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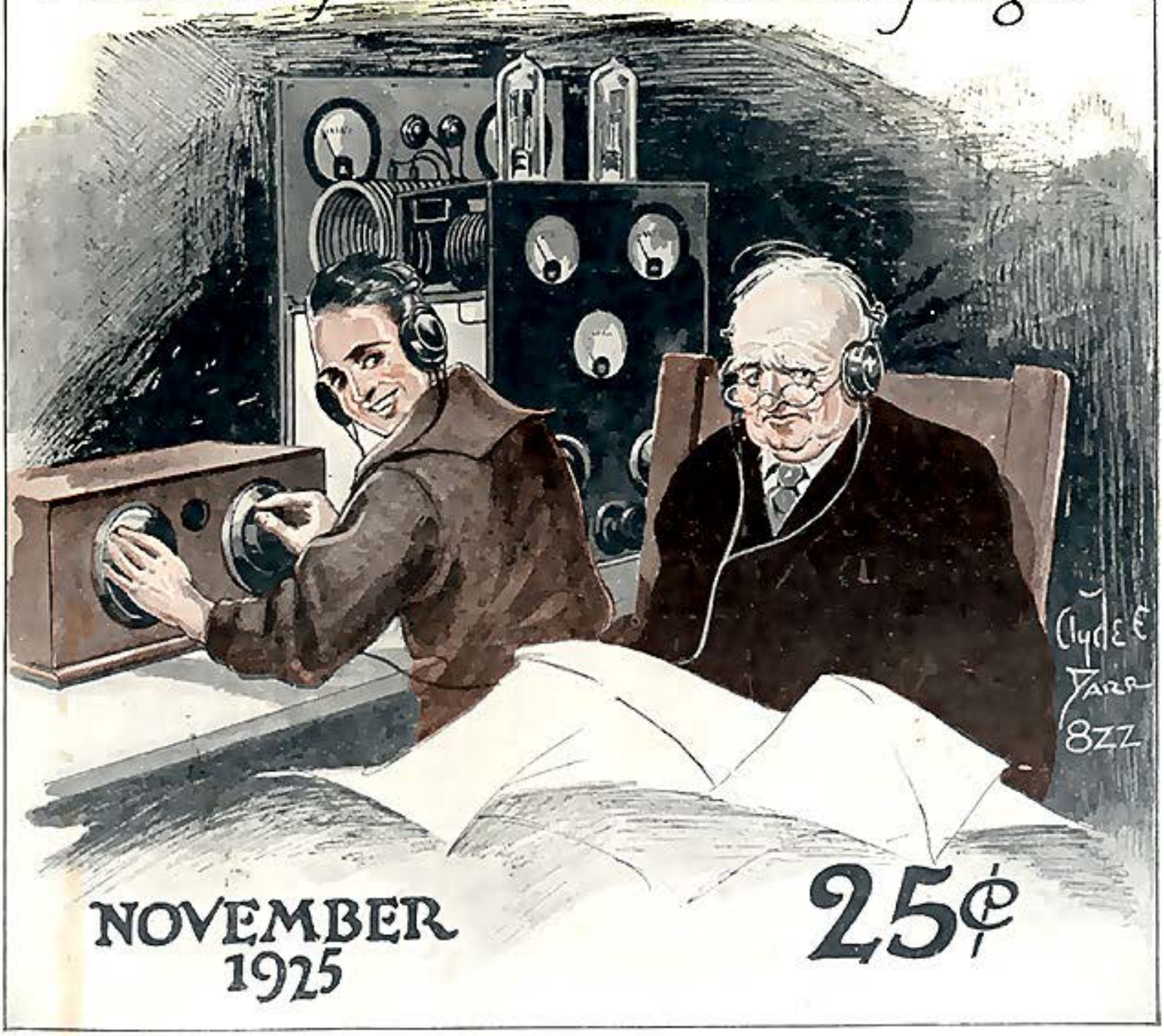

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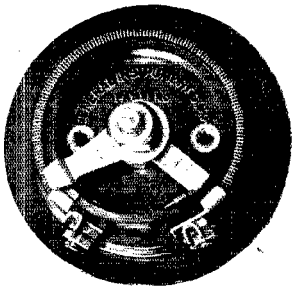

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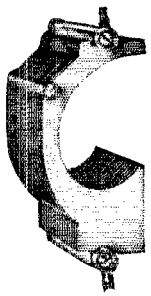

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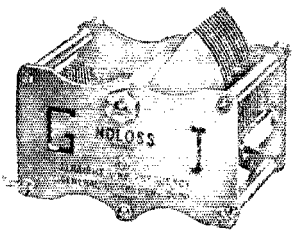

