4-6-8-10 volts mounted $8.00. Homcharger $5.00; magnetic modulator 1367—$10.00; Grid chopper P.X. 1638 $5. U.C. 1803 Faradon Condenser $2.50; .0005 Hartman condenser $3.00; .001 condenser $2.00; three U.C. 490 condensers at $1.50 each; two U.C. 1866 condensers at $1.00 each; one Atwater Kent variocoupler at $5.00; 2-300 turn honeycomb coils $1.00; Thordarson audio transformer at $2.50; terms are cash with order or C.O.D. No trades considered; must have cash. Radio 8BCA, Galion, O.

MAGNAVOX M4—Latest nationally advertised reproducers. Magnetically balanced. Sensitive. Improved rubber cushioned diaphram. List $25. Introductory $21. Radio Central, Dept. Q, Abilene, Kansas.

SOMETHING NEW GRAB Bag a large quantity of electrical parts valuable to amateurs one lb. No. 32 enamelled wire in each "grab" $1.00 only. Other apparatus; price list. 6LC, 715 Bath St., Santa Barbara, Calif.

1000 Volt 500 watt direct current Esco generator, direct coupled to one horsepower 60 cycle 110 or 220 volt Wagner motor; attains full speed in two seconds; good condition; sacrifice at $105, f.o.b. including field rheostat, cost $200. Several UV-203 tubes nearly new $10 each; Jewell meters half price General Elec. Radiola 2 Portable $50.; Western Elec. 10-A power amplifier with new tubes $50; Lots of other transmitting equipment. Must sell account ill health. F. A. Miller, Flagstaff, Ariz.

TRANSMITTING TUBES—all sizes and make, prices very reasonable, new tubes. 500 cycle Motor Generators and Transformers. Kenotrons and suitable oil immersed transformers for same, all sizes. General Electric 1500 volt, 500 Watt Generators $45. 1500-1800 Volt 1200 Watt Esco Generator on Common base with 2½ H.P. 220 volt DC Motor $150. J. K. Hewitt & Co., 252 Neptune Av., Brooklyn, N. Y. 2RK-2FP.

1 KW SPARK TRANSMITTER DX (6TI) Oakland, Calif., 1600 miles. Acme Transformer Type FI with ¼, ½, & 1 KW taps, $45.00; Synchronous Spark—Gap with 1" Electrodes, $35.50; Oscillation Transformer with 1" Bronze ribbon, $13.50; Home made ¼" Plate glass oil type condenser, $11.00; Marble Base Nickel plated Key with ½" silver contact-points, $5.00. Sell for $60.00 or Exchange for two UV 203-50 watt tubes. V. Rosso, Plaquemine, La., 5KC.

GENERAL ELECTRIC type CG 1104A transmitting sets complete with dynamotor etc. operating from 12 volts $75. cost $350. Pure DC for the plates. GE 350 volt .143 ampere dynamotors with filter for 12 volt supply $18. Holtzer-Cabot 500 volt .07 amperes for 12 volt $22. GE 1500 volt .233 amperes operating from 24 volts $45. Well constructed double commutator machines. 750 volts each side. Adapted for belt drive $48. When driven will also generate current for filaments etc. Crocker-Wheeler 500 cycle self excited and motor generators. Navy Flame Proof Keys with "Blinker Light" $1.50 Tubes from 50 to 1000 watts What do you need. Henry Kienzle, 501 East 84th Street, New York.

TELEGRAPHY—Morse and Wireless—taught at home in half usual time and at trifling cost. Omnigraph Automatic Transmitter will send, on Sounder or Buzzer, unlimited messages, any speed, just as expert operator would. Adopted by U. S. Govt. and used by leading Universities, Colleges, Technical and Telegraph Schools throughout U.S. Catalog free. Omnigraph Mfg. Co., 16M Hudson St., New York.

GREBE 13—absolutely guaranteed 100% PERFECT condition. Not a scratch inside or out. Cost $95 sell for $75. Am leaving for school and can't use her. Send cash to 3JX, Washington, D. C.

EDGEWISE WOUND copper ribbon the only really satisfactory antenna inductance 5/16 inch wide, 5 inch diameter 13 cents, 6 inch diameter 16 cents, 7-¼ inch diameter 18 cents per turn prepaid any number turns in one piece. Geo. Schulz, Calumet, Mich.

Q R A SECTION

50c straight, with copy in following form only: CALL — NAME — ADDRESS. Any other form takes regular HAM-AD rates.

1AWM—H. A. Chinn and G. E. Witham, R.F.D. No. 3, Box 45, Nicolin, Maine.

1CAK—1ZD—1XAX—John M. Wells, 40 Main St., Southbridge, Mass.

1JE—R. Gordon Granger, 55 Stark Rd., Worcester, Mass.

RADIO 1XAQ, 1AEL, 1OA, 1ID, Silver Lane, Connecticut, a suburb of Hartford. Operators; S. Kruse, "LQ"; F. C. Beekley, "JS"; A. L. Budlong, "VL"; H. F. Mason, "MN"; all of the A.R.R.L. Headquarters staff.

3LW—H. A. Robinson, 4300 York Road, Philadelphia, Pa.

3PQ—Walter A. Cobb. Camp Kittatinny, RFD No. 5, Newton, N. J.

3RX—Hunter B. Frischkorn, Jr., No. 3500 Chamberlayne Ave., Richmond, Virginia.

4IU—4XE—Wm. Justice Lee, Winter Park, Fla.

4UR—Isidoro A. Baldrich, P. O. Box 148, Cayey, Porto Rico, U.S.A.

5AQR—Gaylord Knight, 12 Euclid Ave., Athens, Tenn.

5CK—John Mitchell, Havana, Ark.

6AOK—Herbert Perry, Somerton, Ariz.

6NH—Grahame Hardy, 25 Artuna Avenue, Piedmont, California.

8BPKB—Used for 8DRW until license issued.

8DRW—C. A. Grissinger, 316 Welsh Ave., Wilmerding, Pa.

8DRZ—Lawrence E. Ross, 103 Warren St., Glens Falls, N. Y.

9ADS—Abe Benesovitz, 415 McKinley St., N. Hibbing, Minn.

9APY—Frederick J. Hinds, 3337 Oak Park Ave., Berwyn, Illinois.

9AUW—Paul E. Glaubke, 5551 Central Ave., Indianapolis, Ind.

9BWC—Francis E. Nelson, 1431 2nd Ave., East, Cedar Rapids, Ia.

9BXO—Robert E. Rice, 433 N. Wabash St., Wabash, Indiana.

9DET—E. A. Bergner, 2478 Orchard St., Chicago, Illinois.

9XBF-9BP—E. C. Page, es W.W. Watts, 725 Noyes St., Evanston, Ill.

"THE AIR IS FULL OF THINGS YOU SHOULDN'T MISS"

Eveready "B" Battery No. 772 for detector and amplifier. Connections at 22½ and 45 volts. Three Fahnestock Clips. Approximate over-all dimensions, 8¼ in. x 3¼ in. x 7¼ in.

Sustained power!

WHERE table or cabinet space is limited, use this *new* vertical 45-volt Eveready "B" Battery No. 772. It has the same long life, the same steady high power as the horizontal Eveready 45-volt "B" Battery, but because it stands upright it takes less than half the table space.

Tables and most battery cabinets have more headroom than floor space. This battery is built in recognition of that fact. It fits the Radiola Super-Heterodyne cabinet perfectly.

Many multi-tube receiving sets use a "hard" detector tube which does not require fine adjustment of "B" voltage, so the new Eveready Vertical 45-volt "B" has but three plainly marked terminals, negative, plus 22½ and plus 45 volts.

Standing upright to save space, made of large, powerful cells to last longer, here is the battery you've been looking for.

Manufactured and guaranteed by

NATIONAL CARBON COMPANY, INC.
New York San Francisco

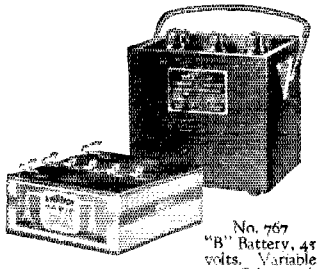
Headquarters for Radio Battery Information

Canadian National Carbon Co., Limited, Toronto, Ontario

If you have any battery problem, write G. C. Furness, Manager, Radio Division, National Carbon Co., Inc., 124 Thompson Ave., Long Island City, N. Y.

EVEREADY
Radio Batteries
–they last longer

Eveready 6-volt Storage "A" Battery



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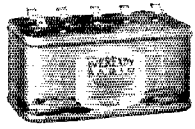

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No. 771 Eveready "C" Battery. Clarifies tone and prolongs "B" Battery life

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IN THIS ISSUE

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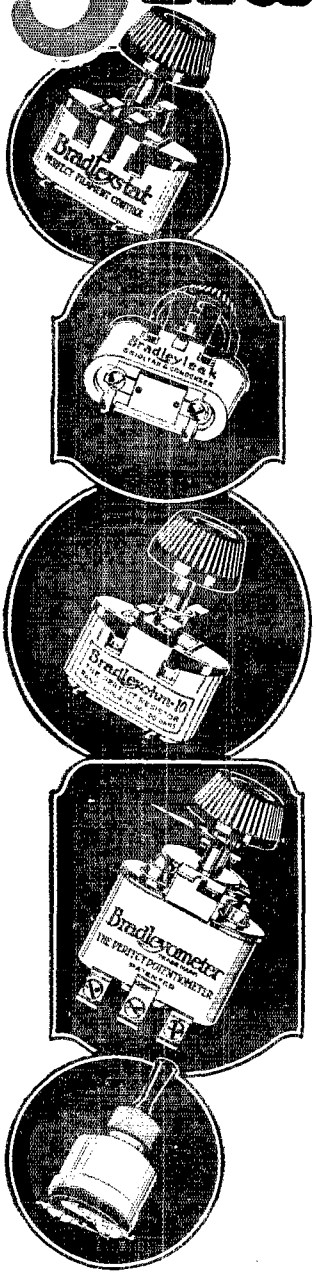

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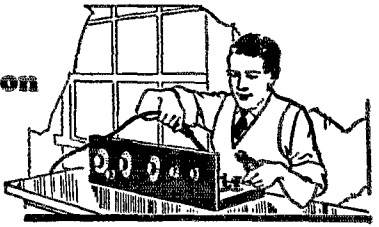

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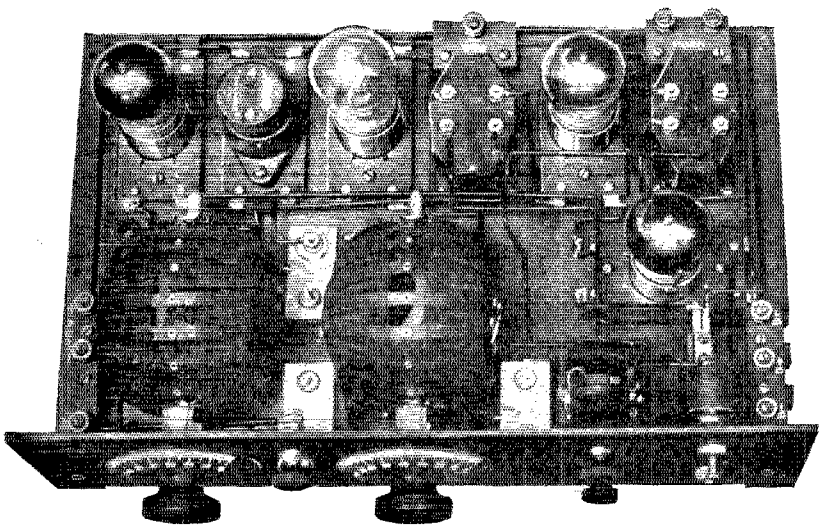

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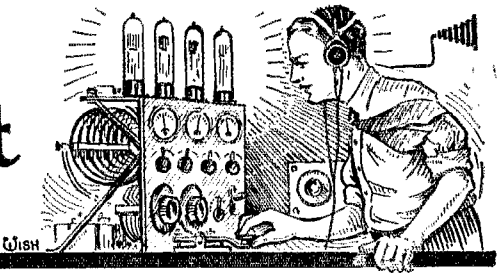


Yes sir, QRN, warm weather and an additional hour of quiet have played mean pranks on amateur radio. Throughout the reports, it is noticed that a good many stations have closed down until fall because of the various conditions. We point out that the early hours of the morning will find quite a crew on the job and QRN is not bad.

Message traffic is rather spotty in some places, while in others it is normal. Of course, other places show an increase, but they are few and far between. The same number of stations operating through the winter months would have nearly four times as much business during the same hours of operation. Well, no one can blame a fellow for not wanting to sit in a hot shack when the outdoors is calling with a cool breeze and lots of other things. MIM!

We still hold out hopes for some short waves for general amateur use—'twould be a great stimulant 'right now and our guess is that amateur radio would be turning over the most active leaf in the pages of its long history. Just think of the stir we could create with some short wave daylight tests across the country—oh gosh, there are too many things we could do to start putting them down. It would be like starting all over again but with the advantage of having funds of experience at our call.

A new division comprising all amateurs in the Second District may be named before the month is gone. Probably it will be called the "Hudson Division" as suggested by the majority of hams in the district. This will mean the sawing off of part of the present Atlantic Division. More later.

Contact with VDM, up to July 10th, has been 100% as VDM at this writing is about 50 miles west of the Straits of Belle Isle. Probably by the time this reaches you she will be in Davis Strait and in communication with WNP. Through the courtesy of Mr. G. A. Wendt, of the Canadian Westinghouse Company, a short wave receiver of special design and pages of "how to get down on short waves" from QST have been placed in the hands of "Bill" Choat, operator of VDM, for QSR to Mix. We look forward to hearing WNP on short waves before the month is out. So, gang, keep an ear out on 120 meters for VDM and "comb the ether" in that vicinity for WNP.

Canadian 9AL has been in contact with VDM every night since she sailed. 9XAX and 1XW have reported working VDM and 5XAW was heard QSO VDM. Stations reporting signals of VDM are: 2WZ, 3BHV, 3WV, 8BRU, 8CTZ, 9DBF, 9EM, and 9CBD. Don't forget to send in your report when you hear VDM—please. Signals from VDM have been very loud each night with practically no fading. At times QRN has been quite heavy, yet VDM comes bumping right through it.

ATLANTIC DIVISION
C. H. Stewart, Mgr.

This month finds a report for Western New York, something which has been missing for quite a few months. We're glad to see Taylor taking hold of things and keeping the gang on the job. The additional activity is worth mention at this time of the year when other parts of the country are being stopped by QRN. Many stations are disregarding QRN and work as often as possible.

EASTERN PENNA: A.D.M. Rau is quite elated over reports from nearly every district and rightly so during the warm season. Not many A.D.M.'s can say the same. 3QV was heard in New Zealand. 3BOB has been given the call 3ZF. 3BNU tied a can to his sync rec. and is now using a chem. The new C.M. of Allentown is on the job, FB. 3MB was reported in Chile. Traffic: 3QV, 11; 3BOB, 18; 3BNU, 94; 3EK, 76; 3BAQ, 5; 3CJN, 80; 3MQ, 23; 3TP, 42; 3UE, 6; 3ZO, 112; 3BDI, 64; 3CBL, 18; 3MB, 96; 3CCX, 20; 3BBV, 46; 3BFE, 58; 3BQ, 21; 3FS, 22; 3BTU, 20; 3HD, 17; 3CGS, 30; 3BCT, 23; 3BMS, 33.

DELAWARE: 3WJ is the only station representing the state. 3LS was forced to take his antenna down—some landlord! 3AUN, being a doctor, is very QRW and no time for radio now. 3BSS is out until fall. 3AIS is expected on the air very soon, which will help some. Generally, we have had a streak of luck—but its all been bad.

MARYLAND—3LL is the busiest station—using a couple of UV 201 A's. 3APV is the same old reliable and does as much for the district as he does for this state. His lone 5'er does the trick. 3KU is getting under way, too. 3CDU has a 50 now and gets out better. 3FB is doing fine DX at his new location. 3TE is in France with a receiver for us hams. 3BML is poking right along at Laurel. 3BUR is off until fall.

Traffic: 3IL, 117; 3APV, 88; 3FB, 25; 3KU, 5; 3BUR, 5; 3HG, 84; 3SF, 30.

DISTRICT OF COLUMBIA: QRN has just about nailed every shack up, along with hot weather. 3LR is a big loss to the district. 3BWT should worry about static—10 ops defy old man QRN. 3APV is the main inlet for all traffic.

Traffic: 3BWT, 79; 3BSB, 54; 3HS, 52.

NORTHERN NEW JERSEY—2AGB has resumed operation and leads Jersey for summer work. 2CUV and 2CYW are using UV201-A for transmitting around town which cuts QRM to a minimum. 2CO is a new comer and promises to install a 100-watter in the fall with plenty of operators. 2CNJ is reopening in the fall. 2FC claims traffic is moving slowly along the shore due to heavy QRN and YL on the boardwalks. 2CPD has a fine report this month and the gang are pleased as he is an ex-B.C.L. 2CRP is moving traffic for the west Hudson towns. 3CS has changed his QRA. 3BLZ is the only station in Trenton operating in the day time and is open for Philadelphia traffic at all times. 3BFH is doing fine work. 3CBS has joined the married mens' union. 3OH is a fone ham which accounts for little traffic. Newark stations are working the stations along the sea-board and this

summer will find traffic moving into these resorts in a few hours.