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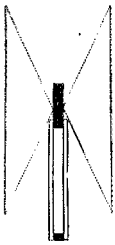
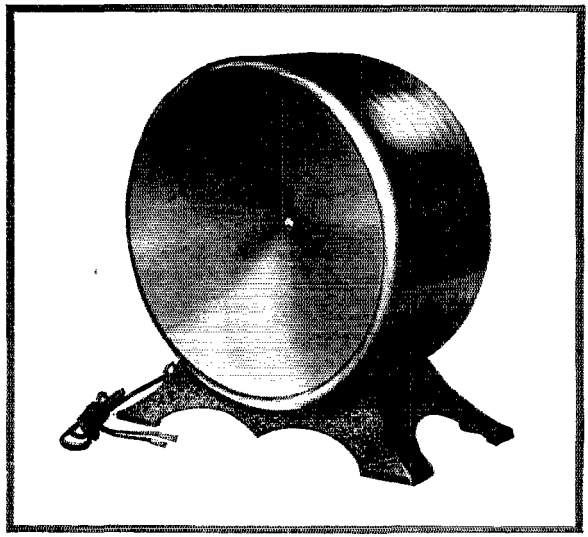


Section of the New Acme FREE-EDGE CONE Loud Speaker, showing the two free-edge cones.



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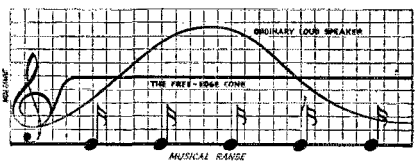

NOTE the equal volume over the musical range with the free-edge cone in contrast to the ordinary loud speaker.

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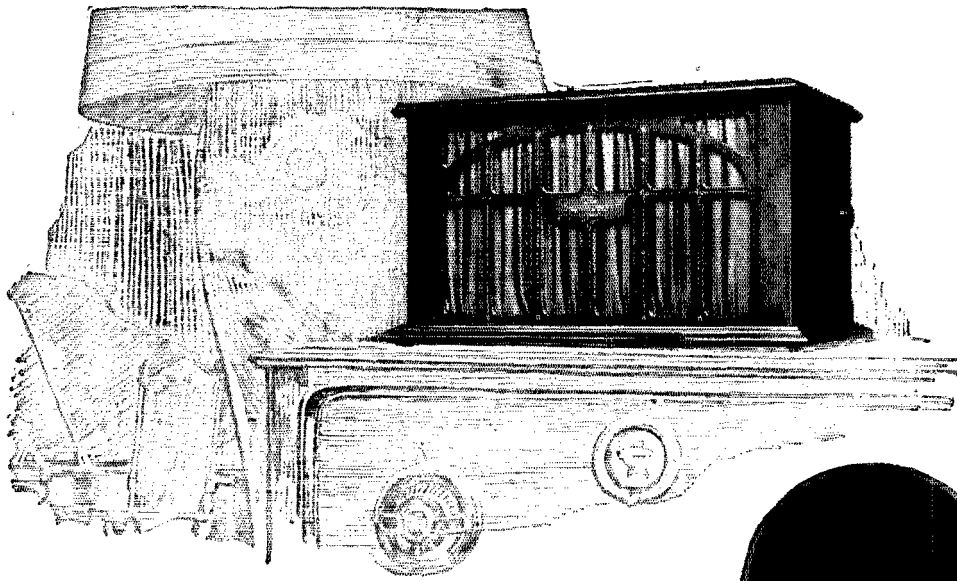

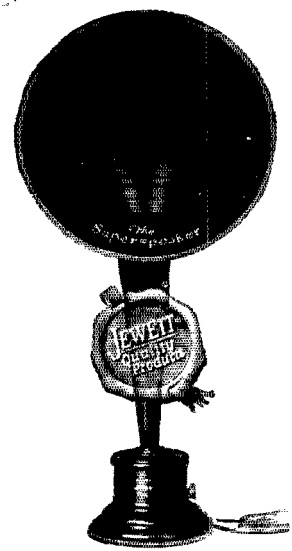

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QST

The Official Organ of the A·R·R·L

VOLUME IX — NOVEMBER, 1925 — NUMBER 11

Official Organ of the International Amateur Radio Union

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THE AMERICAN RADIO RELAY LEAGUE

The American Radio Relay League, Inc., is a non-commercial association of radio amateurs, bonded for the promotion of interest in amateur radio communication and experimentation, for the relaying of messages by radio, for the advancement of the radio art and of the public welfare, for the representation of the radio amateur in legislative matters, and for the maintenance of fraternalism and a high standard of conduct.

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 the world and has a history of glorious achievement as the standard-bearer in amateur affairs.

Inquiries regarding membership are solicited. A bona fide interest in amateur radio is the only essential qualification; ownership of a transmitting station and knowledge of the code are not prerequisites. Correspondence should be addressed to the Secretary.

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EDITORIALS

Do You Tell The Truth?

THE complexion of amateur radio has changed so greatly since the general use of short waves that today there are many hundreds of stations on the air engaged in more or less serious experimentation. Frequently these experiments have to do with actual communication and the experimenters get into contact with a DX station and ask for some sort of a report on the transmission. Even the purely traffic man frequently has a new adjustment to try out and asks somebody at good DX for a report on his signals. These requests all too frequently meet with anything but a truthful answer. There is altogether too much optimism displayed in the replies that we overhear, and we ought to do something about it.