Traffic: 2AGB, 200; 2ACD, 76; 2AEY, 92; 2CMK, 63; 2ACO, 60; 2CQZ, 62; 2WR, 45; 2BXY, 44; 2CPD, 79; 2CRP, 34; 2BEO, 25; 2ZB, 22; 2BMT, 20; 2CO, 19; 2AWV, 17; 2AHW, 16; 2AUH, 16; 3BFH, 16; 2CRD, 14; 2CRW, 12; 2BZJ, 9; 3BLZ, 7; 2KK, 6; 2CYW, 6; 2FC, 6; 2BSJ, 5; 2AYN, 4; 2CZX, 4; 2BGO, 4; 2CBP, 4; 2CYQ, 4; 2BQA, 2.

SOUTHERN NEW JERSEY: 2BGI was reported in New Zealand. The class of message traffic has improved, according to 2CGK. 3KT and 3OQ guarantee message delivery in Atlantic City. (FB-T.M.)

All Jersey traffic is handled promptly.

Traffic: 3KT, 38; 3OQ, 34; 2BGI, 59; 2CGK, 13; 3ACQ, 70; 3BAY, 60; 3BEI, 12; 3BWJ, 47.

WESTERN NEW YORK—With the handicap of the summer static coming on so strongly during the warm days and nights, the amateurs of the following localities are ever ready to further the good work along in the art of transmition and reception of code, and are supporting their A.D.M. to their very best. Note: All C.M.'s will please report to the D.S.'s all changes and make your applications to him for O.R.S. certificates. Those who are willing to assume the duties of C.M. should get the vote of the amateurs of their location and send it to the D.S. who will report it in through the regular channels with his O.K., so the A.R.R.L. can issue an official certificate of C.M. or O.R.S. Note: All district superintendents please get in touch with the A.D.M., Charles S. Haylor, 8PJ, who represents you in the 8th district, Atlantic division, sub. dists. 9 to 16, inclusive.

This months report shows some new additions in stations 8CTN and 8ND are out of commission on account of business. 8CTN is no more. 8DGA has increased power to 15 watts. 8BQB is doing some good work with his antenna at half mast. 8SR is the only station in operation there. 8AMM has the finest district for number of stations reporting in and also some very good records. 8DAA and 8DMR are the only ones in Courtland left for summer traffic. 8DKL has gone for the summer. 8AXX and 8ANJ are QRX for short wave tests for summer. The following stations are going strong: 8VC, 8CRA, 8PK, 8DOL, 8BJW, 8CPT, and 8ABX. 8BJS is on at times. 8NB leads traffic this month and has been heard in Holland and handled traffic with the west coast. 8ATR has a new car and a YL, and the 250 set will be silent for a while. 8CYI has handled traffic with west coast also, using 100 watts. 8BLP is rebuilding for 50 watts. 8DNB is building a 5 watt set. 8BCP is negotiating for 250 watter. 8ROW is going strong on 10 watts and 8TC is putting in 500 cycles. 8ADC reports only a few stations in operation, 8COK and 8ADC, which were heard in New Zealand. 8ADJ reports having worked Aberdeen, Washington, and he has been handling traffic with 8DCD, 1AMG, 1RX and 1ABF. Ray Schweinberg of Boonville reports his district is open with about 20 hams ready to build sets and by fall the district will open to traffic to the Adirondacks. 8QB has at last awakened to the fact that msgs are going in this district with a report from 8AGW, 8BSM, 8AQM, 8BSF, 8OX, 9PJ, 8ZB. They are on most any night throughout the summer. The loss of 8ND was a sad blow to the gang here.

Traffic: 8QB, 15; 8AGW, 36; 8BMS, 12; 8BSF, 37; 8PJ, 27; 8ZB, 10; 8AY, 51; 8AYB, 10; 8AQM, 61; 8KU, 10; 8DPL, 31; 8DAJ, 8; 8ABX, 68; 8BHM, 8; 8ROW, 2; 8DNB, 3; 8BLP, 63; 8BCP, 7; 8CYI, 67; 8ATR, 67; 8NB, 110; 8SR, 84; 8BOE, 43; 8AXN, 41; 8DGA, 8; 8BQB, 7.

EASTERN NEW YORK—Report are beginning to fall off due to hot weather coming and will continue to be low until September. The C.M.'s of Bronx and Brooklyn are on the war path for stations handing in "Fluke" reports. Several fellows certainly don't handle the traffic they say they do, and they are going to be caught if they don't watch their step. Every station is hereby requested to keep on file for two months every message handled. When the C.M. suspects crooked business he will visit the station and ask the operator for copies of all messages handled during the traffic month. If the operator is not able to produce them, reports from said station will be nullified. If the station happens to be an O.R.S., the certificate will be cancelled immediately. SO, WATCH OUT!

2CHK sends in a fine report for Manhattan. The gang is at last waking up. There are some of the active stations that didn't report, but they are very few this month. 2CPK and 2XNA have closed down until fall. 2CIZ, one of the few O.R.S., is using a 50 with 350 volts on the plate. 2TT has started up again. 2CMG, the Hudson River Yacht Club gang has 2CZR, 2CPO, 2ADR, and S.W. Wilkinson, ex-5UU as ops.

Traffic: 2KR, 49; 2XNA, 45; 2CMG, 36; 2CHK, 14; 2CIZ, 6; 2BNL, 12; 2CSL, 29; 2LX, 34; 2CZR, 21; 2TT, 11; 2BEE, 27; 2EV, 14.

The air of Brooklyn has not been contaminated by any spark lately as 2BWB and 2BEG have been away.

English 2AW and his son visited stations 2WC, 2CLA and 2BRB. Stations are urged not to send a message from one station to another around town when it is for the town where they are located. Deliver the message by phone or mail. Stations are requested to send in number of messages delivered. This month, 2CHY delivered 9, 2BZO, 4; 2WZ, 2; and 2BRB, 2.

Traffic: 2ADC, 112; 2CPQ, 110; 2BO, 88; (?) 2CRB, 67; 2ABR, 50; 2BRB, 48; 2ABN, 44; 2CHY, 47; 2WZ, 26; 2WC, 27; 2CXA, 20; 2BZO, 17; 2AEC, 29; 2MO, 7; 2AEX, 5; 2PF, 2; 2CQN, 2; 2AAY, 1.

2MO is a new station located on Governors Island. Ted Wilson, 2IK, formerly 2nd op. at 2BRB, operates the station. The station is owned by a Captain in the Signal Corps. This station is well situated for traffic and DX. The west coast has been worked in heavy QRN with 150 watts input. The Bronx report is poor this month. Can't you fellows who never send in reports remember that 2CWR is the C.M. and that reports are due on the 16th? The same old faithful gang keep sending in reports.

Traffic: 2CRQ, 79; 2AAI, 8; 2CJJ, 65; 2CVX, 34; 2BBX, 99; 2CWR, 17. What's the matter with Marty, 2CYX?

The Staten Island report is very porr. 2CEV, 35; and 2CEP, 28. CEV is still on spark but he is buying parts for a C.W. set. Come on you fellows show some life. Send in reports to 2CEV.

Traffic: 2BCK, 35; 2BSL, 34; 2APM, 13; 2CSX, 9; 2AVE, 6; 2CLJ, 6; 2MU, 6; (Glad to see so many fellows back on the air and co-operating—A.D.M.)

New Rochelle is dead as King Tut, according to 2CFE, C.M. 2ADD sends in a fine report from Yonkers as usual.

Traffic: 2BGD, 5; 2APY, 14; 2CIL, 3; 2ADD, 17; 2AAC, 1.

2AG, 2CUZ, 2CBG and 2AQH are on the air.

Dist. No. 3: 2CPZ, 9; 2ANM, 31. The district is dead.

Dist. No. 4: Van Loan, 2CX, resigned as D.S. A new D.S. will be appointed. 2AGQ sent in a nice letter giving his report as 68 messages. He is the main station between N.Y.C. and Albany and does fine work on that relay line. 2AQR and 2CXG are doing good work. Newburgh: 2CNP, 9; and 2AQR, 65. Fine work, keep it up. Sorry 2CXG didn't report.

Dist. No. 5: 2GK hands in the usual excellent report. 2CGH heads the traffic with an even 100 this month. He is on the air a great deal and doesn't seem to mind the hot weather. (FB). 2CDH in Castleton sent in a fine report this month. He gets fine results with a pair of 5 watters. 2BXW and 2AVJ report not much doing.

Traffic: 2CGH, 100; 2CDH, 78; 2BXW, 4; 2AVJ, 13; 2APU, 10.

2ALK and 2XQ have shut down until September. 2EY is using raw A.C. Some noise. Hi. 2BSK is another bird with raw A.C. The gang offered him a rectifier gratis, but he wouldn't accept it. 2ACS, 2CGJ, 2ADM and 2CPA are rebuilding. Some QRM when they all get going at once. Will sound like N.Y.C. 2CWJ is on a great deal.

Traffic: 2CWJ, 50; 2BSK, 40; 2BY, 30; 2ACS, 25; 2GK, 21; 2ALK, 10.

How come all the even numbers. Hi.

Albany is dead as usual. 2AWP, 5.

2BXP handed in a late report of 5.

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

KENTUCKY—QRN has been unusually bad here for this time of the year as is shown by the traffic figures.

9ELL and 9BAZ are holding out best in the hot weather though traffic through the state is moving slower than usual. 9OX has tried to operate several nights but says he sweated so much he had to use a canoe to get out of the shack. 9WU has been heard in London. He is sailing for Europe July 10th and will visit some of the foreign hams. 9DRC is using a 50-watter now and his sigs have plenty of punch.

Traffic: 9ELL, 51; 9BAZ, 41; 9EP, 16; 9WU, 10; 9ARU, 8; 9DTT, 6; 9MM, 5; 9EI, 4.

SOUTHERN INDIANA—Traffic in Southern In-

diana is slowing up some due to the hot weather and QRN. However, some stations are taking this opportunity to re-fit their stations.

9EJI has increased his tube capacity to 50 watts. 9ARP is putting in a new D.C. generator, 100 volts. 9BDB has a new 50-watt bottle. 9CZS is increasing tube capacity to 1000 watts. 9AUD is on the air again with 50 watts. 9BAK, 9CTB, 9DDA, 9BJY and 9EJ are doing good work.

Traffic: 9BDB, 79; 9BLJ, 58; 9EJI, 27; 9TG, 23; 9CUR, 15; 9EIU, 14; 9EJA, 11; 9AUD, 7; 9BVZ, 6; 9CYQ, 4.

NORTHERN INDIANA—Dist. No. 1: 9AFY tops the list this month but had bad luck as a storm blew down his sixty foot mast only a few minutes after he got a DX report from New Zealand. 9DBJ has watts no more. Blew his only fifty. 9AFI is back on the job again and has discovered the value of a pure D.C. tone. 9HJ, Central High School, has a 150 watter, a good aerial and outfit, but no one to work the set this summer. 9CZF has a 100 watter under construction using S tubes for rectification. 9DJZ has great success working the west coast on low waves, his regular wave being about 160 meters. Elkhart is going to get on the map soon. They are starting an A.R.R.L. City Club with 11 members for a starter. There are two new stations, 9DHO and 9BQN. This makes eight active stations. 9ARD is going fine but says there is plenty of QRN up there. 9CUS has gone back home to Dayton, O, where he is known as 8AWN. 9CLN is a real amateur fone station that can handle traffic with the best of them. 9CTB is giving her a complete remodeling.

Dist. No. 2: 9DHJ is going to put in a tin mast and get on the air with C.W., which is under construction now. Rah! No more spark. 9BON reports that it is hard for him to get traffic lately. (I got a rumor that he is kept busy with an OW. His name is Brown and her's Green. Green may turn Brown in fall. Wt sa, eh?—D.S.) 9DWA is reinstalling everything. 9MM has a 250 watter now. 9CP heard in New Zealand and used a two wire aerial that was strung up in about fifteen minutes. He doesn't know what to try next. He reports no luck as yet with the mercury arc rectifier.

Traffic: 9AFY, 124; 9CLN, 52; 9CP, 41; 9BON, 35; 9AFI, 36; 9CUS, 30; 9DWA, 28; 9DYT, 26; 9DLW, 24; 9DJZ, 24; 9DRS, 24; 9CTB, 21; 9BKJ, 15; 9AZX, 14; 9DMI, 13; 9DBJ, 12; 9EFZ, 11; 9BQB, 9; 9BYI, 8; 9AMJ, 6; 9APD, 6; 9HJ, 6; 9CEM, 4; 9DLN, 2; 9EHU, 2; 9AKO, 1; 9EJR, 1.

ILLINOIS—New A.DM., G. W. Bergman, Dwight, Ill., 9CA. Dist. No. 1: QRN has most of the fellows down in his district. Lack of traffic seems to be a general cry from every district in the state. 9BIZ was laid up for three weeks with a power leak. 9CFK reports being heard by ZIAX but didn't say what power he was using. 9LE says he gets through better on the lower waves quite natural). 9NQ is using the old sync yet but on a wave of 177 meters and says it gets out better with less QSS. C.W., this fall.

Dist. No. 2: Some real activity will be stirred up with the appointments of 9ARM as Dist. Supt. to succeed 9CA who has been appointed A.D.M. The Streator gang is less active than usual. 9CTF refuses all rubber stamp messages—his usual good report. 9CGV sends his report of 13 msgs in on the 13th, Friday. Sez "maybe bad luck" (Would have been worse if he hadn't). 9BUK has been appointed O.R.S.

Dist. No. 3: 9CRX is using 20 watts with one "S" tube. 9ATT handed in the best report. 9DJG gives only report from Granite City. 9TW has tried repairing 50 watters and says they are FB. 9AHJ finds all the local hams off for the summer but vows he will stick it out QRN or no. 9AWQ is out for a while. 9BHH has been QRW braduating which accounts for the slim message total.

Dist. No. 4: 9VV is trying to get his C.W and fone set down on the lower waves. 9BAW now has two 5-watters and is doing very consistent work. With a new 70' mast now under construction. 9CZL hopes to raise the dead if the QRN doesn't beat him to it. 9CZL knocked off 204 bona-fide messages this month. 9ASD has gone to South Dakota with geologist instructor to dig up skeletons. (Find any old tubular Audiotrons?) 9DCR is rebuilding his transmitter and changing from panel mount to "breadboard." (9CGV pse note.) 9REB is using fone a great deal. 9BGC is on now and then. 9CLJ and 9DQU of Decatur and 9TW of Lincoln spent two days visiting 9ATT and 9CLZ of Jacksonville and 9MC of Roodhouse. 9DQU got a real thrill when he pushed the key on the 500 watt set at 9MC (about like Marco does when Matty steps on the Cadillac.) 9ELJ is waiting for a replacement on a tube. 9BHX is rebuilding his entire set, antenna, C.P., and all. Couple 50's this fall.

Dist. No. 5: We regret to announce that D.S. Hicks has resigned as he is now permanently located out of his distrct. His successor has not yet been appointed. 9BDA reports no traffic but will be on soon with a 10 watter. 9PE has the 30 dollar blues—nother fifty went west. 9CIZ is installing a new 20-water. Rockford is practically the same as last time except 9DJO has started again, but with his small antenna he can't get up to 100 meters. 9BHD's budding proteges are coming along fine, but unlike some others, they are learning on a buzzer. 9CDB is on regularly, but 9EHQ is out of tubes, jack and luck now. 9AKU is not on consistently. 9CJB ex-9AFF is on with C.W. in place of the well known spark. 9AFN is back from college and will be on the air in a short while.

Dist. No. 6: This district was surprised by the announcement of a picnic at Apple River Canyon, to be put on by 9BHD, 9CEI and 9DJR, with the help of a couple of more Apple River fellows. The greater part of the district planned to attend but owing to the rain the night before the dirt roads suffered and the attendance was cut down to about twenty. They fed 'em on overgrown hot dawgs, salad, ice-cream, strawberries, etc., until it was dangerous to bend over, and then they went to the canyon and tried a liar's contest, but due to the presence of BHD, the rest of the gang was outclassed. (He should have been barred like Schnell was at the Chicago Convention). It is said they have some keen pictures of the bathing beauties . . . . They all went home at an indecent hour and the only one to complain was 9AKU who only got a little over a quart of ice cream. 9EHQ lost his pants on some barbed wire aerial wire.

Dist. No. 7: 9DKK is poking out in fine style. 9AZJ is still going with the 50 watter. 9AUY has a new 250 which is perking pretty well. 9OU's 5 watt bottle kicked the bucket. 9AAW has been on almost every night and finds but few stations with traffic to QTC. 9DHQ has a new mast. His 50 watter died a "natural death" from overloading. It is planned to install 9APK's old spark at 9DHQ. 9DHQ located another illegal station in Evanston by the use of the club's portable loop set.

Traffic: 9CTF, 382; 9KD, 373, 9CZL, 204; 9DBP, 115; 9DGA, 114; 9ARF, 72; 9ATT, 66; 9CRX, 65; 9AIO, 65; 9CFK, 64; 9DJG, 63; 9AZJ, 52; 9AAW, 51; 9BWO, 45; 9DWX, 42; 9BRE, 37; 9DNP, 36; 9BUK, 36; 9AIC, 34; 9MC, 33; 9CYZ, 31; 9LE, 31; 9BE, 31; 9DVW, 30; 9DQU, 29; 9TW, 28; 9BBG, 28; 9CTT, 27; 9BDL, 23; 9CFS, 22; 9AUY, 18; 9BWQ, 16; 9AKU, 16; 9DQR, 14; 9BZQ, 14; 9DKK, 14; 9CGV, 13 9ABB, 13; 9ALW, 12; 9OU, 12; 9AHJ, 11; 9JO, 9; 9CAH, 7; 9ARM, 5; 9BIZ, 5; 9CIZ, 4; 9BWP, 4; 9BHH, 1; 9NQ, 2.

WISCONSIN—Dist. No. 1: 9BKR will close down the station until September 1st. 9BVE is back on the air again with a new filter system. 9BBY will be on the air all summer with 100 watts and 5 ops. They clear the hook within 12 hours; any station wanting a schedule send them a card. 9AAP is leaving the station in the hands of one of his operators while he adjourns a month in the northern lakes. 9OT spends his spare time coaching the OW for her op's exam. 9ATO recently entertained 2BT and 2ADK. 9CVI is using full wave self-rectified set with 100 watts, putting out 3 amps at 185 meters. 9DP worked Jap ship "JUPU" May 31st, 50 miles west of Frisco, using 150 watts at 3000 volts. 9ELV is rebuilding the station and putting in a 2KW power line. Louis Prahl, ex-9WW, is in partnership with him.

Dist. No. 2: 9BIB is the star station this month and incidentally, he and 9AZR were stars at the Illinois State Convention. 9EGW is doing fine work and ranks second in the district. 9CHE is putting up a new 100 ft. mast. 9EAR will be on the job all summer. 9AZR blew a fiver shooting news items to the Milwaukee Journal. 9CWZ does all his work in the daylight. 9DBM is still going strong and most of the Racine gang will be on all summer. 9DWP split the ether for a few days with the old spark and was promptly jumped on from the four corners of the earth. Wots the matter with that C.W.? 9DCP, the powerful phone station located at London, Wisconsin, is taking care of things well in that part of the country.

Dist. No. 7: 9BMU recently paid Milwaukee a visit and looked over several stations. 9CXY won second place in the Milwaukee Journal News Contest. 9ADP reports by radio. 9DHG handles a little traffic but says he would rather fish. 9BVA is going to

tour this district and visit all ham stations. 9EAU is not on much but works the first district easily. 9AGT is operating for the Scounts at lamp. 9DCT works both coasts with a loose coupled circuit. 9EMD operates regularly on schedule. 9RQG says he thinks the "Badger ARRL News" is the "berries" (Tnx, OM.) 9CIU reports business poor in his section. 9DRO doesn't send msg. total, but works seven districts on VT.-1.

Dist. No. 4: 9AZN is using a 5-watt exciter in a conductively coupled constant frequency circuit. Just finished a sixty pint chemical rectifier to go with it. 9BXE reports no traffic but was copied for two hours straight by a New Zealand station. 9BLF says he will be glad when exams are over (suppose then you'll want to go swimming or some other alibi, Harold.)

Dist. No. 5: Due to the change of officers in the Fifth District, the reports were not received. All Fifth District amateurs are asked to send in their reports to the new D.S., who is, W. C. Bridges, 9BTH, 1101 N. 21st St., Superior, Wisc.

Traffic: 9BMU, 151; 9BIB, 148; 9BKR, 125; 9EGW, 114; 9CJI, 77; 9DTK, 69; 9AZR, 67; 9BVE, 65; 9CXY, 65; 9RBY, 64; 9BYE, 45; 9ADP, 42; 9DHG, 37; 9CHE, 30; 9BVA, 30; 9EAR, 28; 9CWZ, 27; 9EAU, 22; 9AGT, 19; 9DCT, 19; 9DCP, 17; 9AAP, 14; 9OT, 14; 9AZN, 14; 9ELI, 14; 9EMD, 12; 9BQG, 12; 9ATO, 12; 9BSO, 9; 9DPR, 9; 9DVZ, 8; 9CVI, 7; 9EGH, 7; 9AJX, 6; 9BMY, 6; 9CCS, 5; 9CCF, 5; 9CIU, 5; 9PJ, 4; 9DP, 4; 9AZA, 4; 9ALI, 3; 9BLF, 3; 9CFX, 2.

MICHIGAN—Dist. No. 1: Among those saying they will be off the air for a month or so are 8DAT, 8BDR and 8AIH. 8CBO is the only active station at Ann Arbor. 8DIL, star station this month, has been most consistent for many months, especially in message handling and regularity of reports, altho the stations which are reporting are sending reports in on time. 8AMS reports fair communication to the north. He will be off the air for a few weeks and when back expects to have schedules with northern stations.

Dist. No. 2: 8ARV leads the gang this month with 8DCW second. Traffic is moving better than usual for this time of year.

Dist. No. 3: Very little doing outside of Kalamazoo this month and even there things have dropped off. 8CQG brought up his msg. total by mostly all daylight work at noon. Every one of the 25 that attended the meeting held at the station of 8CPY-8DKC on May 17th in the afternoon and early evening at 8DCY and 8CZZ and 8CQG had a good time according to their own reports. A banquet was held at the Columbia Hotel at seven in the evening. A business meeting was held after the banquet, at which D.S. Wilson was unanimously re-elected. Traffic is light now as summer and the YL's have taken a strong hold on the younger "hams."

The R.I. paid Grand Rapids a visit in May and now the gang are all set with new 1st class operators licenses. (FB, must be he was sure Kalamazoo was 100% as he didn't bother the hams there, but pulled in WLAG's ears for ten meters off wave. Hi.

Still plenty of good stations to hook up with in this district to QSL to D.S. for schedules for western half of Michigan.

Traffic: 8BD, 272; 8ARV, 140; 8DCW, 130; 8YN, 90; 8DIL, 80; 9CQG, 76; 8CPY, 20; 8DEP, 61; 8CZZ, 46; 8DFB, 45; 8DAT, 40; 8DKF, 36; 8AQA, 30; 8DJH, 26; 8BDR, 26; 8ZZ, 20; 8AYJ, 20; 8AMS, 16; 8BWJ, 15; 8AQR, 14; 8BCV, 12; 8CBO, 12; 8AIH, 11; 8ZH, 9; 8BKC, 7; 8ZF, 5; 8WA, 4; 8AUB, 4; 8BGQ, 4; 8DGC, 3; 8BWR, 3; 8MV, 2.

OHIO—Dist. No. 1: 8DFF is doing good work in daylight. 8AGP is putting up an 80 ft. mast from lath and 2 inch posts. 8CCI, 8BCF and 8GD are remodeling. 8ER is doing good work on I.C.W. 8CMU is working daylight on account of QRN.

Dist. No. 3: V. D. Gettys, 204 Oak St., Warren, Ohio, is a newly appointed D.S. 8BKM is reaching out well with 201-A tube, but has purchased his 11th 5-watter. 8WY has blown two 50-watters. 8ES is remodeling with remote control.

Dist. No. 4: C. P. Goetz, 8ZAB, 1128 Atwood Ave., Cincinnati, O. is succeeding R. E. Humes as O.S. 8CWR is doing the best work in the district. 8AIB had all tubes stolen. 8BGF has remodeled. 8BHE will be on soon. 8AHY is back again.

Dist. No. 5: 8GZ is also 8ZG, who handled some R.R. emergency work.

Traffic: 8CWR, 274; 8BYN, 210; 8GZ, 102; 8CVH, 99; 8BMB, 88; 8BKM, 69; 8CCI, 64; 8ZAB-8ANB, 45; 8ER, 40; 8ZC, 39; 8BNH, 37; 8DFF, 34; 8BZT, 34; 8ALW, 30; 8BN, 30; 8CMU, 30; 8BBH, 28; 8TJ, 33; 8APP, 22; 8UQ, 17; 8DKM, 14; 8BGF, 14; 8GD, 12; 8BCF, 12; 8AGP, 10; 8QK, 9; 8CNR, 9; 8FU, 6; 8ABD, 5; 8AHY, 5; 8BO, 4; 8WY, 3; 8DCH, 3; 8BBF, 2; 8CNZ, 2; 8RB, 1; 8AVN, 14; 8TJ, 7.

DAKOTA DIVISION
D. C. Wallace, Mgr.

NORTH DAKOTA:—Severe electrical storms and tornadoes put a stop to most of the radio work in this state. Unfortunately, we had no stations in the storm zone and very little help could be given. 9AEJ has a new big 70 foot tower.

Traffic: 9DM,5; 9AMP,7; 9CSI,6.

SOUTH DAKOTA:—The recent cyclone took nearly every aerial in the state but most of us are back with some sort of radiating system. 9AYD is about the most consistent in operation with 9ALG, 9DKQ, and 9CKD doing some work.

Traffic: 9AYD,52; 9ALG,17; 9DKQ,42; 9CKD,17; 9DIY,6; 9BRL,6; 9DWN,2.

MINNESOTAA:—New Q.R.S. certificates were issued to 9AEI, 9DFN, 9DPY, 9DMA, 9DQH and 9BMX. Traffic in and out of Duluth is moving very good. Very little holds up and that due to much QRN. Traffic on the range is very slow and is practically at a standstill. Old faithful, 9EGU, is certainly sticking on the job. 9BVS is pounding brass occasionally but 9BFU, 9SF and 9BFO are Redwood Falls are not on. 9COF reports a new pole for next month. 9FN is leaving Fairmont and 9DQM at that place is back on the air with a 10-watter. 9BNF has just buried his first-born fiver. 9EGG is continuing his low power work. He uses a 6 volt Hotshot on the filament of a UV201-A for both receiving and transmitting, using one tube in two circuits. He also worked 9CHC at Spencer, Iowa, and 9AXS at Marshall. Both are working on the farm. 9ANJ reports getting into Iowa and Wisconsin in great shape. Everyone is doing daylight work almost entirely. 9CPO has been forced to squeeze his pocket book for a fiver, even with a new second op to support. He was heard in New Zealand on the So.

A meeting place for the next S.M.R.A. Convention is wanted—invitations to any city should be mailed to 9DSW.

District No. 3 has practically gone dead for the summer, but it will doubtless soon wear off when the glamour and novelty of some real summer weather disappears. The old reliables, however, are finding this summer as interesting as any previous summer, and practically all districts of the United States and Canada are being worked by some Twin City station every few days. Special credit is due to 9BPN, 9AWV and 9DGE. 9BIS has a clickless, practically silent, transmitter.

9ZT-9XAX just received a whole sheet of reports from Chile. These reports included copies of frequent transmissions, even including complete messages. The old Minnesota Wireless Association has come to life in the Court House—Minneapolis—Call 9EF. 9ZG will handle traffic again being off the air practically two months. 9GZ has gone to the Great Lakes for the summer, and has appointed 9BMX as temporary C.M. in his absence which appears to be a wise move on his part. 9APE is putting up a set in Alaska.

Traffic: 9DOE,343; 9EGU,85; 9AND,42; 9EAU,40; 9ABI,37; 9CO,29; 9CDV,19; 9ASW,15; 9BQY,12; 9BPN,45; 9DAW,19; 9BTT,10; 9BIS,50; 9BQQ,5; 9AWV,25; 9CVV,20; 9DGE,61; 9CRW,5; 9BLY,15; 9ZT-9XAX,97; 9CPO,3; 9BVS,2; 9AXS,68; 9ANJ,19; 9EGG,11; 9BNF,61; 9DSW,17; 9COF,4; 9MB,4; 9DYR,10; 9DDP,15;

DELTA DIVISION
W. W. Rodgers, Mgr.

ARKANSAS—Recent developments here indicate a general awakening of the stations in this state. Good traffic is being handled by stations seldom reported as operating. 5AW-XAB is the leader this month with 5ANW a good second. 5WK is also operating. Traffic: 5AW-XAB 88; 5ANW 15; 5WK 6.

TENNESSEE—Traffic is moving rapidly thru this state and as a result, 5KA holds the honor position for the entire Division. Very good work is being done by 5ANT 5AIY, 5CN, 5NT, 5APC, 5ANV, 5AQY, 5APO, and 5ES. Memphis stations are busy with plans for the Delta Division Convention in August, to which we invite all hams of the old Earth.

Traffic: 5KA 103, 5ANT 69; 5AIY 62; 5CN 34; 5NT 47; 5APC 21; 5ANV 3; 5AQY 3; 5APO 15; 5ES 6.

MISSISSIPPI—5ALZ leads the Mississippi Sta-

tions in messages handled in May. 5KR breaks thru the QRN to report his total. 5AGV, 5AGS, 5QZ and 5AKP hold up the Meridian reputation very creditably. Traffic: 5ALZ 51; 5KR 40; 5AGV 28; 5QZ 25; 5AKP 12; 5AGS 10.

LOUISIANA—No traffic is reported from this state, altho we think it inconceivable that so many stations can operate without handling traffic. 5GI, 5UA, 5KC, 5TQ, 5RH, 5HT, 5LH, 5ARH and 5ZK report activities of varying importance, the majority of them being engaged in the peaceful pastime of "rebuilding". Many of the Louisiana gang have gone to work in order that they may come to the Delta Division Convention. (Here's looking at you, fellows—DM).

EAST GULF DIVISION
H. L. Reid, Mgr.

FLORIDA—Daily thundershowers throughout the state have forced us into an almost continuous silent period. Traffic to and from the north is handled mainly by 4FS. 4IZ and 4FS have been copied in New Zealand, and 4ER worked 7ACX. Traffic up and down the peninsula passes principally through 4HZ, 4FS, 4IZ, 4PB, 4BL and 4CH. 4IZ and 4PB are the most active stations in central Florida. 4CH is the same for south Florida. 4XE-4IU has moved to Winter Park where he will open up a new relay point and be a valuable addition to central Florida. Old timer, 4NE, is back with us and works up the state with ease. 4QY still gets the DX and has almost a monopoly on Cuba.
Traffic: 4IZ, 68; 4IU, 44; 4PB, 41; 4RL, 28; 4FS, 24; 4QY, 22; 4CH, 10; 4EZ, 7; 4ER, 3.

SOUTH CAROLINA—4DX-4SY is back on the air and doing splendid work. 4SH, 4PV and 4RR are QSO all but the 6th and 7th districts and are eager for traffic. 4SH continues with his schedule with 4JR.
Traffic: 4SH, 25; 4PV, 25; 4DX, 197; 4RR, 25.

ALABAMA—Traffic for this district fell very low this month. Only 56 messages were handled. This may be attributed to the very heavy QRN experienced during the last month and to the number of stations undergoing repairs. The rebuilding craze seems to have hit the district in general.

Anniston reports very little activity. Three stations are working, namely, 5GP, 5BP and 5ACM. However, 5ACM is the only one who reported any traffic. 5ACM is working out consistently as nearly all of the Birmingham fellows report him. Gadsden seems to be in a worse condition than Anniston. 5QP has been bitten by the rebuilding habit for he is not operating regularly. 5VC is exploring some of the lower regions and using I.C.W. (Lay off the stuff, old man.) 5HM has left town for a while and can be found in Cincinnati. Old 5AMH has forsaken the higher waves and is now hanging around 160 to 175 meters. His new 85 foot mast is a peach. 5ZAS works now and then. 5MI had plenty of pep until his 50-watter went west recently. 5VV is recovering from an operation.
Traffic: Dist. No. 1: 5MI, 23; 5ZAS, 15; 5CAM, 18. Dist. No. 2: 5AOM, 34; 5AC, 10. Dist. No. 3: QRN.

MIDWEST DIVISION
P. H. Quinby, Mgr.

IOWA:—City Manager 9BRS of Des Moines reports stations all active, however, not much traffic was handled. 9DSL reports the following routing msgs. South through 9DIX, 9BRU, north through 9AJE, 9LA, Des Moines; east through 9BCX, Ill. Stns. Most of stns. 9DSL works have no traffic. 9DJA reports the following routings: east-9CXX; west-9BGH-9CWF-9BPV-9CLG-5LA-Des Moines; north-Mason City,-Eagle Grove; south-Oskaloosa-knoxville. 9CS reports the following routings: The following stations were appointed as O.R.S.; west 9RR.
east-9AAW, 9EDH, 9DIL, 9LF; south 9DC, 3CRM; 9CZO, 9DIP, 9CWF, 9CTD, 9BGH, 9AHH, 9CHN, 9DJA, 9DKW, 9BCX, 9BWC, 9CSR, 9DSL, 9BSX.
Traffic: 9ZO,41; 9CWF,109; 9DJA,53; 9BCX,32; Stations not yet appointed O.R.S. 9AVJ,58; 9CGY, 14; 9CLG,60; 9CS,24.

NEBRASKA:—New O.R.S. certificates have been issued to the following stations: 9ATC, 9CGS, 9CJT, 9AWS, 9COU, 9AQO and 9CPB. 9CIM of Omaha, 9AKS of Lincoln and 9BUN of Fremont. Traffic has been comparatively light throughout the state because of adverse weather conditions; storms doing considerable damage to antenna systems, including the wrecking of towers and antennae at 9CJT, 9CMK and 9DSM. The latter two stations will probably not be on the air again. A number of stations are being rebuilt during the static season so as to be ready for operation just as soon as weather conditions become better.
Traffic: 9ZO,41; 9CWF,109; 9DJA,53; 9BCX,56; 9BNU,85; 9AKS,102; 9COU,18; 9DXY,57; 9CJT,62; 9EEO,20; 9AFR,21; 9DJP,1; 9EAK,14.