"VY QSA, OM!" All signals can't be very QSA; some of them *must* be just normally QRK in order for there to be any standard of comparison. We wouldn't be surprised to learn that some of them were actually QRZ once in a while. But to listen to the reports one would think that all signals whatsoever were of the same audibility. It sounds fine, this QSA business, but it doesn't mean a thing. Such good DX signals are received nowadays from low powers that it ought to be a terrific signal indeed that merits the "VY QSA." And why the old "Q" signals on audibility reports? Haven't we adopted the R1-to-R9 audibility scale for this very purpose? Let us use it, and give each inquirer a truthful report.

The same thing goes for QSB. "QSB VY FB DC OM" sounds great, but the experimenter doesn't want flattery—he is trying to find out the truth. What does he think of you when he has just disconnected his filter and knows darned well that the note can't be all that good? Don't besitate to tell him "ROTTEN RAC ES LOTSA HUM" if that is what it sounds like. And wobbly notes! How can a signal be FB is you have simply been lucky enough to copy it in spite of its shimmying? A fellow wants to know when his wave isn't steady, and you do him a favor to tell him. No signal is good that doesn't come decently close to standing still, and no signal rates "QSB VY FB DC" unless it sounds like it came from battery plate supply.

All of us know that when we ask a fellow questions of this sort we are not out to have our vanity tickled. We want to know, for a definite purpose. It is our duty to be just as truthful to the experimenter and tester who asks us. Let us cut out this slipshod optimism and tell the exact truth as we perceive it.

Make a Brass Pounder

WE know that there are may thousands of advanced BCLs who have progressed into an understanding of radio that has awakened their interest in amateur work. They would make good brasspounders, and they would like to become hams, but they don't know quite how to go about it. What they need, and about all they need, is a personal invitation.

You know, come to think about it, we are rather mysterious about this game of ours. Our activities all presume that a man already has a station in commission. We act for all the world as if every one of us was born into this world possessing a completely equipped station and a first-grade license. No wonder it's hard for a newcomer to break in.

These chaps who can build their own superheterodynes and make them work can build a five-watt transmitter and make it work, and they can learn the code. This League is primarily devoted to two-way short-wave radiotelegraphy. We members of it are the best-informed group of people on that subject in the world. We can sell the transmitting idea to any potential amateur in five minutes. We ought to do it, because we need strength in our ranks and because the addition of some thousands of graduated BCLs will give a new impetus to radiotelegraphy.

If all this is true, why don't we start things going? Let's! "Every member make a new brasspounder." Let every amateur sit down in quiet for a few minutes and think over his BCL friends, and select the most likely candidate or two. Do this yourself—today. Then go see them and tell them what they are missing and how to break into the game. Offer to help them with advice and hook-ups. They'll come in all right, for they are needing only to be shown the way.

—*Kenneth Bryant Warner.*

Crystal Control for Amateur Transmitters

By John M. Clayton, Assistant Technical Editor

DR. TAYLOR of the U. S. Naval Research Laboratory has done more crystal-controlled work with high-power transmitters than any other man in the world, and it is his conviction that the crystal control transmitter is in a class by itself; that it is second to none; that its nearest competitor is a transmitter using a very rigidly supported antenna-counterpoise system and an oscillator keyed by some compensation method in which the load is on the tube at all times.

The various transmitters at NKF should for once and for all settle any doubt in the mind of anyone as to the merits of a crystal-control system and the tremendous advantage it would be to amateurs to have transmitters of this type.

Years ago the Curies found that if a crystal of Rochelle Salts is placed between two pieces of metal as in Figure 1 its shape can be changed by connecting the two pieces of metal to a battery or direct current generator. When the voltage is applied to the two pieces of metal the crystal will become shorter along the lines A-B and C-D, and longer along the lines A-C and B-D. The crystal will act just as if it were a sponge and were being squeezed by the two pieces of metal: it will become thinner and longer. Other crystals show the same effect but not as markedly as Rochelle Salts. However, the Rochelle Salts crystals are very weak mechanically and absorb moisture easily: hence in experimental

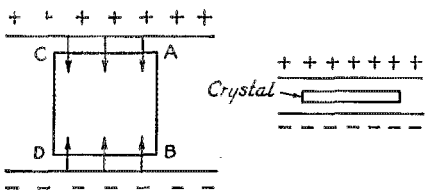
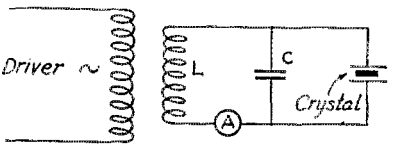


FIG. 1 CRYSTAL ACTION

work it is usual to use Quartz crystals, which are very hard and last almost indefinitely. In the case of the quartz crystal, if the polarity of the charge plate is reversed the mechanical strain on the crystal will be reversed also. In addition to this change, if the plate is compressed endwise by a potential applied to the edges of the plate it will become shorter and thicker. These changes are microscopically small, but they are there just the same.

This phenomena also works in the opposite manner. If the crystal is subjected to a mechanical strain or pressure its surfaces will become electrically charged.

When the shape of the crystal is distorted either by mechanical means or by means of a momentary voltage applied to the metal coatings on it, it immediately tries



CIRCUIT USED TO SHOW CRYSTAL ACTION
FIG 2

to return to its original shape, but in so doing it swings past its normal size and actually contracts. Then it tries to return to normal size by expanding but again swings past its normal size and becomes larger and so on. In other words, it oscillates. This oscillation is quite similar to the oscillation of an iron plate when struck by a hammer. In the case of the iron plate the oscillation is at an audio frequency—we hear the plate ring for some time after it has been struck. The crystal oscillates at a *radio* frequency. Each crystal will oscillate at two definite frequencies.

If a coil L, R.F. ammeter A and condenser C (Fig. 2) are connected in series and the two metallic coatings of a properly cut quartz crystal are connected across the condenser the frequency of the crystal can be found. A high frequency driver is coupled to the coil, and a curve showing the variation of current in the L-C circuit (as indicated by the ammeter A) with the variation in frequency of the generator is plotted. Referring to Figure 3, as the driver's frequency is increased the current in the L-C circuit increases up to a certain point where it sharply drops off. If the current variation around this point is carefully explored by minute changes in the driver frequency the depth of this dip can be found. The frequency corresponding to the bottom of the dip or crevasse is either the fundamental frequency or a harmonic frequency of the crystal. If the L-C circuit is now tuned to this frequency either by a variable capacity in place of the fixed C or a variable inductance in place of L, the crevasse will be much deeper, indicating that the crystal in the L-C are absorbing more power from the driver. If

the driver is not very powerful it may cease to oscillate at the resonant frequency of the L-C circuit and the natural or harmonic frequency of the crystal. Some crystals that are cut from a piece of quartz which has irregularities in it may demonstrate all sorts of weird frequencies. It is also very easy to mix up the harmonics with the

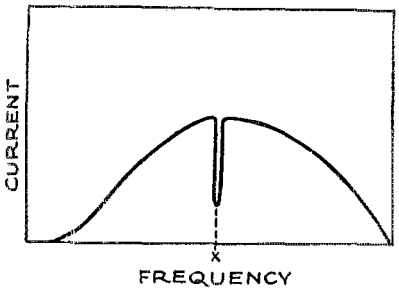


FIG. 3 RESONANCE CURVE OF CRYSTAL AND TUNED CIRCUIT

fundamental frequency, so if you are trying to find the fundamental of your crystal be sure that you are not playing with some harmonic.

The Axes of a Crystal

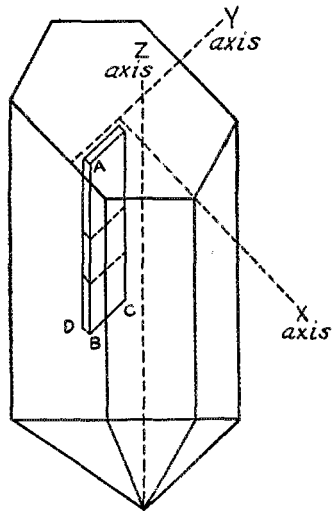
In order to get a good oscillating crystal it is necessary to cut out a piece along certain definitely set dimensions. These bounding lines are known as the axes of the crystal. The first is the optical axis. It is usually found in the geometric center of the crystal. It is known as the Z axis (Fig. 4). If this axis cannot be determined by inspection an optician can locate it in an optical machine in a very few seconds. The next axis is the Y axis, an imaginary one drawn at right angles to two parallel and opposite sides. The other is the X or electrical axis and is drawn from one corner of the crystal to the opposite corner, and at right angles to the Y axis. There is only one Z axis, but there are three 1 Y axes and 3 X axes (Fig. 5), one axis between each parallel side or opposite corner of the crystal.

Cutting the Crystal

When cutting the crystal it should be taken out so that its length AB is parallel to the Z axis (parallel to a side of the crystal), its width BC parallel to the Y axis and thickness DB parallel to the X axis (Fig. 4). If the raw crystal is clamped in a wooden vise and viciously attacked with the back edge of a hacksaw blade over which very fine carborundum dust and water are continually poured, you can grind out a piece. The slice taken out should be about 2½ millimeters thick and an inch wide. When cutting be sure that the cut is parallel to one of the Y axes. It will probably be best to cut in a direction lengthwise of the crystal first. (See Fig. 6.) Then cut it into pieces about an inch square. Be sure, though, that all of the edges are parallel to the axes of the crystal. This is important, for the crystal will not oscillate if its edges are cut at an angle very far from the correct one.