KANSAS:—QRN is very bad. 9BVV has been laid up in bed. 9BVN has been appointed C.M. of Kansas City to succeed 9DLM. 9CFI is fixing for 250 watts. 9QW, a new ham, is doing fine. 9CLV says business is picking up. 9BRD uses a 201A in parallel with a 5-watter to good advantage. 9BIO reports a new shack and 65 foot pole. 9CCS is building a master osc. set. 9EFU worked Mex. 1-B. Lawrence reports fine with a gang of active stations. 9AIM is getting 250 watts.
Traffic: 9AJU,18; 9DMX,24; 9DVI,10; 9CRO,10; 9EHT,15; 9EFU,28; 9BRD,51; 9BIO,20; 9CCS,50; 9QW,21; 9CFI,91; 9BVV,14; 9CVL,36; 9SV,40; 9DCX,10; 9AGA,7; 9BJB,12; 9DLM,12; 9BXG,20; 9BVN,160; 9AIM,65.

MISSOURI:—New O.R.S. certificates have been issued to the following: 9AAU, 9ACI, 9BHI, 9BLG, 9CCW, 9DMJ, 9DXN, 9NU, 9PW, 9ASX, 9BSH, 9DCW, 9DWK, 9AYL, 9DJB, 9FM, 9SS, 9ST, 9RR, 9DOJ, 9EX, 9DLT, 9ADC, 9AOJ, 9CKS, 9CYK, 9DAE, 9EFC.

The new D.S's are 9BSH and 9DAE. A new effort is being made by the D.S. to get relay routes in effect. Unusually heavy rainfall and severe lightning and QRN is handicapping relay work badly and doing some damage. A new station, 9DRQ, located at Mountain Grove is expected to help bridge the gap from northern stations to 9CRM for daylight work. Some excellent reports have been received on freak reception and dead spot. We want more reports—Missouri is famous for dead spots and we have a wealth of experience and example to report. Let every one help! 9ADC is the high traffic handler with 150 msgs. Relay routes remain unchanged.
Traffic: 9AAL,9; 9AAU,57; 9CCW,11; 9DXN,15; 9EKF,53; 9EKY,62; 9DS,27; 9DWK,13; 9ACX,5; 9AHZ,4; 9BKO,54; 9BUC,4; 9DJB,5; 9ELZ,4; 9RR,49; 9SS,3; 9ST,125; 9ADC,150; 9DAE,59; 9DZO,18; 9AOJ,29; 9CKS,45; 9AOJ,29.

NEW ENGLAND DIVISION
I. Vermilya, Mgr.

EASTERN MASSACHNSETTS:—Most of the bunch say that QRM and QRN are holding them up. The star station this month is 1AJA with the 250 watter that he has just installed. A close second is that of 1AAC-ZO. 1BZQ has schedule with 1ASU every day, and had one with 8AQ but bottles blew. BZQ's operating hours are 12:15 to 1:00 P.M.; 6:00 to 7:30 P.M., and 2 to 4 A.M. every day. 1AIR is doing the annual summer stunt of overhauling, increasing plate supply, etc. So far as traffic routes go everything seems to be moving fairly smooth through the state. Of course some of the stations are laying off for the summer, which makes it a little more difficult to QSR, but most of the stations are getting on to the stunt of mailing after 48 hours, so that helps. Most of the fellows are hand in hand with the new traffic dope of QST and will start to use it immediately. 1LM reports it is hard to get traffic through to N. H.,

WESTERN MASSACHUSETTS:—There is great need for stations working on schedule, but there are few stations on consistenly enough to keep to schedule. 1ARE has been accepting traffic east but finds it necessary to QSR by mail too often. 1PY is moving traffic through Springfield and has a schedule with 1ALK for traffic north every night except Friday. 1CBH is the new C.M. for Springfield and we look for better cooperation. Traffic north through Greenfield will have to go through a different route as 1BOM and 1BSZ have closed. Traffic is being handled completely in Worcester by 1BIP, 1CPN, 1BKQ and several others.

CONNECTICUT:—The warm weather has taken the kick out of most of the boys as the report shows. 1UP is unable to be on the air due to the fact that his station was recently robbed of everything. He will, however, be back on the air again in the fall. 1AJT reports ND in his territory except that 1FD is heard once in a while. 1CP will soon operate his summer station at East Hampton.

RHODE ISLAND:—Huddy is leaving for Europe soon, and his office will be filled by Miss Mildred Lorentson of station 1AID. 1BCC is on consistently and moves traffic in good shape. 1AWE is off the air moving to the country. 1AWV gets out in fine shape. 1OW, the C.M. of Providence, fell

off in his traffic this month, but as traffic is scarce we can hardly blame him. 1AID, the YL of R.I., still shoots 'em through in fine style. 1GV tore himself away from his B.C.L. biz long enough to handle 20 msgs. 1BIE is getting out great. His late t DX is New Zealand. (FB, OM.) 1BVB and 1AAP are doing about the same as per usual.

MAINE:—1AUR listened in on Argentine CB8 this month and was heard in New Zealand. (FB) 1KX has designed a new ultra efficient lightening switch and every shack he has visited has one under construction. 1CTP turned in his last report as D.S. He is leaving for California. Sends 73 to the gang, and will seed them soon from a six station. (Best of luck, OM.)

NEW HAMPSHIRE:—Traffic seems to be exceptionally good for this time of year, although some of the stations complain that there is no traffic in their section, and that every one is after DX rather than a good report. 1YB will be off the air until September as school closes and there will be no ops. 1AVL and 1AER are very consistent and are pushing traffic through to the Provinces in fine style.

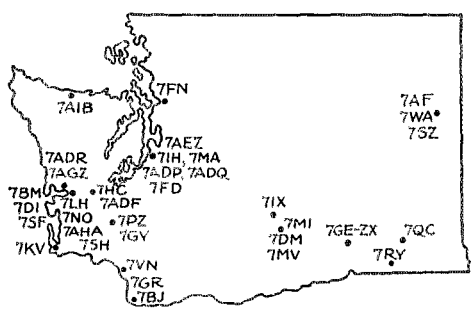
VERMONT:—While two of our stations are closed down now, due to the ending of the school year, others are opened for the same reason. As a result, the state is in much better shape for delivery, although not for DX. 1LA has the best report—how come? 1CPO, 1CQM and 1AJG will be on regularly during the summer. 1FN must have gone crazy with the heat or something—says he got married. Best 73, OM.

Traffic: 1PP,7; 1AQI, 23; 1AAC-ZO,104; 1SN,6; 1CIT,60; 1SK,102; 1CEA,21; 1LM,30; 1AJA,120; 1AIR,8; 1AQY,12; 1BZO,42; 1AF-XF,68; 1AHL,17; 1NT,16; 1SE,20; 1ADM,27; 1AHE,10; 1FN,11; 1ARY,8; 1AJG,6; 1CPO,26; 1AVL,99; 1AER,112; 1YB,105; 1GL,79; 1BJF,163; 1CKK,31; 1ALK,60; 1APM,37; 1AUR,86; 1BHR,8; 1BTT,60; 1CIB,30; 1CTP,11; 1FM,28; 1KK,26; 1VF,48; 1AVJ,5; 1CKP,40; 1VX,46; 1KV,13; 1AWY,41; 3AH,59; 1AYT,41; 1YD,33; 1CDE,28; 1UJ,10; 1MY,30; 1PY,38; 1ABF,50; 1ARE,22; 1BVR,7; 1DB,10; 1LC,23; 1ANM,33; 1ABG,30; 1AJK,7; 1ASU,89; 1BIP,119; 1CPN,18; 1BCU,38; 1BLX,25; 1BKQ,17; 1JE,12; 1AAL,89; 1AAP,90; 1BVB,88; 1II,354; 1AID,108; 1BIE,33; 1GV,20; 1OW,15; 1BCC,24; 1AWE,15; 1AWV,16; 1AEL,53; 1IV,11; 1ZT,19; 1AXN,16; 1BGC,6; 1BM,22; 1ABB,150; 1AVW,25.

NORTHWESTERN DIVISION
Glenn E. West, Mgr.

The time-worn idea that summer is a closed season for radio has been thoroughly lived down in this district. Stations are heard on the air regularly and as consistently as in the winter time. Of course the jumps are much shorter but traffic is moving steadily.

WASHINGTON:—Traffic still going FB for summer and QRN is not holding it a bit. The DX



WASHINGTON – TRAFFIC STATIONS

season is at a close. 7BJ says "low-loss tuners, superhets, superpunkodynes, or anything won't help DX. All eastern traffic has to go through Montana. 7GE-ZX comes up and grabs first place this month. 7AF side-steps to second. 7LH comes in third. The Gray's Harbor gang more than hold up their end. 7LH does fine work on low QRH. 7NO has bad QRN from nearby defective motor. He still keeps his schedule with Alaskan 7AEB. 7ADF worked 3BG on low waves. The Seattle gang is doing fair. 7FD, QRW, re-building station. 7GR, 7BJ and 7VN are doing their bit to hold up Vancouver and Kalama. 7PZ and 7GY of Chehalis, each sent in reports this month. The South Eastern gang had sort of a convention at 7QC's. Those present were 7QC, 7RY, 7EK, 7TH, and 7GE. 7RY almost worked WNP—he CQ'd and heard Mix answer but was unable to work him. We have Gordon Cornue of Selah (7IX) appointed new D.S. for dist. No. 8. He has already brought 7MI, 7DM, 7MV and 7IX out from their silence. New O.R.S. certificates were assigned 7LH, 7KV, 7SH and 7AX. The map will show where the traffic has been handled.

Traffic: 7GE-ZX,183; 7AF,128; 7LH,105; 7RY,97; 7GR,92; 7VN,85; 7QC,83; 7NO,70; 7PZ,65; 7GY, 60; 7AIB,60; 7FN,54; 7MI,54; 7WA,51; 7DI,40; 7AEZ,38; 7DM,33; 7SF,32; 7IH,27; 7BJ,27; 7ABB, 26; 7AHA,25; 7KV,21; 7ADR,19; 7HC,19; 7ADF, 15; 7IX,12; 7MA,11; 7SH,8; 7AGZ,8; 7ADP,6; 7ADQ,6; 7FD,5; 7MV,2; 7SZ,1.

OREGON:—A new O.R.S. certificate was issued to 7ABY. The routes in the state are the same as in the past. Traffic is moving in all directions with the ease of winter weather, there being nearly as many stations on the air as there are during the good DX season. Traffic for Medford can be gotten off the 7MF, 7TQ and 7LS. 7AV is the star station with 7GV next. 7ABY has been appointed D.S. for district No. 10 to succeed 7JE who will be out of the state for some time.

Traffic:—7FY,7; 7RD,29; 7ZW-TO,11; 7GV,104; 7AV,110; 7EL,65; 7AIX,14; 7IW,92; 7AKH,30; 7ALD,28; 7KS,18; 7AJQ,35; 7MF,22; 7FR,9; 7TQ,10; 7HH,2; 7LS,8.

IDAHO:—Well, get out of the way! WHAM!! Idaho socked the ball again. The R.I. was in Boise June 3rd and several new licenses are to be issued, and one to a YL, the second in the Northwestern Division. Hooray for Boise! Static, of course is increasing but most of the fellows put out such a wallop they can work fair DX in spite of the interference. 7OB is still hammering away with his ten watts, and they say he is one of the loudest 7's heard in California. He is helping the UI, to get her transmitter in operation. (FB, OM!) 7OT got a first commercial license but he is not heard on the air very much. 7IO has rebuilt his antenna and is ready to work east with a 20-watter. 7GW was up in Nampa and Boise looking over the local ham sets. 7GX has been having a little trouble with his mast, but has another one up and will soon be at it again. 7ACF was doing great on 5 watts but he has gone to Camp Lewis for a while. 7QP is a new station in Kellopp. He has 10 watts of pur. D.C. 7IU is on steady and can work east easily. A schedule is being arranged for both east and west through 7LN. He's putting over five amperes into the cage and the YL's don't bother him a bit!

Traffic: 7ACF,57; 7OB,12; 7IO,10; 7LN,18; 7GW, 13.

MONTANA:—Conditions in Montana are better than ever before for summer. More stations are one the air and more traffic is being handled han ever before in history. 7AGF reports working the first district. His QRH is 154 meters. 7KZ is away on a trip to the coast. 7WP is QSO all parts of the state and will be on all summer. 7IT is heard quite often. He worked Alaska 7AEB recently. 7ACI is on regularly and handles lots of traffic. He is one of the most reliable stations in the state. 7ZL has been on the air in the early A.M. Lately 7CO takes second place in traffic handling for the first time in many months. 7ACI holds first place this month.

Traffic: 7ACI,127; 7CO,113; 7TO,42; 7AGF,37; 7WP,33; 7IT,31; 7ZL,31; 7KZ,25; 7ZU,14; 7ZF,4.

PACIFIC DIVISION
M. E. McCreery, Mgr.

With the oncoming of summer, radio activities have taken their usual slump, still there are a few who continue to stand by the key and keep traffic moving. Activity is centered around Los Angeles with about the same number of stations on the air as is heard during winter.

One of the most consistent stations this month is 6BRA. 6PL continues to do good work. 6AGK deserves considerable credit for his fine DX. All his apparatus is home-made and presents quite a contrast alongside the set where several hundred dollars is invested. 6CGW has installed a remote control so that he can work the east coast without getting out of bed. 6BRF has taken on a Y.L. as 2nd trick opr. Her voice on fone is very nice indeed. Of particular mention is the robbery that

occurred at 6ALC, the Santa Ana Radio Club. About $400.00 worth of transmitting and receiving apparatus was stolen. Mott is busy fishing.

CENTRAL CALIFORNIA:—A new route to the west has been opened up through 6BCL. He has a schedule with 6CEU in the Hawaiian Islands, working Wednesday, and Saturday nights. 6CEI and 6CIE report working him, also. The in-land route north and south is through 6AME, 6FY, 6BGH and 6ZX. The coast route is through 6BCL, 6BSJ, 6CEI, 6ZAH, 6ZAU, 6NX, then to San Francisco or the Bay cities through 6LV, 6AWT, 6CHL, 6AFZ and others. The cities of Oakland, Berkeley, the Alameda, are divided into districts and an O.R.S. in each district, this insures the prompt delivery of traffic. The route to the Valley and east is through ..ZX. 6HP, 6DC, 6BCU, 6EW, and 6GF. 6CRO-6CKC, acting station for the Western Radio Amateur Association, was installed at the Berkeley Fair, and handled traffic for the Fair. 242 messages were handled.

NORTHERN CALIFORNIA:—Organization is not computed yet.

In addition to the above report the D.M. would like to say that organization is rapidly being completed throughout the Pacific Division and several new O.R.S. stations have been appointed. The list is as follows: 6AFG, 6BEG, 6AAO, 6BRA, 6ALG, 6BRF, 6MH, 6BVG, 6PL, 6ZH, 6TU, 6ZX, 6CHX, 6ADT, 6CNH, 6AKQ, 6ALK, 6RWP, 6QJ, 6BLW, 6ZP, 6GT, 6NB, 6CAE, 6CBB, 6AGK, 6US, 6CMS, 6AJI, 6ZAT, 6ZAU, 6CKC, 6RMV, 6LV, 6CJV, 6BCL, 6ATZ, 6AOR, 6CDP, 6CLZ, 6AFZ, 6CGL, 6NK. The following appointments for the Pacific Division have been made as far as personnel is concerned other than O.R.S. stations: S. F. Wainwright, 6BVG, A.D.M. Districts No. 1, 2, and 3. B. R. Cole, 6ZAH, A.D.M. Districts No. 4, 5, 6, 7, and 8. Lester Picker, 6ZH, D.S. Dist. No. 1. D. C. Brockway, 6PL, D.S. Dist. No. 2. L. Mott, 6XAD, D.S. Dist. No. 1A. Harold Bender, 6CNH, Dist. No. 2, C.M.—LONG BEACH. R. Martindale, 6AAO, C.M.—LOS ANGELES. B. Sawyers, 6XAS, C.M.—SAN BERNARDINO-IMPERIAL. Chas. Hisserich, 6QJ, C.M.—SANTA MONICA-VENICE-OCEAN PARK. R. J. Paerves, 6BWP, C.M.—SANTA ANA. R. A. Hancock, 6ALK, C.M.—ORANGE COUNTY, except Santa Ana. 6ZP, C.M.—RIVERSIDE COUNTY.

Traffic: 6CHE,35; 6CHL,30; 6AWT,36; 6AUU,7; 6CLS,6; 6AMS,5; 6BFY,6; 6CMM,28; 6ADM,5; 6BQI,4; 6CPW,6; 6APH,1; 6CKF,10; 6ZAU,68; 6ZAH,41; 6CLZ,18; 6CDP,2; 6; 6CGH,13; 6CKC,68; 6ZX,50; 6CRO,242; 6FY,14; 6BCH,10; 6NX,8; 6CEI; 6ALK,10; 6CNK,6; 6BWP,2; 6AGK,50; 6TS,15; 6QY,6; 6CAE,40; 6AFG,72; 6MG,35; 6PL, 157; 6AAO,144; 6BRA,274; 6APK,1; 6ALG,7;

ROANOKE DIVISION
W. T. Gravely, Mgr.

The usual summer slump is with the division although a few messages got through. The new quiet hours has worked a hardship on the gang and several have quit for good. Brace up, gang, "every cloud has a sliver lining." Some of the gang have changed over to inductively coupled sets and several have put in the four coil Meissner, although the radiation drops some. From all reports the inductively couped sets are the "berries." 4TJ has worked west coast twice using two 201-A tubes input, 30 watts, 60 volts. Daylight schedules are helping out some in the work. 3BID recently logged two stations supposedly in Denver working between 2:30 P. M. and 3 P. M. If one of the "hams" had not stopped to choke the baby no doubt 3BID would have found out the QRA for us. We have no report from West Virginia, something unusual—too hot!

Traffic: 4 JR,235; 3BMN,104; 4SU,53; 4MI,52; 3CKL,51; 4BX,33; 4EA,25; 4FT,25; 3MK,15; 4SX,14; 4RW,12; 4GW,8; 4KC,7; 4OU,3; 8AUU,2; 4JM,2; 4NX,1.

ROCKY MOUNTAIN DIVISION
N. R. Hood, Mgr.

Things have slackened up some during the past month. QRN has been heavy, but stations are sticking it out just the same. A few stations have been off the air for some reason or another, but it is only a temporary condition, probably due to hot weather.

UTAH:—Salt Lake has some active stations in 6CSD, 6CRB, 6CRR, 6CRS, 6CQI,, 6CSB, and 6RV. Most of them using 5'ers, but they get out pretty well. Outside of 6RV, phone testing seems to be the craze now. 6BUH is rebuilding his outfit. 6CBU will be off the air until fall, having sold his entire set. 6RM is sticking in a master oscillator set. He is the leader in traffic this month.

Traffic: 6RV,5; 6ZT,2; 6CBU,18; 6RM,91.

COLORADO:—Traffic through Denver has been moving poorly last month. The southern part of the state is well organized and traffic is holding up fairly well. The emergency railroad route from Casper, Wyoming to Texas is via Denver, Colorado Springs, Fowler, La Jacinto, and Trinidad. This route is open day or night during storms or other emergencies.

Traffic: 9AMB,170; 9RUN,3; 9CAA,154; 9CJY,3; 9EEA,10; 9AZG,2; 9BVO,2; 9CDE,19; 9CHT,57; 9CLD,18; 9DFH,20; 9EAE,61.

WEST GULF DIVISION
F. M. Corlett, Mgr.

Yep, SUMMER is here! Just too blooming hot to stick it out in a shack. Only 33 stations report this month for the entire division. They handled a total of 631 messages. Daylight routes are being worked up and a number of them are working.

No reports received from the A.D.M's in charge of Oklahoma or New Mexico.

5ZAZ is in Tampico and he intends to listen for hams from 4 to 7 each morning.

H. T. Mapes suggests no QSR into Mexico for a while. QRX on Mexico traffic until a "clear" signal is given. MIM!!

NORTHERN TEXAS:—Along with the D.M., about half the stations in the section seem to be taking a vacation—that is they failed to report at all for the month. (Better watch this—that's the easiest know way to lose an O.R.S. appointment. —A.D.M.) The rest of the gang seem to already have their stations under the process of re-construction, or state they intend to take this action during the coming month. Traffic is moving on daylight schedules.

Traffic: 5HY,48; 5IL,20;5AAO,8; 5NW,7; 5ADH,32; 5AQC,5; 5DC,5; 5FC,52; 5VU,50; 5AGH,18; 5SD,42; 5CT,44; 5AES,9; 5OQ,11; 5ALD,7; 5ABW,12; 5KX,3; 5AJT,22; 5AJJ,18; 5JH,6; 5QI,26; 5BD,18; 5AGQ,17.

SOUTHERN TEXAS:—QRN has been very strong and stations have been so handicapped that traffic has decreased very much. 5XAV has been practically shut down until September. The following stations are in operation. 5BO, 5XAQ, 5EZ, 5FT, 5ALR, 5WP, and 5KG, 5VL, 5AJZ and 5ZAE are off temporarily. 5KQ has worked 6XAD on 15 watts. San Antoni's amateurs are planning a Trans-Texas Relay (Daylight). They have been very successful in various trans-city relays in accuracy and record time.

Traffic: 5VO,14; 5VL,1; 5KG,13; 5UX,27; 5WP,1; 5EZ,27; 5XAQ,35; 5XAV,5; 5ADI,13; 5GE,15.

CANADIAN SECTION
A. H. K. Russell, Can. Gen. Manager

The summer has put a severe dampener on amateur activities in Canada and there are not many of the stations heard last winter still on the air, at any rate with anything like the regularity of some months ago. It is however anticipated that the sailing of the "Arctic" for the north will renew the activity of the amateurs in the short wave field.

Last month's principal event was the Canadian trip of British 2NM, who while in North America visited the Canadian Cities of Halifax, Montreal, Toronto, Winnipeg, Moose Jaw and Vancouver, at each point meeting the local relayers and in some cases chatting personally with men whom he had worked through three thousand miles of air. Mr. Marcuse sailed for England delighted with his trip and

hoping that he would be able to work every amateur that he had seen while in Canada and those of us who met him are determined to have a good try at it.

The Postal strike of the middle of June in Canada seriously inconvenienced the receipt of reports from the various divisions and accordingly little information is forthcoming of conditions in the various divisions.

The publicity end of the League in Canada is slowly showing results but it is very hard pushing to get any amateur information published particularly by Eastern papers who are short-sighted in believing that their readers are only interested in dope on broadcasts.

The sailing of the Arctic has been postponed for a week or so owing to the backward season in the north with the result that the ice conditions around Greenland are very bad and to sail earlier would only mean that the ship would be tied up for a long period in the north by ice fields. The Arctic will likely sail around the beginning of July but will be on the air for test purpose before that time and by the time that this is in print many amateurs will no doubt have worked her. The latest information from Quebec where she was being fitted was that all the apparatus had been installed and the aerial erected but that no steam was available for power.

The Canadian General Manager would appreciate expressions of opinion from all amateurs in Canadian about a national convention to be held, say, at Winnipeg, next winter. What does everybody think of that and how many think they can go? Please write and let us know.

MARITIME DIVISION
W. C. Borrett, Mgr.

The following is a list of the O.R.S. certificates issued to date: 1BQ, 1DD, 1EF, 1BV, 1BZ, 1EI, 1AF, 1EB, 9AK and 1AR. 1BV's certificate has been called as he is unable to operate for the summer, owing to business. All O.R.S. holders are reminded that they must report to their A.D.M. or C.M. by the 25th day of each month at the latest. Failure to do so will mean cancellation of O.R.S. certificate. It is the intention of the D.M. to issue O.R.S. certificates only to those stations that prove that they are worth it. A dozen reliable stations are worth having.

Montreal and other upper Canadian stations are our chief link these days, although daylight time is making radio operation in the division rather hard, but nevertheless, quite a few stations are on each night. Only two European stations have been heard. g2OD and c1BQ hooked up for a short while early in the month and f8BF and c1AR were QSO for a short while one evening toward the end of the month. Very little European traffic being handled as no other Europeans seem to be on the air of late.

Newfoundland will soon be heard from. Mr. Loyal Reid of St. Johns, has installed a 100 watt set under the call of 8AR, and intends to establish a relay station to handle amateur traffic from England and the rest of he Maritime Division of Canada. Jas. Moore, Jr., 8AW, of Carboneer and another station, 8AY, are on the air also.

New Brunswick is forging ahead. 1 ET is very QSA and is working all parts of the division. Fredericton, N. B. is the home of two new stations, 1AN and 1AM. 1AB is on the air and works 1AF on schedule. 1DN is conspicuous by his absence. How cum? All N. B. stations please report by letter to T. B. Lacey, c/o N. B. Power Co., St. John, N. B.

Prince Edward Island still remains prominent as the home of 9AK and 1BZ. 9AK is an O.R.S. and eligible for initiation into ROTAB next time he visits Halifax. Hi. 1BZ has been reported by g5JX, Scotland. (FB,OM.).

Nova Scotia is coming along slowly, Halifax, the centre, has had several changes. 1DT is off the air for good, having sold his set. The new owner, John Young of Dartmouth, will make a good substitute, however, and is a strong A.R.R.L. booster. 1BV is traveling and cannot be relied upon for some time. The mighty 1AR, otherwise known as "Joe" is the star for this month. He has handled 36 msgs, and reports exchanging sigs with "R"-CB8, also with f8BF and VDM, Canada's Arctic Expedition. By the way, gang, his monthly reports are always on time and in perfect order. (FB, Joe—D.M.) 1AQ has done good work in addition to establishing a Halifax meeting place for the gang. 1BQ has handled 35 msgs and works on schedule with his brother at u1JF Boston nearly every night. 1EB our Publicity Manager, is one of our most reliable stations and with 1DJ, has developed into a regular owl. Both have excellent D.C. notes. 1DF, the boy wonder, has spent most of the month on building a new type transmitter. A little more traffic handling would be in order again, OM, if possible. 1DD has not been on much of late. Tired out from last winters work, will be on more now. 1DQ is also conspicuous by his absence. He is espected back in the fold soon. 1EF, Arthur Dalton, the C.M. for Halifax and his second op. C.P. (Hi) are right on deck. Wish we had a few more ops like CP. Two new stations are expected on soon. Laurie Smith of Yarmouth and G. Robertson of Seal Island are getting the goods together. The sooner the better. Many new members are reported this month. All members are again requested to write to the A.D.M., if in N.B. or P.E.I. and to the D.M. if in N.S. (excepting Halifax) by the 25th of each month at the latest, in order that a report of their radio activities may be accurately reported to QST each month. *Please.* 1AE of Glace Bay is reaching out well and 1AW another Cape Breton station has come to life. (FB, 1AW a fine op., fills a few necessary links for Newfoundland traffic.)

Traffic: 1AR,36; 1BQ,35; 1EF,5; 1EB,5; 1DJ,4; 1DD,6; 1BZ,3; 1EI,8; 9AK,11; 1AF,1.

ONTARIO DIVISION
C. H. Langford, Mgr.

Radio in general seems to be taking an easy time. Reports are very few in number, owing possibly to the Postal strike. The only districts to report were the Central and Eastern Ontario districts, and as the Central Division came late by telegraph, it did not contain a great deal of news. However it shows the right spirit. Individual traffic figures of course could not be given, the total for that district was 233.

Eastern Ontario reports a falling off in activity, due possibly to the summer season. From Ottawa news arrives that 3AFP and 9CC are helping to break the summer theory. An oldtimer in 3NX has recently returned from England and will be heard from shortly. Welcome OM. Don't forget fellows that VDM the CGS Arctic will be well on its way north by the time this comes to you. Of interest to some, is the fact that the "Arctic" goes as far north as the Bowdoin every year. The call is VDM, the wave 120 meters, 48 cycle note. 3ACO leads in traffic reports and is doing good work in the district. Other station reports are NIL.

Traffic: 3ACO, 85; 3IA, 74; 3XN, 12; 3ACY, 12; 3WV, 22; entire Eastern Ont., 121; entire Central Ont., 233.

QUEBEC DIVISION
J. V. Argyle, Mgr.

Traffic has been very light during the past month though there is no dropping off of stations, due, simply to summer. 2BN has gone to sea, but 2BG has resumed traffic handling after recovering from a bad accident. 2BE and 2CG are still remaining almost exclusively on 132 and 127 meters, respectively; the higher wave communication being maintained by 2FO, 2DO, 2CT and 2FU. Interest has been greatly revived by the starting up of the SS "ARCTIC" VDM. This division is sworn to be outdone by none if its the matter us using short waves that will ensure real communication. European and direct-to-Winnipeg schedules have lapsed due to the rotten conditions.

(Concluded on page XVI)

How To Get "Repeats" or "Fills" on Messages

By F. H. Schnell, Traffic Manager

THERE seems to be considerable misunderstanding as to how the missing part of a message—commonly called "repeats" or "fills" should be secured when part of a message is lost through interference or fading. This is something of interest to all amateurs, and the A.R.R.L. proposes a method that should be standard practice in the amateur fraternity because there has been a lack of understanding on this particular point. Some amateurs handle it one way and others another—every one has had his own idea and the result has been a waste of time and much unnecessary conversation over the air.

To get the idea over in the best way, it will be necessary to use some examples. Let us suppose we have a complete message, numbered in accordance with the new A.R.R.L. practice of numbering as explained in June *QST*. Here is the message:

VANCOUVER WASH 7BJ NR 65 JULY 15 CK 35
TO HOWARD F MASON
QST HEADQUARTERS 1045 MAIN ST
HARTFORD CONN
THE GANG OUT HERE HAS NOT DONE ANYTHING WITH A BEVERAGE WIRE SINCE YOU LEFT BUT A FEW OF THE FELLOWS ARE USING BEVERAGE WIRES AT THEIR OWN STATIONS WITH GOOD RESULTS DURING THE SUMMER
GEORGE STURLEY

Now let us suppose 7BJ starts that message to Hartford via 7ZU. 7BJ calls 7ZU in the regular manner (see Rules & Regulations of the Traffic Department) and 7ZU answers 7BJ and tells him that QRN is bad, but that he (7ZU) will try to take the message. 7BJ then starts transmitting, but because of heavy QRN, 7ZU has a copy which looks like this:

VANCOUVER WASH 7BJ NR ?? JULY 15 CK 35
TO HOWARD F ???
?? ??QUARTERS 1045 MAIN ST
HARTFORD ????
???? HAS NOT DONE ANYTHING???? WIRE SINCE YOU LEFT BUT A FEW OF THE FELLOWS ARE USING ??? STATIONS WITH GOOD RESULTS DURING THE SUMMER
GEORGE STURLEY

The ?? indicate the parts of the message which 7ZU was unable to copy and it will be necessary for him to get "repeats" on the missing parts. 7ZU has enough copy not to ask for a complete "repeat" of the entire message, so he must indicate to 7BJ just what parts he wants repeated and not what parts he has copied, which is done by some amateurs.

In all practice, the question mark (?) (- - — — - -) is used to indicate that something is not understood, and particularly does this apply to radio. After studying the message for a few seconds, 7ZU goes back after 7BJ, but he does not QSL for the message. Instead he may say "part received pse rpt" which means "Please repeat the words where I am using the (?) (- - — — - -)." This is what 7ZU would transmit back to 7BJ:

NR ?? JULY —- - - — HOWARD F ??
QUARTERS 1045 —- - - — HARTFORD
?? HAS —- - - — ANYTHING ?? WIRE
—- - - — USING ?? STATIONS

While 7ZU was asking for the "repeats or fills" in the message, 7BJ would underscore the words which "fill in" between the last word correctly received and the first word which was picked up after the interruption—which 7ZU has indicated by the (??).

After 7ZU has finished his transmission, 7BJ looks over the underscored words, and here is how he would transmit the "repeats or fills" to 7ZU.

NR. 65 JULY —- - - — HOWARD F
MASON QST HEADQUARTERS 1045
—- - - — HARTFORD CONN THE GANG
OUT HERE HAS —- - - — ANYTHING
WITH A BEVERAGE WIRE —- - - —
USING BEVERAGE WIRES AT THEIR
OWN STATIONS

The underscored words are the "repeats" "fills" which 7ZU asked for, and in order to make continuity of copy, 7BJ transmitted a word or two before and after the "repeats' 'or "fills" requested by 7ZU.

The same form holds true, whether it is one word, a part of a word, or several words. Usually, it is better to give two words before and after the interruption as a surer way of getting just what you ask for in the repeats.

The above form applies in instances where some part of the message has been received from the very beginning. But when the beginning of a message has been lost, especially the very first word, there is nothing or no way by which you can indicate the last word you received before the gap. This calls for a slight change in form.

To ask for a "fill" or "repeat" on the beginning of a message is done this way: Tell the transmitting operator what you want by transmitting back to him "RPT MSG FM ??" and then give him the first two or three words you received. This lets the transmitting operator know that you want him to start the message again. (See June *QST*, page 26, "How to number messages", and the preamble.)

When the last part of a message is lost, it is only necessary to give the last two or three words you received followed by "?? K", meaning that you want the last part of the message or the words after those which you have sent back to the transmitting operator.

Calls Heard

When preparing a list for QST, it is essential to observe the following rules:

1. List the calls neatly on a separate sheet of paper with a line of space between lines; do not embody them in a letter.

2. Arrange the calls as they will appear in *QST*: across the page, numerically by districts, alphabetically in each district, Canadian and foreign calls listed separately, state whether spark or C.W., and give period of time covered by the list.

3. Forms close on the fifth of the month preceding the date of issue of *QST*. Make your lists cover the period from the first of one month to the first of the next if possible, but don't let your list come in late.

4. List only calls over 500 miles distant.

HEARD DURING JUNE
unless otherwise specified

L. H. Thomas, 6QB
33 Harpenden Road, West Norwood, London, Eng.
(period not stated)

1abf, 1agh, 1aia, 1ajp, 1akl, 1alj, 1bbo, 1bcf, 1bdi, 1bes 1bsd, 1btr, 1cak, 1ccx, 1dq, 1bf, 1jv, 1rw, 1sw, 1xah, 1xak, 1xar, 1xat, 1xm, 1xw, 1xj, 2agb, 2awf, 2awl, 2avv, 2bt, 2by, 2bqh, 2cis, 2fs, 2ts, 2xi, 3aa, 3au, 3bv, 3bg, 3bjy, 3eh, 3mb, 3ot, 3pz, 3vw, 3yo, 4hy, 4hz, 4eq, 4jo, 4je, 4hn. 4hs, 4og, 4xe, 8dkb, 8qm, 8sl, 8xbh, 9xw.
Can.: 1af, 1bq, 1dd, 2bg, 2bn, 9bl.
Receiver, o-v-o, often without antenna or earth.

S. K. Lewer, 6LJ.
32 Gascony Ave., W. Hampstead, London N.W.6, England
(May 25th to June 15th)

1aja, 1bgf, 1cmp, 1te, 1xah, 2cei, 2cfb, 3xab, 3bg.
Can.: 1ar, 1bq, 2be. 2bn, 2bq, 9ak.
Argentine: Cb8 (Hrd on single tube).
Japan (?): JMJK.
Wud appreciate QSLs. All crds answered.
F. B. Gang: urs still coming in QRK.