Grinding Them Down

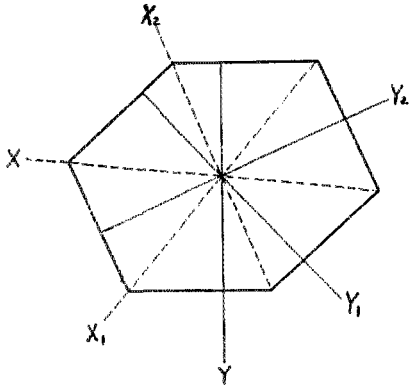
You now have a crystal cut along the right lines but entirely too rough to oscillate. It must be ground down until its faces are absolutely smooth and parallel. Mix up a quantity of No. 301 powdered emery and kerosene in a can and use this as the Rough grinding solution. It should have a consistency similar to tooth paste. Cover one face of the crystal with the mixture and lay it on a smooth steel plate or heavy glass plate, and push the crystal around in circles on the plate, at the same time turning the crystal around so that its whole surface will be ground equally. (See Fig. 7.) Keep a thin layer of the grinding mixture on the surface of the crystal, and



RELATION BETWEEN THE CUT CRYSTAL AND THE AXES
FIG. 4

see that the pressure on the crystal is equal at all points. When one side has been smoothed off turn the crystal over and grind the other side. Then the edges should be squared off. For high frequency work we use the thickness of the crystal as the oscillator. It does not matter what the crystal's length or width is. The wavelength at which the crystal will oscillate will be found to be very nearly equal to

105 meters per millimeter thickness of the crystal. In order to grind the crystals to a definite frequency the "grinder" must proceed most cautiously when he has begun to get down into the neighborhood of the required frequency. The final grind is done with No. 100 carborundum and oil. A micrometer caliper is a necessity. The crystal must be of uniform thickness and the wavelength must be tested often. A simple test circuit should be set up and frequent



CROSS SECTION OF CRYSTAL SHOWING X AND Y AXES
FIG. 5

use made of it or you will grind way past the wavelength you want.

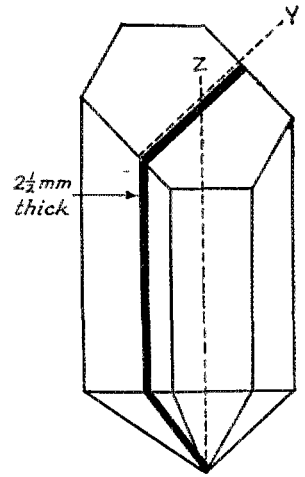
Unless one has a good crystal that oscillates at a useful frequency it is, of course, impossible to build a crystal control set. Quartz crystals ground to a known frequency can be obtained from the General Radio Company. If you have a lot of time and patience you can cut the crystals yourself. Grinding them to some useful frequency is a comparatively simple job. Uncut crystals can be obtained from a number of sources. The Master Optical Company of 19 West 36th Street, New York City, can furnish them, or they can be picked up from almost any wholesale optical company. Care must be taken, though, to see that the crystals are good for radio purposes. All crystals will not yield good oscillators. The uncut crystal must be free of flaws, bubbles or cracks, and should be tested by the optical company to see that it is not a "twin crystal". This cannot be determined by a casual glance by the uninitiated, but the optical people can tell you in a few seconds.

If you do not want to try the cutting job yourself, quartz crystals guaranteed not to be twin crystals and further guaranteed to be cut along the correct axes can be obtained from the Master Optical Company for a very reasonable sum. The crystals will be ground to any desired thickness. No guarantee is given as to their oscillating qualities. If you buy the cut crystals they can be ground down by yourself by hand. A crystal one millimeter thick and one inch square (or having a diameter of one inch if round) is a convenient size.

After the crystal has been ground it should be cleaned thoroughly in carbon tetrachloride (Pyrene Fire Extinguisher liquid or a Carbona) to remove all traces of emery and oil.

Mounting the Crystal

In order to operate the crystal it must be mounted. There are two forms of mountings that can be used. The type shown at the left of Fig. 8 allows the crystal to vibrate when it starts to oscillate. The insulating base has a metal plate (brass or copper) A attached to it. The upper surface of this plate is ground absolutely flat, as is the lower surface of the brass or copper cap. This cap fits over the plate A and the crystal vibrates between the plate A and the inside of the cap. This distance is very small, a few thousandths of an inch. Where extremely fine precision is desired this type of mounting is of advantage. For practical work and for operation in a radio transmitter it is sufficient to use a mounting similar to that shown at the right of Fig. 8. The base holds a lower plate whose upper surface is ground smooth. The crystal



TAKING OUT THE FIRST SECTION
FIG. 6

rests on this plate, and the upper plate (with a smooth bottom face) rests upon the crystal. The surfaces of the plates touching the crystal must be ground smooth.

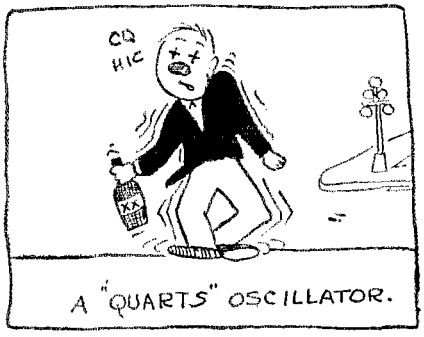
A light spring brass strip is arranged to push the whole works together and hold the crystal in place. The output from a crystal mounted in this fashion is con-

FIG 7 GRINDING THE CRYSTAL

siderably greater than from the other type of mounting, in which the crystal is loose between the two plates.

Testing the Crystal

A good testing circuit for the crystal is shown in Fig. 9. A UV-201A tube can be used. A plate voltage of from 90 to 200 volts should be used. The C battery voltage will vary between 1.5 and 10 volts. This, although almost any voltage can be used, is not critical. The coil L and a condenser C should be of such size that the combination can be tuned over the wavelength range in which the crystal is expected to oscillate. The grid choke (RFC) should be wound with fine wire and made as small (physically) as possible. In an operating circuit this choke should have a natural period equal to the period of the crystal itself. The ammeter A is used to show when the crystal is oscillating. If low plate voltages are used this meter can be a 0-100 milliampere hotwire meter. If high voltages are used it should be a 0.1 ampere R.F. meter. As the condenser C is rotated the current in the ammeter will vary as follows: At first there will be no indication on the meter—the crystal is not oscillating. As the condenser and coil begin to approach the resonant frequency of the crystal the current will



start to flow in the ammeter. The nearer the LC circuit is tuned to the frequency of the crystal the greater will be the current in the LC circuit. When this circuit is tuned to the same frequency as the crystal the tube will abruptly stop oscillating. The crevasse of Figure 3 will drop all the way to zero. When operating a crystal in a transmitter the plate coil is never tuned to the frequency of the crystal, for the crystal will cease to oscillate every time. It should be tuned always to a wavelength less than the crystal wavelength.

If the oscillating receiver is coupled very loosely to the coil L and a beat note with the crystal is picked up, a lot of things can be observed. In the first place, the beat note will virtually stay constant, no matter how much the condenser C is varied so long as the tube is oscillating. The condenser C, ammeter A and coil L comprise a tuned circuit. Here we are changing the capacity in the tuned circuit over quite a large range and the wavelength is not changing at all! Next, if we take a lead pencil and push down on the crystal mounting as hard as we can the beat note in the receiver will change only a few hundred cycles, proving that the crystal *can* be mounted between two metallic blocks that are pressed tightly against it. Then we vary the plate voltage. Nothing much happens so long as the tube does not stop oscillating. The beat note stays the same. Bring your hand close

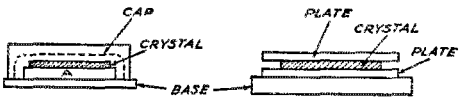


FIG 8 CRYSTAL MOUNTINGS

to the coil L. The note remains constant. Try this in your present transmitter and —well, you note what happens to the note in your receiver and the other fellow's receiver also.

Practical Circuits

The circuit of Fig. 9 is one of the most elementary crystal circuits. It can be used as a very good transmitting circuit also. If the tube is changed to a UV-210 and the plate voltage raised to 350 or 400 and the C battery to about 40, we have the makings of a very good amateur transmitter The antenna is coupled to the oscillator by means of the coupling between coils L1 and L of Fig. 10, and is tuned to the oscillator's wavelength. Immediately the antenna ammeter shows signs of life and we are doing some crystal controlled sending. The antenna coil L1 must not be coupled too closely to the oscillator or the latter will cease to oscillate. The coupling, however, can be much closer than in the usual type of amateur transmitter. If your crystal does not have a natural wavelength in the amateur band you are interested in, but does have a harmonic in the band you want, you can tune the antenna to

this harmonic and get some power into the antenna. The crystal generates a whole flock of harmonics, a lot of which can be used in this fashion. The amount of power that can be put into the antenna from such a simple circuit is relatively small. The crystal will crack if the plate voltage on the tube is much higher than 400. The UV-210 tube is an ideal crystal tube, and probably is the largest tube that can be directly crystal controlled. If we want more output in the antenna we must proceed to a power amplifier combination. A UV-210 crystal control will very satisfactorily control a 203-A tube or even a UV-204A. The circuit of the power amplifier is so well known that it is not repeated here.