Arthur H. Fielding, 2AUI, ex-2IJ.
32 Stanley Ave., Birkdale, Lancashire, England.

May 29, June 1, 2, 7: 1ae, 1axa, 1bes, 1bf, 1cf, 1jf, 1xae, 1xaq, 1xw, 1xz, 2hm, 2zl, 3fc, 4sa, 4xh, 8bqj, 8qm, 8tt, 9ak.
Can.: 1bq, 1dj, 9ak.
Argentine: cb8.
Low loss tuner and one valve used. Pse QSL card.

R. L. Royle, 2WJ
Southwold, Aldermans Hill, Palmers Green, London, N-13, Eng.
May 20, June 1, 2, 7, 11 only).

1bei, 1xah, 1xam, 1xj, 1xu.
Can.: 1ar, 1bq, 1dt, 2cg, 3bq, 3xn, 9ak.

F. R. Neill,
Chesterfield, Whitehead, (near Belfast) Ireland.
(During 1924)

1aja, 1ajp, 1alj, 1auk, 1bmp, 1xam, 1xar, 1xw, 2bqh, 3vw, 37x (?), 4xe.
Can.: 1ar, 9bl.
Would be grateful for cards. Receiver, single valve.

Santangeli Mario, 1ERI
April-May
(5) S. Eufemia 19, Milano, Italy

American: 1aia, 1auf, 1nmf, 1ke, 1xw, 1xab, 1xar, 2cxl, 3xo,9ak.
Can.: 1ar, 1bq, QRA?
Belgian: 1cf, 2na. 4aa?, 4c2. 4mg, 4qs. 4ww, pz, w2.
Danish: 7ac.
Dutch: 0ba, 0hd, 0kn, 0mr, 0ms, 0px, 0xf. 0xp, 0xq, perr.
English: 2dr, 2fc, 2fn, 2ih. 2kc, 2kz, 2mg, 2na. 2nw, 2pj, 2qk, 2sa, 2sh, 2ta, 2uf, 2uw, 2vn, 2vs, 2vw. 2wy, 2xg, 2xo, 2xav, 2br, 2bt, 2cu, 5cu, 5fs, 5hn, 5jx, 5kg, 5ku, 5lf, 5ls, 5nc, 5nw, 5ot, 5pu, 5qm, 5qs, 5qv, 5sh, 5sz, 5wm. 6by, 6fg, 6qa. 6qv, 6rw, 6tm, 6ud, 6xx, 6yg.
Finnish: 2nm, (2000kms, DX transmitting).
French: 500 miles and below, 68 stations.
Luxembourg: Op.
Spanish: 9aa 4au?
Swedish: sald.

R. Deloor
26 Ave. Du Mont-Kemm el, Brussels, Belgium.
(January, February and March)

1bp, 1dq, 1ii, 1mo, 1sw, 1ajp, 1ajr, 1auk, 1aur, 1bcr, 1bdi, 1boq, 1bsd, 1cmp, 1xj, 1xm, 1xw, 1xz, 1xam, 1xae, 1xar, 1xah, 2agb, 2age, 2brb, 3bw, 3mb, 3bwt, 3ot, 3bo 3bji, 4by, 4xc, 4xe, 8egu, 9aou, 9ckw, 9bl.
Can.: 1bq, 2bn.

Major R. Raven-Hart, Los Andes, Chile.
May 19 to 31

1xae, 1xw, 3xi, 4xx, 8xs, 8xbp.

Geo. Blake, 3AD.
Blaketon, Greymouth, New Zealand.
(April 14—May 22)

5ajj, 6aao, 6ado, 6adt, 6alu, 6avj, 6nx, 6nz, 6bur, 6egs, 7fq, 8apw, 9ku.

C. D. Maclurcan and Jack Davis aboard R.M.S. Tahiti on voyage from Sydney to San Francisco and return.

Feb. 28: Aust., 2jm. 2ra, 2dk, 2uw.
Feb. 29, Daylight. 330 miles from Australia, Aust., 2bb.
Feb. 29, Night, 430 miles: Aust., 2bb. 2jm, 3by, 3er, 2zn, 3bm, 3jh.
N. Z., 1ya, 2ap, 1aa.
March 1, 850 miles: Aust., 2jm, 3af. 3jh, 3ju. 3jf, 2ij, 3ar, 2am, 2ra, 2jn, 2yi, 5bq.
N. Z., 2ab, 1ym.
Mar. 2, 1200 miles: Aust., 3bm, 2ds. 2iy, 2jm, 3bd, 2ij, 3ju. 2kc, 2fa, 3bg.
N. Z., (2ap), 3ad, 1aa, 1ao, 1ae.
U. S. A., 8ze, (6000 miles).
Mar. 5, 1600 miles: Aust., 3bd.
N. Z., (2ap), 4kf. 3af, 2aq, 2af.
U. S. A., Dist. to 'Frisco: 5,600 miles. kgo.
Mar. 5 (No. 2.): Aust., 1830 miles, 3bh, 3by, N. Z. (Dist. 1200 miles), (4aa), 2ap (wkd.), 3bd.
4ab, 4ar, 4ck, 2yg.
U. S. A., 'Frisco, 5300 miles, 7abz, 6zbg. 7npw. 6nb, 6ka, 6blw, 9ccs, 6alk, 6nw, kgo.
Mar. 6:Aust., 2200 miles. 3jh.
N. Z., 1600 miles, 4aa, (2ap), 2ag, 1ac. 2ab, 3af.
U. S. A., 'Frisco, 2500 miles, 6any, 6adc?, 6bk, 6acb, khj.
6adk, 9dk, 9dr, 4je, kgo.
Mar. 7: U. S. A., 9dwn, 6ew, 6aby, 4zav, kgo.
Mar. 8: N. Z., 2800 miles, 1ai, 4aa.
U. S. A., 'Frisco, 4800 miles, 8ll, 6abd, 6eng, 7ah, 8zz. 1bom, 7ck, 5al. 6rf, 5pk, 9bq, 6rfx.
Mar. 10: N. Z., 3400 miles, 4aa.
U. S. A., 4100 miles, 7fq, 6ahp, 9eky, 7aq, 6ah, 9bz, kfkx.
Mar. 11: N. Z., 3800 miles, 2aq, 4aa, 3af.

U. S. A., 'Frisco, 3300 6ql, 9bly, 6arf, 6xc.
Mar. 12: U. S. A., 'Frisco, 2900 miles, 6edc, 9and, 9bq, 9cju, 6afm, 6do, kgo.
Mar. 15: N. Z., 3400 miles, 2aq.
Mar. 16: U. S. A., 'Frisco, 2200 miles, wgy, wgaf, kgo khj.
U. S. A., 'Frisco, 2200, wgy, wgaf, kgo, khj.
Mar. 17: U. S. A., 'Frisco, 1700 miles, kfi, 5ft, 6avr, 8aig, 6bwd, 8cik.
Mar. 18: U. S. A., 'Frisco, 1350 miles, 6ahp, 6bnt, 5gt, 5aim, 3hh.
Mar. 19: U. S. A., 'Frisco, 1000 miles, (6akw), 9cxx, 5um, 6avy, 6fp, 6alk, 6cdv, 6anb, 6ra, 6chu,
April 1: U. S. A., 6bic, 6ccy, 9tc, 6cpo, 7co.
Mar. 19: U. S. A., 'Frisco, 1000 miles, (6kn). 6ads, 9acy, 6xad.
April 3: U. S. A., 'Frisco, 3000 miles, 1 cpi, 1cjm, 6axi, 6ccy, 6zbt, 6ahp, 6bez, 6aja, 6afa, 6bri, 6chl, 6ao, 6cb, 6wp, 6bla, 6la, 7em, 8czz, 6ur, 8kja, 9ckw, 9day, 9cjy.
April 4: U. S. A., 'Frisco, 3300 miles, 1bie, 5adb, 5cuy, 5app, 5ajj, 5adb, 6hlw, 6bnt, 6akm, 6bwp, 6cej, 6go, 6bno, 6emu, 6pu, 6ego, 6pn, 7uzb, 7dr, 6jn, 7fr, 7iw, 7fo, 7adg, 8di, 8cxm, 8dbm, 9day, 9ej, 9ayj, 9my, 9ie, 9clq, keo, kfst.
N. Z., 2700 miles, 2ar.
April 5: N. Z., 2200 miles, 2ad.
Aust., 4100 miles, 3bd.
N. Z., 2200 miles 2ad.
U. S. A., 'Frisco, 4300 miles, 1al, 6dur, 4ahg, 6blk, 6blw, 7lm, 8txc, 9cr, 9cdl.
April 6: U. S. A., 'Frisco, 4700 miles, 6qj, 6agk.
April 8: U. S. A., 'Frisco, 5300 miles, 6bwp, 5qls,
April 7: U. S. A., 'Frisco, 5000 miles, 9cly. 6aek.
April 9: N. Z., 1200 miles, 3af.
U. S. A., 'Frisco, 5700 miles, 9cp, 1mo.
April 10: Aust., 1900 miles, 3bm, 3bd.
N. Z., 900 miles, (2ap).
U. S. A., 'Frisco, 5200 miles, kgo, kdka, (6400 miles, 95 metres daylight), 5be, 8ry, 1vl.
April 12: Aust., 1700 miles, 3bd.
N. Z., 600 miles, 2ac, 2aq, 2aa, 2ar, (2ap), (4aa), (2xa).
U. S. A., 'Frisco, 5600 miles, 9afy, 9cun, 9dwn, 6add, 8aj, 9ciu, 9eak, 6agk, 7sh, 8sv, 6zbf, 6aaq, 6zba, kdka (6600 miles).
April 13: Aust, 1500 miles, 2hf, 3bd, 3ju.
N. Z., (2xa), (3at), (2ap), (1ax), 1aa).
U. S. A., 'Frisco, 5800 miles, 7em, 7sf, 6nb, 7sh, 7au, 6ark, 6aol, kdka, (95 metres, 6800 miles).
April 15: Aust., 1200 miles, 2yi, 2bc, 2ij, 3bh, 2yg, 2bf.
U. S. A., 'Frisco, 6000, 4ck, 6uk, 6afi, 6rn.
April 16: Aust., 900 miles, 3qw, 2jm, 2ij, 2lo, 2zz.
N. Z., 2ab, 3af, (1ax), (4aq), 4ck.
April 17: Aust., 520 miles, 2so, 2yg, 2ij, 2zz, 7aa.
N. Z., 2ad, 2ab.

A. F. Emrich,
U. S. S. N-3, New London, Conn.
(During May)

2ah, 2aw, 2bt, 2fu, 2lc, 2lo, 2mr, 2qh, 2xq, 2adk, 2amf, 2aqr, 2atz, 2bmr, 2bsc, 2bti, 2btj, 2buc, 2bxf, 2byn, 2byw, 2ckp, 2cmg, 2cmh, 2cpd, 2cqh, 2ctf, 2ctn, 2cvj, 2cwo, 2czh, 3av, 3cj, 3fb, 3fs, 3gc, 3ho, 3hg, 3mf, 3oh, 3pf, 3ph, 3pi, 3tj, 3tt, 3vw, 3vh, 3wr, 3yv, 3ahg, 3apv, 3bdu, 3bgt, 3bmn, 2bug, 3btp, 3byv, 4ca, 4ft, 4gx, 4lj, 4oi, 4xb, 5ax, 5ft, 5la 5uk, 5alb, 5akn, 5amo, 6awt, 6bui, 6ceu, 6xad, calling pcll, 7ab, 7aj, 7cl, 7im, 7zu, 7akn, 8et, 8hj, 8pk, 8bt, 8xe, 8abx, 8adm, 8akk, 8akt, 8amq, 8bfe, 8bgw, 8bhm, 8bmh, 8bpk, 8bpv, 8brc, 8bvd, 8cpv, 8cpv, 8ewr, 8cyu, 8daa, 9ax, 9lk, 9vx, 9zt, 9aaw, 9adg, 9alv, 9aoj, 9aps, 9atj, 9bjg, 9bjo, 9btk, 9bwd, 9xs, 9cvs, 9dml.
English: 5at.
French: 8ab, 8bf.
Mexican:bx, bz, md.
Canadian: 2ak, 2bn, 2gn, 3bp, 2eo, 9al.

Canadian 3QO, Brantford, Ont.

4bz, 4dp, 4ed, 4ft, 4io, 4id, 4je, 4jr, 4mb, 4og, 4oi, 4pk, 4rf, 4ro, 4so, 5ac, 5aac, 5aeo, 5aht, 5az, 5ee, 5df, 5dg, 5ek, 5ft, 5gm, 5gj, 5ht, 5ja, 5mi, 5ml, 5ov, 5pv, 5uv, 5wg, 5zk, 6adf, 6bcl, 6cel, 6cix, 6cnc, 6kj, 6lv, 6pl, 6fu, 6tv, 6xau, 6xbc, 6xn, 6xar, 7afe, 7aek, 7agi, 7alk, 7aoc, 7eo, 7dr, 7ej, 7gb, 7gg, 7iv, 7jn, 7no, 7qt, 7zu.
Canadian: 1ar, 1ef, 1eb, 1bg, 4cw, 4dg, 4eo, 4er, 4fv, 5ch, 5cn, 5hh.
Mexican: bl.

Straits of Juan de Fuca
Canadian 5AY, River Jordan, B. C.
25 Miles West of Race Rocks

Canadian: 4ax, 4cb, 5dq.
U. S.:5aiu, 5amw, 5mz, 5rg, 6aaz, 6adm, 6afu, 6aja, 6alw, 6anx, 6aoh, 6aps, 6awt, 6bds, 6bnf, 6bny, 6bqd, 6cbu, 6ebw, 6edg, 6chl, 6emi, 6em, 6ew, 6fy, 6gu, 6rm, 6ry, 6ti, 6bu, 6zca, 6zef, 7aci, 7dz, 7iv, 7ln, 7mn, 7ob, 7ot, 7pj, 7wp, 8bmb, 9amb, 9bck, 9bkk, 9cju, 9eky, 9ejn, 9mc.

Norman H. Miller,
25 Phillips Street,
Providence, R. I.

4cp, 4ea, 4ez, 4gt, 4ku, 4mb, 4pv, 4rh, 4sh, 4tj, 4xe, 5aek, 5aik, 5ail, 5air, 5alz, 6ap, 5apc, 5gg, 5in, 5ir, 5ph, 5pl, 5qh, 6adt, 6agk, 6cee, 6cys, 6cgw, 7to, 9abc, 6ach, 9ary, 9ayd, 9bis, 9bko, 9blr, 9bnu, 9bpn, 9bqy, 9bxt, 9caj, 9cnb, 9cpz, 9cs, 9etr, 9cyb, 9dfz, 9dkq, 9doe, 9hn, 9pw, 9su, 9xaq, 9zt.
Canadian: 4er, 4dq, 4fz, 4io.

4FM,
Miami, Florida.

1aei, 1aja, 1amr, 1ar, 1are, 1arf, 1avl, 1axa, 1ayt, 1bbe, 1bro, 1bes, 1bie, 1bq, 1ccz, 1ci, 1cpv, 1er, 1gv, 1oj, 1rr, 1um, 1xae, 1xax, 2abs, 2awf, 2bgg, 2bgi, 2buy, 2cqz, 2cvj, 2ea, 2kf, 2mo, 2mu, 2rb, 2wr, 2xb, 2xl, 3aau, 3abb, 3ahp, 3agp, 3agv, 3apv, 3bay, 3bco, 3blu, 3bmn, 3bnu, 3buy, 3bvl, 3cbl, 3cjn, 3ckf, 3ckl, 3edh, 3hs, 3lg, 3ll, 3mf, 3oe, 3oq, 3sf, 3vw, 3xn, 3zo, 5aam, 5acm, 5ads, 5ajj, 5alz, 5amf, 5apo, 5aw, 5bp, 5ck, 5es, 5gi, 5gp, 5iz, 5mi, 5mo, 5nt, 5oq, 5ql, 5qy, 5ua, 5uk, 5ux, 5vo, 5zas, 8aab, 8abm, 8abq, 8agq, 8ajh, 8bdc, 8bmb, 8bnk, 8bos, 8brm, 8byn, 8cnu, 8cyi, 8dkj, 8doc, 8doq, 8er, 8jq, 8uf, 8uk, 8xs, 9amb, 9ayx, 9cew, 9cifi, 9cus, 9dbf, 9dlh, 9dlm, 9dnh, 9ekf, 9eky, 9es, 9mc, 9su, 9zt.

5VU, Frost, Texas

4ai, 4pv, 4tn, (5cc), 5cn, 6bdt, 6cgw, 6rn, 8afa, 8uk, 9aal, 9aau, 9aoj, 9axb, 9bfp, 9bkf, 9bkk, 9bet, 9avn, 9brd, 9bsb, (9cbk), dalite, 9cjm, 9cke, 9cym, 9czm, 9cii, 9dee, 9dlv, (9eeo), 9ekf, (9eky), (9ecb), 9clb, 9elm, 9em, 9ici, 9kr, 9ty, 9as,

---

5AFF, Martin Walters, Chattanooga,, Tenn.