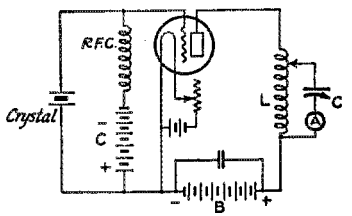


FIG. 9 ELEMENTARY CRYSTAL CIRCUIT

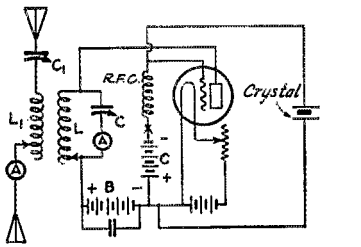


FIG. 10 THE SIMPLEST TRANSMITTER CRYSTAL-CONTROLLED

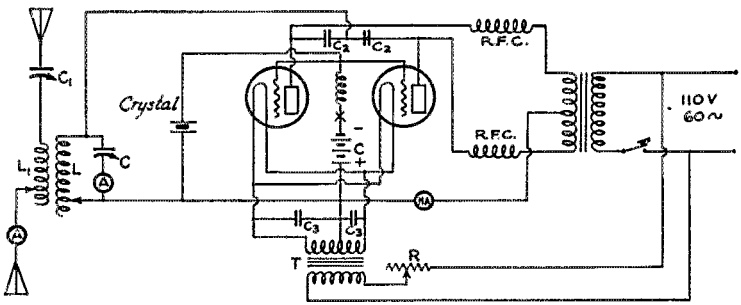


FIG. 11 CIRCUIT OF AN A.C. CRYSTAL SET

The A.C. Crystal Set

If two UV-210 tubes are connected in the familiar self-rectification circuit to give full wave rectification of the 60-cycle supply, they can be very successfully crystal controlled. The note, contrary to all expectations, is very pretty indeed. As the crystal, once set into oscillation, tends to continue to oscillate for a short time it will successfully "ride over" that portion of the cycle in which the plate voltage to the tubes is at a minimum, and the note from the set will correspondingly hold on. At a distance it is very nearly equal to a pure D.C. note. There is nothing unusual in the circuit of Figure 11. It is our plain old everyday full wave rectification circuit in which we have left out the grid coil and added a crystal. The ammeter A in the LC circuit, while not necessary, greatly aids in tuning the transmitter, since it shows when the crystal is oscillating. If each tube is supplied with 400 volts of A.C. this ammeter should have a zero to 3 ampere scale. It is an R.F meter of course. The set can be keyed either in the primary of the plate transformer or in the C battery circuit at "X" of Fig. 10 and 11. Both L and L1 should be of "low loss" construction. They should be wound with copper or brass strip laid flat on the supporting pieces and spaced a distance equal to the width of the strip.

An A.C. Power-Amplifier Circuit

If you want more power than can be obtained from the two tube set working in the circuit of Figure 11, an A.C. power-amplifier can be added. The oscillator tubes and the amplifier tubes are fed from the same high voltage transformer. The R.F. choke in the leads from the transformer keep the tubes from getting mixed-up. The input to the amplifier tube is governed by the position of the grid tap on the coil L. The setting of this tap is not very critical. If the C battery in the amplifier circuit is made unusually high the harmonic of the amplifier will be more pronounced, and it will be possible to get a lot of energy into the antenna on this harmonic. The two crystal controlled oscillator tubes can be operated at 80 meters, say, and the amplifier

tuned to 40 meters by means of L1-C3, and there will be plenty of pep in the antenna on 40 meters when the antenna circuit is tuned to 40.

Things to Watch Out For

There are a number of things to watch for when playing with crystals. In the first place, do not try to grind the crystal to too short a wavelength. Dr. Taylor at NKF has made a good crystal oscillate at 26 meters. If you look very hard at a crystal that thin it may collapse. It will probably be best not to try to grind them to a wavelength lower than 75 meters. If you want to operate on wavelengths shorter than 75, grind the crystal so that its fundamental is at twice the wavelength you want and either operate directly on a harmonic of the crystal or on a harmonic of the crystal through the power amplifier, as explained above.

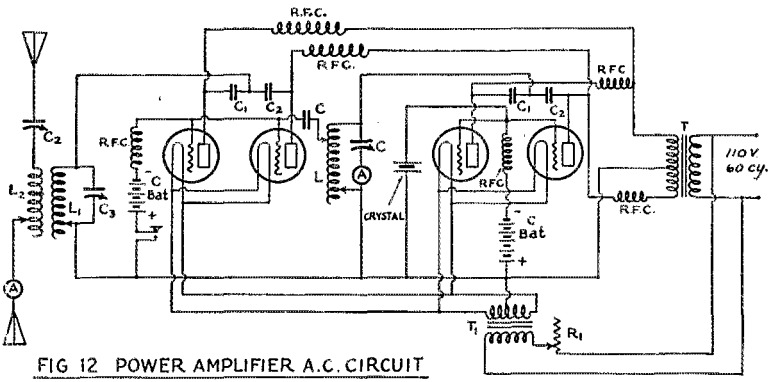


FIG 12 POWER AMPLIFIER A.C. CIRCUIT

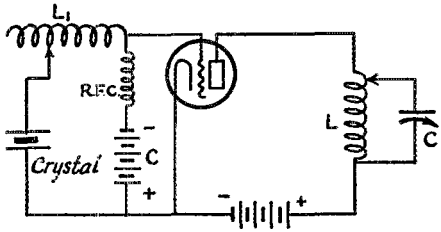


FIG. 13 ADDING REGENERATION WHEN THE CRYSTAL WON'T OSCILLATE.

If too much plate voltage is used the crystal will crack. Do not use a crystal controlled tube larger than a UV-210, and use only one tube of this size unless you want an AC set, when two tubes can be worked successfully.

The crystal must be clean at all times. It will not oscillate if it is scratched. Grind the scratch out. In so doing, though, you will shorten the wavelength.