1acb, 1aig, 1cpn, 1kx, 1om, 2aet, 2atz, 2cjr, 2uu, 3adb, 3cjn, 3gg, 3hs, 3ly, 3mo, 3zs, (4ai), 4an, 4cp, 4do, 4er, 4gn, 4ia, 4io, 4jm, 4jr, 4lp, 4mi, 4nj, 4pv, 4tf, 4tj, 4tn, 4xu, 4yz, 5aac, 5aam, 5aaq, 5aaz, 5aek, 5akx, 5apc, 5azs, 5ac, 5ax, 5ck, 5cn, 5ka, (5lz), 5ql, 5vo, 5vv, 6alg, 6cbf, 6cgw, 6cl, 6mu, 6zh, 7aek, 7akk, 7ks, 7zw, 8afm, 8bhg, 8bjv, 8bmb, 8dae, 8dep, 8ue, 8vq, 8vt, 9aaf, 9aaw, 9dlw, 9dml, 9bk, 9rc, 9wu.
Canadians: 1ar, 4cb, 9al.
Mexican: bx.

5ANY, Memphis, Tenn.

3buy, 3ly, 3zo, 4io, 4it, 4rr, 5acj, 5agz, 5aiu, 5alz, 5zas, 5aw, 5ck, 5ga, 5gi, 5js, 5lr, 5mi, 5mz, 5ox, 5ql, 5qy, 5rg, 5rm, 5sg, 5ua, 5uk, 5vo, 8aid, 8bmb, 8bmt, 8brc, 8brm, 8bul, 8cei, 8cga, 8cmx, 8cvx, 8cwu, 8czz, 8dpu, 8do, 8fm, 8rj, 8vt, 8tt, 8ze, 8zg, 9aaw, 9aal, 9abf, 9aci, 9acs, (9afy), 9aob, 9arf, 9ash, 9auy, 9azx, 9bex, 9bre, 9brk, 9bpd, 9bsg, 9btd, 9ccs, 9cdb, 9cek, 9cln, 9cmn, 9cog, 9cvs, 9dbf, 9dge, 9dhg, 9dlw, 9dqu, 9dsa, 9duc, 9dxs, 9bk, 9ee, 9mc.

6NB, 1588 W. 49th St.,
Los Angeles, Calif.
(Period not stated)

1tg, 1anf, 1anr, 1ary, 1asa, 1aur, 1bcr, 1bdj, 1cmp, 2eb, 2ph, 2wr, 2brb, (3ab), 3hg, 3hh, (3hs), 3bgj, 3bva, 4hs, 4io, 4qf, 4my, 4su, 4kz, (5az), (5be), (5cv), (5ft), (5ga), (5gj), (5hn), (5lr), 5mz, 5qg, 5adj, (5age), (5agz), (ahd), (aiu), (5amo), 6ceu, (7af), (7av), (7bj), (7co), (7ei), (7fr), (7fs), (7ft), (7gi), (7kk), (7mf), (7to), (7abb), (7abf), 7aio, (7ald), 7er, 8ku, (8vy), (8afn), 8ard, 8anh, 8anl, 8bmb, 8bpa, (8bwb), 8bwy, 8cvz, (8cwp), (8dbm), (9ca), 9gs, 9mc, (9vm), (9ql), 9abc, 9aep, 9ami, (alz), 9amp, (9ato), (9avg), (9axs), (axz), (9azp), (9bez), 9bis, (9bkf), 9blt, (9bly), (9bof), (9brk), (9bto), (9bum), (9bvv), (9caa), (9ccs), (9ccv), (9cde), (9cfk), (9cii), (9cji), (9cjy), (9ckj), (9ctg), (9cvo), (9daw), (9dug), (9dun), (9dwa), (9dxr), (9dyi), (9eae), (9eak), (9ebh), (9ecb), 9edo, (9eca), 9efh, 9egu, (9eky), 9evo.

7AKK, 592 E. 40th St.,
N. Portland, Ore.

(6bcp), (6cei), (6cka), (6gu), (6jp), 9agl, 9amb, 9aor, 9zt.
Can. 4aa, 4cb, (4io).

(Concluded on page XVI)

Radio Communications by the Amateurs

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

T.O.M. Speaks

Editor, *QST*:

Say son, give us a hand, will you? I received a letter from one of the Gang and he gives me no address. I cannot reply to him. He writes me about "Where the energy disappears", as per something I wrote on this subject some time back.* He has the champion answer all right, and it's a blamed shame not to give the thing to the rest of the crowd, so I am referring it to you here in the hopes that you will print it and it may meet his eye. Also, the rest of the gang will be interested in the information he offers.

He has a thing he calls a "Retardation Coil." He says it is not a "Choke Coil." To retard a current is evidently not to do the same thing to it as to *choke* it. It seems to be like some people. You can retard them, but sometimes the results are awkward when you choke them. So, rather than choke the current, and possibly get it all heated up, and unruly to some extent, he gently retards it. I wonder how in blazes he *retards* an electric current.

Then he says, "it is possible to retard the progress or time it takes certain high frequency currents to pass through it, and by a suitable number of these groups of coils and associated pieces of equipment, it is possible to pick up messages that have been floating around in the air for at least several months, and receive them again, just as if they were being received for the first time."

Now I ask you fellows, if that doesn't rank a Nobel Prize or a cast iron umbrella or something. To retard things so that they can be picked up out of the air several months after they were started, is like going back in the dark ages and living your life all over again. Thank gawd he cannot go back several years, or I would be arrested for the stuff I have sent out from my station in bygone times.

This gink is a real one, for he goes further, and says, "I have only been able to go back over past broadcast programs for about one year, and have accomplished this with several types of standard receiving sets, including a superheterodyne. I have also been able with suitable "inverters" to cause some of these programs to run backwards—" How about that, fellows? Got anything up your sleeves that will beat that much? How about taking some of KDKA's stuff that he squirted out a year ago and running it off hind side front? Some gay little program to listen to, I'll say.

If anybody's got a rubber key contact or a bakelite beefsteak that isn't working, here's a chance to consecrate it to a really worthy cause.

—T.O.M.

* "Rotten Problems" by The Old Man, pg. 52, February 1924 QST.

It Works—It Doesn't Work

419 Greeley,
Kansas City, Kan.

Editor, *QST*:

After reading the article by Mr. Grossman, 9AVS, in the April *QST*, I feel we are brothers under the skin as I, and I suppose every other ham, has had the same experience. In fact I have not been fortunate in having the good luck some others have.

I operated old 9LJ, a 1-k.w. spark that was heard on both coasts; but junked it during the war. I did not try my hand at transmitting again until a year ago. Since then I have tried every circuit known to humanity, staying up late at night and increasing my vocabulary considerably, but satisfactory results have not been obtained.

The first week it would not oscillate, even after staying up all night and nursing it like a sick child. But after that and to this day it has a kick like the renowned Missouri mule, and runs the five-ampere antenna off the panel. However, only once in a while does it get out any distance. The farthest it has been heard was 900 miles on voice, with loop modulation, reported QSA.

By touching the aerial or counterpoise with a screwdriver, you may draw a flame big enough to light your cigar, so you see the set is at least good for one purpose.

But success is sweet only when it is gained by hard work, and what is better than patience, well developed. It is this quality that has made amateur radio what it is—everyone striving to do his work well and achieve the goal of master of distance. It is this characteristic that has made the many tests that have been held a success. Instead of being quitters they worked on and success has been their reward.

More and more amateur radio is coming into its own and we are recognized as not just a bunch of small boys playing, but as an asset to the community. In every issue of *QST* there is something about how amateurs have assisted the railroads, the newspapers, the steamship companies, and individuals.

So when you feel tired and disgusted with your transmitter just buck up and try

again. I've been working with my set for over a year and have not received the hoped-for results—but have not given up as yet.

C. V. Entriken, 9WG.

Two Good Pieces of Advice

Wayne, Mich.

Editor, *QST*:

There are two points pertaining to amateur operating that the "reform wave" has not touched as yet.

Nr. 1 is the correct method of handling an ordinary straight key. In a great number of cases the operator has the key perched on the edge of the table, with contacts set very close, and pounds the key with his whole arm in midair. This makes "bum fists", and the op's arm soon tires if much traffic is handled. I have tried it myself, and find that the quality of the sending is bound to be lowered considerably. The way shown in the Junior Operator section of *QST* for July, 1923, on page 53 in *the only way* to handle a key. If it isn't, why don't railroad operators adopt some other style? Unless an operator desires a "glass-arm", he will do well to follow out the above article to the letter. It may take some time to get used to this form, but a quality fist is worth a lot.

Nr. 2: Why don't more ham stations use break-in? If we all had break-in systems QRM would be reduced greatly; more traffic could be handled in less time, and with less confusion. Calling could be shortened greatly, as the station called could come back just as soon as he got the caller's sign. Long QTA'S and QSZ-ing would be eliminated entirely—why, "radio heaven" would be pretty close at hand!

Such a system can be installed easily. A small one-wire antenna for receiving is all you need, left connected permanently to your receiver. The receiving antenna should be at as near right angles to the transmitting antenna as possible, and the primary circuit of the receiver should be left untuned so as to prevent undue absorption when working transmitter and receiver on the same wave. *QST* has published dope on break-in systems for a long time but few have taken advantage of it.

Well, it's nm hr, so I guess I'll QRX and watch for results. Hope a microscope or an Ultra-audible Microphone won't be be needed to detect them. Hi! 73 to the gang.

—Clifford Tunis, 8DLZ.

Calibrating Your Receiver

36 Central Ave.,
Audubon, New Jersey.

Editor, *QST*:

Here's a little stunt that some of the fellows might like to try some Sunday afternoon or during the quiet hours. There's nothing startling about it, but I've never seen it described before.

The idea is to calibrate your receiving set by using broadcast harmonics. Here's how. Pick up a harmonic from some broadcasting station whose wave you know. The harmonics will be found with your tube oscillating at one-half, one-third, one-fourth, etc., of their wavelength. For instance, suppose the station has a wave of 400 meters. The half wavelength or second harmonic will be at 200 meters exactly; another harmonic will be found at 133 meters, another at 100 meters, etc. The right number to divide by will easily be found by observation. The thing to do is to plot as many of these points as possible on cross-section paper, and then draw a fair curve through as many of the points as you can. The more stations and waves you can plot, the better, for the chance of error will be reduced.

There are four Class B stations near here, two on 509 meters and two on 395 meters. Thus it is possible to check one against the other. Three harmonics can be tuned in and measured from the 395 meter stations on my tuner and four from the 509 meter stations. Can also pick up harmonics from WEAF, WOR, KYW, and quite a few others. Altogether I have over twelve points on my curve.

After the curve is drawn, small inaccuracies can be remedied by checking as follows: pick out some fairly-nearby amateur whose wave is at least twice the minimum wave of your tuner. Note his wave from your curve, divide this by two, and look for his second harmonic on the resulting wave. If your curve is OK, his second harmonic can be plotted right on your curve. This process can also be worked in the reverse order: pick up a harmonic, find the wavelength of this harmonic from your curve, multiply it by two, and set your tuner on that wave. He'll be right there if your curve is correct. Practically the whole scale down as far as you wish to go can be checked in this way.

In order to check up this method of calibrating I listened for WWV recently and found his standard waves checked to within one meter of the calibration curve of my receiver, obtained by the above method. Most of the points I had were only one-half meter off, which is close enough for practical work.

It goes without saying that the coupling between the primary and the secondary, and also the tuning adjustments of the primary, must be fixed while the calibrating is being done, otherwise the results will be inaccurate. In my set I use an untuned primary with fixed coupling, and calibrate with the tickler set so the tube is just on the oscillating point. If there is any body capacity effect on your tuner it is of course impossible to get anything like an accurate curve, but all of these things apply to any other method of calibrating as well.

I'd be glad to hear from any of the fellows who try this method. 73.

—Geo. Grammer, 3AIH.

Regarding NKF Tests

DEPARTMENT OF THE NAVY
OFFICE OF THE SECRETARY
WASHINGTON

May 19, 1924

Mr. Hiram Percy Maxim, President,
The American Radio Relay League,
Hartford, Connecticut.

Sir:—

I have the honor to acknowledge receipt of your letter HPM:CIK of 7 May, 1924, offering to the Navy, the coöperation of the American Radio Relay League, in conducting short wave experiments. Such assistance will be of very considerable benefit to the Navy and I hope that the resulting exchange of information will benefit the members of your League.

The experiments on the part of the Navy will take place at the Naval Experimental & Research Laboratory at Bellevue, D. C. I am consulting with the Director of that Laboratory to learn his wishes in regard to the precise form of the experiments to be conducted. This information will be communicated to you in the near future.

Permit me, my dear Mr. Maxim, to express to you, and through you to the members of the League, the appreciation of the Navy for your offer to perform a service that will be of the greatest benefit to the Naval Radio Service.

Respectfully,
(signed) Curtis D. Wilbur,
Secretary of the Navy.

A Problem

342 Main Street,
Riverside, Calif.

Editor, *QST*:

I've been wondering ever since the advent of the use of "short waves" why it is that all of the notes of stations we hear on waves of about 160 meters and below are all A.C. I can't offer any explanation that seems feasible, so I thought I would write and see what the gang has to say about it.

I have carried on many tests with stations at distances varying from 15 to 2500 they say my note is D.C. when I am up on my 176 meter wave, but when I QSY to 150 meters, or even 165 meters, my note is immediately knocked to pieces and I get no reports other than "rectified A.C." You yourself have probably noticed that there are very few, in fact almost no stations on or below 150 meters that have pure D.C. notes. Now just why is that? Imagine my consternation the other day when I reported Canadian 4DQ's note as sounding like rectified A.C. without a filter and I received a reply QSL stating that he was using 550 volts of *battery* on the plate of his tube! His wave was around 145 meters. 6G—here in town experienced the same sensation when he reported Canadian 4A—as having a poor rectified A.C. note and received a QSL shortly after stating Canadian 4A—was also using battery on the plate of his transmitting tube. His wave was low also.

If any of the gang can offer a plausible explanation of why things happen as they do to one's note when lowering the wavelength I would certainly be pleased to learn of it.

—*Lloyd E. West, 6IV-6ZP.*

Hams Please Note

Walnut Grove, Calif.,

Editor, *QST:*

I am going to break forth with a few kicks and suggestions on QRM and the traffic situation. Of the various kinds of interference, I believe that from amateur fones is the worst. A good fone with DC plate supply is fine for some work but these are few. Most of the fones heard on the air are useless for satisfactory two-way communication.

Next comes unnecessary communication. It should possibly hold first place in the amount of QRM it causes. Under this heading we can place most repetition of messages, long calls without signing and long calls while working stations. When working a station that reports you "QSA vy" why on earth is it necessary to come back with eight or ten calls* signing an equal number of times and repeating this between every break or message? Then the messages are repeated two or even three times. Nothing should be repeated unless it is requested by the receiving operator. When working average relay station "1 R K" does the trick just as well in acknowledging for a message as anything else you can send, and saves a lot of time.

As for repeats and long calls; they are seldom necessary. A little more attention to quality of sending and less speed will put more traffic through than high speed jumbled key work.

Then we have testing, you know the kind, this home amusement stuff where the key is held down for a half minute or more between changes in adjustment just to see if the tubes are going to stand the gaff. A short dash and a glance at the meters will show you all you need to know in most cases. If not, hook up a dummy antenna, put a book on the key and burn up the tubes if you want to, but for heaven's sake don't shove it all on the air and make life miserable for everyone within a thousand miles.

Now comes CQ calling as a source of QRM. The CQ hound hurts himself more than others for very few will listen for the end of a long CQ. The CQ hound will die a natural death.

Then we have power line QRM and plenty of it. However, the power companies usually show a kindly disposition to remedy the situation. The only job is to find the location of the trouble and a little assistance on your part with a loop set will usually do the trick.

Last, but not least by any means, we have harmonics from broadcast stations. These are worse the shorter we go down on the wave, it seems, and there should be some remedy. Perhaps it is through the broadcast stations themselves.

Now we have the traffic situation and interference question summed up in one word; TERRIBLE! A glance at "Traffic Facts" by Schnell, will give you all of the dope.

No improvement will be forthcoming until every operator is made to realize that in accepting a message he assumes an obligation that MUST be performed, either by radio, land wire, or mail, within 48 hours. I can say that no message has ever been held at this station for over 48 hours and 90% of the traffic is moved the same night it is received. On all important messages to points where final delivery seems at all uncertain, a copy is mailed to the addressee the following morning. Subsequent acknowledgment of these copies show the value of this practice.

Official Relay Stations are under control of the A.R.R.L. and should be compelled to conform to the traffic regulations. Inefficient handling and non-delivery of messages should result in cancellation of appointments until the operator is willing to assume the responsibility of holding an ORS appointment. All messages should be in complete commercial form, as outlined in Traffic Rules, and this should be insisted upon of relay stations. Look over your message file and see how many you can find that are complete. You cannot probably tell whether it took three minutes or three months to get the messages through. What? You have no message file? No wonder you can't tell where that message went. Better get busy and start such a file.

Transmission of abbreviations for words in a message that was accepted written out in full is not allowed in commercial practice and should not be done in relay work. I have checked the handling of some of these abbreviated messages and found the meaning to be entirely different from what it was supposed to have been. This is inexcusable and results in a habit which would give one a short life as a commercial operator. More attention should be paid to proper routing. Don't send a message north when its destination is south, just to get rid of it. What's the idea?

Attention to the following would also help eliminate needless QRM. More efficient transmitters using coupled circuits, universal use of break-in systems, use of schedules and definite waves for traffic handling, better key work rather than speed.

—*Stanley T. Runyon, 6AGE.*

Locating the Buzzes

1621 Riverside Drive,
Knoxville, Tennessee.

Editor, *QST:*

Some time ago in *QST* you told how the power line leak in Hartford was located and repaired. I have just finished a survey of the city and have found over thirty leaks in different parts of town. I did this partly in self defense because the BCL's were telling the Dept. of Commerce that all the noise was coming from my station. They went so far as to have my experimental license revoked over this, however it was returned when we found the real trouble.

I can give you the dope on this if you want it. In every way our finding the power leaks was a big success and now the power company is working on the leaks we found. This will certainly "clear up" the broadcast and amateur receiving conditions in this town.

—*Philip Stout, 5LF-5XK.*

Short Waves Do The Work

104 South Hamlin Ave.,
Chicago, Ill.

Editor, *QST:*

Your continued entreaties to all amateurs to get below 200 meters has borne fruit at this station. From an outfit that would not "perk" below 210 meters, and suffered the inevitable BCL abuse, we have transformed into a 176 meter station and the results are twice as good. On 210 meters the antenna current with a 50-watter was 4.5 amperes. With that arrangement we worked every district but the sixth but Western amateurs were not reporting us QSA. On 176 meters with two series condensers, Reinartz style, putting 1.5 amperes into the antenna on low power, we have been constantly reported "vy vy QSA" out West and needless to say we are working more 6's than we thought a bottle was capable of doing! Of course the lower the wave we enjoy better DX, *even though the ammeter does not budge.*

The short waves have proven to be *the* thing for we amateurs. By right of discovery, exploration, and settlement they belong to us. The members of the American Radio Relay League must procure these wavelengths for themselves by creating a strong public opinion, and our cause will succeed.

—*T. Lowenthal, 9AUE's XG.*

CALLS HEARD

(Concluded from page XI)

8DOS, 20 Fargo Ave., Ashtabula, Ohio.

1arr, 1aru, 1by, 1ckp, 1er, 1gv, 1xae, 1xax, 1xu, 1xw, 1xx, 1xz, 2adp, 2agf, 2cla, 2wz, 3adb, 3bo, 3buy, 3hh, 3ot, 3xar, 3xx, 5amh, 6avo, 6fp, 7lu, 9cii.

Canadian: 1Bq, 2bn, 2cg, 2hm, 3aa, 3atk, 3bq, 3cw, fone, 3gg, 3gn, 3lb, 3ml, 3rg, 3vh, 3ml.

8BFE, Williamsport, Pa.

(1aur), 1aa, 1abu, 1ea, 1eq, 1ft, 1gw, (1io), 1jr, 1lj, 1su, 1tj, 5aaq, 5aek, 5ajj, 4apc, 5cn, (8dgo), 9aal, 9afv, 9aic, 9ajw, 9akv, 9aol, 9arp, (9arf), 9be, (9baz), 9buj, 9bcb, 9bdr, 9cvf, 9cmc, 9ccw, 9cyq, (9day), 9dfq, 9dhg, 9dlw, 9dni, 9du, 9dvv, 9efp, 9ehh, 9elb, 9eld, 9es, (9kd), 9mc, 9om, 9zt.

Canadian: 1bq.

Wud appreciate reports on my 5 watter, all cards ansd.

8BWB and BTX, 9737 Woodward C't., Cleveland, O.

1ci, 1ck, (1fb), (1fh), 1fn, 1ga, 1gv, 1ii, 1ka,

1kx, 1me, 1px, 1py, 1rb, 1tv, 1uj, 1vq, 1xm, 1xw, 1xz, (1yc), (1yd), 1zj, (1aac), 1abf), 1abt, 1acs, 1aez, (1afa), (1afe), 1afn, (1afp), (1ags), 1agt, (1jh), (ajx), 1aki, 1alj, 1aou, 1are, 1arf, 1arp, 1aud, 1avf, (1avw), 1avx, 1avl, (1awe), 1axn, 1ayt), (1azn), 1bbp, 1bcr, 1bez, (1bgt), (1bhn), 1blx, (1brl), 1bsd, (1bsz), 1cde, (1cit), 1cjc, 1cmp, 1cpn, (1cre), (ctp), 1xam, 1xar, 2al, 2at, 2az, 2ej, 2dn, 2fu, (2gk), 2hm, (2jf), 2kd, 2ku, 2lv, 2nf, (2rb), 2ts, 2wa, 2we, (2wr), 2aaj, 2adn, 2agb, (2axf), 2azy, (2bav), (2bdu), (2bee), 2beo, 2bfe, 2bir, 2bkl, (2blm), 2bms, 2bpb, (2bpr), (2bqb), 2bqu, (2brb), (2bsl), 2btt, 2bum, 2bxd, 2bxg, (2cd), (2cdp), 2cee, (2cgk), 2cjj, 2cjx, (2ck), (2cpa), (2cpq), (2cqj), (2cqp), (2cqz), (22crd), 2csd, 2csi, (2cts), 2cty, (2cvj), 2cvs, (2cyw), (2cyx), 2xna, 3bj, 3bg, 3cc, 3cy, (3do), (3eh), 3ck, (3ex), 3gg, 3gt, 3hh, (3hs),(3ii), 3iw), 3kq, 3ly, 3me, 3ml, 3na, 3oq, 3pz, (3rs), (3tj), 3ty, 3wx, 3yo, 3yv, 3adb, 3adj, (3aek), (3agf). 3ahp, 3akl, 3alx, (3apv), (3arz), 3auv), (3avk), 3awa, 3bbu, 3bdo, (3bge), (3bhv), (3bkl), 3blp, (3bno), 3bpp, 3bqj, 3bqp, (3brf), 3bss, 3btq, (3buv), 3buy, 3bwt, (3cah), 3ccv, (3ccw), 3cdi, (3cdn), 3cej, (3cel), (3cgs), 3cjn), (3ckh), 4ab, 4af, 4cl, (spk), 4bx, 4co, (4db), 4dv, 4fg, (spk), 4ft, 4fz, 4gn, (4hs), 4it, 4iz, 4je, (4jk), (4jr), (4lj), 4mb, 4mv, (spk), 4oa, 4og, 4ou, 4pk, 4rh, 4sb, (4sh), 4xc, 4xx, 5bx, 5cn, 5ck, 5gh, 5gw, 5gx, 5he, 5ht, 5ib, 5in, 5jb, 5jl, 5ka, 5li, 5mb, 5mi, 5mz, (5nw), 5pv, 5ql, 5qi, 5qj, 5ql, 5rg, (5ql), 4rg, 5sk, 5sz, 5uk, 5uo, 5vm, 5za, 5zr, 5aac, 5abw, (5ads), 5agn, (5ags), (5ahr), 5air, (5aiu), 5ajb, 5ajj, 5alm, 5alo, 5alv, 5amh, 5amu, 5amz, 5anf, (5aom), 6ak, 6bf, 6eb, 6fp, 6gr, (6nb), 6pl, 6uh, 6uw, 6xm, 6zt, 6aao, 6abk, (6ahp), 6alk, 6avj, 6avr, 6awm, 6bbc, 6bij, 6bnt, 6buh, 6cbw, 6cgs, 6cgw, 6cjv, 6emr, 6eng, 6xad, 6zar, 6zat, 6zbu, (7co), 7kz, 7sc, 7af, 7abb, 7ajy, 9bk, (9bu), 9eb, 9cp, 9dc, 9dn, 9ds, 9el, 9er, 9es, 9gi, (9hm), 9hw, 9ib, 9iw, (9ju), 9kd, 9la, 9lb, 9mc, 9mf, 9mm, 9pw, 9qe, 9rc, (9rh), 9ry, 9ta, 9tw, 9wu, 9zt, 9aal, 9aau, 9aaw, 9abe, 9abf, (9aci), 9acx, 9ada, (9adg), (9adp), 9aec), 9aek, 9aep, 9aex, 9age, (9agx), (9ahh), 9ahq, (9ahy), 9aie, 9ail, 9aim, 9aio, 9air, (9aju), 9akd, 9amp, 9amq, (9amu), 9amz, 9aol, 9aom, 9ape, 9apd, 9aqd, 9aql, 9arr, 9aru, (9ase), 9ash, 9asz, 9att, 9aus, 9avg, 9avn, (9awe), (9awg), 9awp, 9awv, 9axi, 9ayj, 9ayn, 9avx, 9azg, 9azl, 9azx, 9bav, 9bcb, 9bcf, 9bdg, 9bdq, 9bed, 9bee, 9bef, 9bez, 9bfi, 9bgc, (9bgk), 9bhi, 9bhw, 9bhy, 9bib, 9bq, 9bji, 9bjl, 9bkk, (9lg), 9blv, 9bly, (9bna), 9bve, 9boz, 9bpm, 9bqj, (9bre), 9bqv, (9brk), (9brx), 9btk, 9btt, (9buk), 9buo, (8buv), (9bua), 9vz, 9bwx, 9bwe, 9bwu, 9bya, 9bze, 9bzh, 9bzi, (9caa), 9cbf, (9ceg), 9cem, 9ces, 9ecv, (9ccw), 9cdb, (9cee), 9ceh, 9cek, 9cfn, (fone), 9cgu, (9chn), 9cho, 9cix, 9cji, 9cjv, 9ckd, 9cla, 9cld, 9cle, (9clz), (9cmb), 9cmc, 9cmk, 9cny, 9cou, 9cow, 9cph, (9cpm), 9cqa, (9csn), 9ctt, 9cui, (9cvo), 9cus, (9cxi), (9cxx), 9cyd, 9dap, (9daw), 9day, (9dbf), (9dct), 9dcw, 9ddo, (9ddp), 9dfg, 9dfq, 9dft, 9dga, (9dge), 9dhq, (9dkh), 9dlm, (9dlr), 9dkk, 9dnd, 9dni, (9dpp), 9dpr, 9dpx, 9dqn, 9dqu, 9drj, (9drr), (9dsg), 9dsw, 9duj, 9dvg, 9dvm, (9dvw), 9dwa, 9dwp, (9dws), 9dwz, (9dxk), 9dxl, 9dxn, 9dxs, 9dxu, (9dyi), 9dyl, 9dyy, 9dyt, 9dyz, 9dzb, (9eak), 9ear, 9ebh, (9ebt), 9edb, (9eeg), (9eev), 9efe, 9efh, 9efl, 9efq, 9ego, 9egu, 9ehm, 9ehq, (9ekc), 9ekt, 9eky, (9elb), 9eld, (9eli), 9elv, 9elw, 9elz, 9yau.

Canadiian: 1ar, 1bb, 2fc, 2ei, (2bn), (2cg), 3ir, (3wg), 3kg, (3bm), 3bg, (3kq), (3tf), 3oh, 4cn, 5cu, 5ro, (9bb).

French: 8ab.

English: 2kl, 2sh.

Australian: 2cdm.

8ARX, Pittsburgh, Pa.
Heard on det. 2 step with loud speaker using 2 foot loop in apartment on June 14th.

1by, 1sjx, 1bgb, 1byj, 3ahp, 3ahw, 3bdi, 3but, 3buv, 3bwl, 3bwt, 5qs, 8ahc, 8afn, 8apw, 8arv, 9eli, 9esa (?), 9kd, 9mc, 9nu, 9pb, 9vc, 9wx, 9xax, 9xbh, 9zt, 9za.

9ccw, St. Louis, Mo.
(1ah), 1fd, 1gv, (1py), (1sn), (1aac), (1abf), 1adn, 1afa, 1aur, (1ayt), 1alk, 1bxd, 1bie, (1bhn), (1cmx), 1csw, 1yb, 1xax, 2cdp, (2cee), 2cpd, 2cqz, (3hs), 3mf, (3auv), (3bce), 3bnu, 3buy, (3cjn), 3xw, 4ai, (4dv), (4er), (4oa), (4qf), 5's too numerous, (6hbc), (6hbw), 6cgw, (7gr), (8ci), (8jq), (8rj), (8sr), (8abm), (8abs), 8aer, 8afm, 8avb, (8bnh), (8cdc), 8cwp, (8cvi), (8dkj), 8doo, (8yn), (8zw), 8xbq. 9's too numerous.

Can.: (1dd), (2bn), 2co, (3ly), (3xi), (4fv).

Mex.: "bx".

9ZT-9XAX, Minneapolis, Minn.
Stations WORKED using 9XAX on 109 meters (During 1924)

1ajp, 1bes, 1cmp, 1xah, 1xak, 1xam, 1xaq, 1xj, 1xw, 2gk, 2aws, 2bsc, 3ii, 3mb, 3pz, 3vw, 3bdi, 3bwj, 3xao, 4bz, 4fj, 4hs, 4ku, 4xc, 4xe, 5ov, 5ow, 5qw, 5aic, 5ahj, 5xv, 5xab, 6arb, 6efz, 6xe, 6xbc, 6xbe, 7fq, 7gb, 7ij, 8hn, 8pl, 8ve, 8adk, 8alf, 8awj, 8bbf, 8bnh, 8bwv, 8dcy, 8xbe, 8xbp, 8xbq.

kdef, kdeh, nkf, nkf-1.

Canadian: 1bq, 1ef, 2bg, 2bn, 2cg, 3bp, 3bq, 3ko, 3ly, 3aec, 4cr, 4cw, 9al.

9CXY, Gordon Verhulst, Sheboygan High School, Sheboygan, Wis. (June 15-30).

1ask, 1auk, 1bgi, 1gv, 1qm, 2ana, 2be, 2bqb, 2brb, (2cwj qra?), 2cwp, 2cg, 2rk, 2rm, 3aa, 3adb, 3agf, 3bnu, 3ahp, 3bta, 3buy, (8cdk), 3cjn, 3cxl, 3ob, 4dx, 4ft, 4pv, (5ck), 5es, 5qa, 5uk, 7co, 8aem, 8avx, 8bkh, 8hle, 8hre, (fone) 8bg, 8bgl, 8bvd, 8bxh, 8cdc, 8cbp, 8cfb, 8ci, 8cjp, 8czo, 8ckm, 8cic, 3eyi, 8daa, 8dgr, 8dae, 8dgv, 8dmx, 8jq, 8hn, 8ge, 8ij, 8nm, 8rt, 8tdz, 8vq, 8xt, 8wa.

Can.: 3bg, 3anu.

9AFR and 9AN, Lincoln, Nebr.
4H, 5aw, 5az, 5aex, 5ahd, 5ajh, 5alz, 5amh, 5ape, 5aqw, 5cn, 5hy, 5in, 5kg, 5mz, (5ns), 5nt, 5ox, 5pp, (5qh), 5sr, 5ux, 5vm, 5vo, 5xv, 6rm, 6cbg, 6cek, 6emm, 6xad, 7zu, 8aer, 8arv, (8avx), 8bmh, 8bre, 8cwp, 8daw, 8dgo, 8dhs, 8did, 8dpf.

Can.: 4cb.

TRAFFIC DEPARTMENT

(Concluded from page VIII)

VANCOUVER DIVISION
A. J. Ober, Mgr.

Traffic is still moving through the division in spite of the heavy QRN. It is still hard to QSO the coast, but from Calgary to the Atlantic it is easy sailing. 5CT is still the old timer of the West Coast Islands, and has never missed a report. Since 4CL has left Edmonton there has been very little activity there, but Mr. Makepeace, who is acting as DS., is doing his best.

The new O.R.S. for the month are 5AS, 5GO and 4GT.

ALBERTA:—4AB is swinging a wicked "mashie" these days instead of his "cootie"; his favorite figure is 48, but not messages handled. 410 hands in a total of 16 msgs. 4CW says nil. 4GT is pounding fast and furious and keeps traffic moving in great shape. 4DQ is on every night, mostly from 2:30 to 3:30 A. M. tho it's great to hear the sigs gradually fade out as daylight comes on, msgs, 20.

VANCOUVER:—5GF is a new station on the air and has handled some traffic. He is on short waves and reports that it is very hard to raise Yanks for traffic. 5AS handled the most traffic this month. 5CN is back on the job and will remain during the summer. 5CA, another new station, has worked several U.S. stations. 5AH will not be on the air again until September. 5GO is another old station that is closed down. 5AK has left the city for the summer.

Traffic: 5AS,36; 5GF,13; 5CN,11.

VANCOUVER ISLAND:—5CT had trouble in getting "S" tubes to work just right. He had to go back to M.G. for the present. He handles traffic with 7AGF, 4DQ, 5HG and 4CB and once with 3WS. 5HK is experimenting with low power and worked nearby 7 with twenty-two one hundredths of a watt input.

QST

A Magazine Devoted Exclusively to the Radio Amateur

Index to Volume VII, August 1923 - July 1924

Published as a Supplement to QST for August, 1924, Vol. VIII, No. 1

Additional copies of this index may be purchased from our Circulation Department for 4c each.

Suggestions for improvement will be welcome. If errors in indexing or subject matter are found, please advise us.

AMATEUR RADIO STATIONS

AMATEUR REGULATIONS

ANTENNA SYSTEMS

AMPLIFIERS—AUDIO AND RADIO

BATTERIES

BOOK REVIEWS

COILS

CONDENSERS

CONTESTS-RELAYS-RECORDS-TESTS

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EDITORIALS

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FICTION

GOVERNMENT DEPARTMENTS—LEGISLATION

INTERNATIONAL AMATEUR RADIO

JUNIOR OPERATOR

By H. F. Mason

LOOPS—RECEIVING AND TRANSMITTING

MACMILLAN ARCTIC EXPEDITION

MASTS

METERS

MISCELLANEOUS

RECEIVERS—GENERAL

RECEIVERS—DIRECT COUPLED

RECEIVERS—LOOSE COUPLED

RECEIVERS—NEUTRODYNE

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RECTIFIERS

SHORT WAVES

TRANSMITTERS—GENERAL

TRANSMITTER PLATE SUPPLY

TRANSMITTING CIRCUITS

TRAFFIC DEPARTMENT

TUBES

WAVEMETERS

WHO'S WHO IN AMATEUR WIRELESS