It does not matter whether the crystals are square or round. For some reason the Optical people who cut and grind them find it easier to turn out a round crystal than a square one. It does not hurt to have the surface of the crystal unpolished. The unpolished surfaces look "frosted", but crystals with this finish oscillate just as well as the polished ones.

If you think you have a good crystal and the darn thing just won't oscillate, it is possible to make it go by means of a little regeneration in the crystal controlled tube. In Fig. 13 we have added a coil L^1 in series with the crystal and the grid. If we disregard the crystal for a moment—just short circuit it—and increase the number of turns in L, we will have a simple tuned plate oscillator. With the crystal in the circuit the action is just the same. If we increase L_1 the tube will regenerate and the crystal, if it has any oscillating tendencies at all, will pick up and maintain oscillation. A warning, though: if the crystal does oscillate satisfactorily without a grid coil, don't try to introduce any regeneration or the crystal will be cracked.

In the power amplifier combination it is perfectly possible for regeneration to occur in the amplifier. If this happens it is likely to react upon the crystal tube and the crystal will be cracked. It is highly desirable to actually neutralize the power amplifier just as a neutrodyne is neutralized to prevent any oscillation in it.

When grinding the crystals it is possible to proceed with this process to such an extent that the crystal will cease to oscillate. Be very careful when you are grinding to wavelengths below 75 meters. The crystal should be tested quite often.

The day of the amateur crystal control transmitter is here. Soon we will have steady waves like NKF; wavelength accuracies second to none, notes sufficiently close to allow the advantageous use of high-peak audio transformers and the resulting increase amplification secured thereby.

Curing Seattle's Radio Interference

By Laurel J. Smelser*

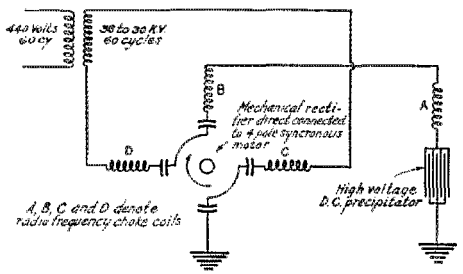
THERE have been many attempts in various parts of the country to eliminate the severe radio interference caused by the Cottrell dust precipitators used at cement mills and smelters.[1]

Interference of this type had existed for a long time at Seattle and Tacoma, Washington. The Tacoma News-Tribune, the Radio Dealers Association and various other interests called a meeting last fall to make plans in order to find a cure for the interference. At this meeting it developed that an interference-suppressor had been quoted to the Tacoma Smelter (by a large electrical concern) at $250,000. This cost had been considered prohibitive and therefore nothing had been done.

I then proposed an installation of choke coils and estimated that the cost would be about $200 for material plus 3 or 4 days labor for three men. Mr. Ralph Barker, manager of the Tacoma Smelter expressed willingness that we proceed with this installation.

On my return to Seattle I made arrangements to see Mr. O. R. Redfern, Supervisor of Radio for the 7th District and from him learned that a number of previous attempts had been made but that none of them had been successful.

Bypass condensers were considered but it soon became clear that their cost would be prohibitive. The number of condensers



SMOKE PRECIPITATOR AT TACOMA SMELTER TACOMA WASH

needed for complete suppression and the high voltage that they were required to withstand made this scheme impossible.

The manager of the smelter also told me that carbon resistance rods had been tried without success. This method would have worked *if* the proper type of resistances had been used, because it is possible to keep the circuit from oscillating by introducing enough resistance so that

$$R = 2V\sqrt{\frac{L}{C}}$$

However carbon-rod resistances are useless since their resistance is very low at radio frequencies, because of the high distributed capacity. Some of you will probably remember that we actually used these rods as by-passes in the primary circuits of early wireless transmitters. The rods have low resistance at radio frequency (where the resistance should be high) and at the same time their resistance is enormous at direct current (where it should be low). Thus they absorb power, make it necessary to increase the power of the plant, and at the same time fail to accomplish their purpose.

Choke Coils

There is but one satisfactory method when price and time are considered. This method requires the installation of radio-frequency choke coils. These can be made to have low resistance to the rectified current and at the same time can be made to have very high reactance at the radio frequencies.

Referring to the attached sketch, A, B, C, D, are the R.F. chokes. A and B are each made of 500 turns of No. 18 single braid, rubber covered, fixture wire wound on a 4½" diameter wood core or frame. These coils have an inductance of 2440 microhenries each. C and D are of the same construction but have only 400 turns and an inductance of 1975 microhenries each. All of the coils are wound in a single layer.

It was found absolutely necessary to mount the coils B, C and D very close to the treater or precipitator. When these coils are properly mounted *all* radio frequency interference is eliminated and the only remaining noise is an occasional crackling which occurs only when the treater is overloaded so that sparks jump between the treater plates.

The arrangements for the listening- and logging-stations were made by Mr. Redfern, aided by the Tacoma News-Tribune. Mr. Ralph F. Barker, manager of the Tacoma Smelter, gave us excellent co-operation and his eletricians made all the necessary coils, doing an excellent job. The writer designed the coils and engineered the work.

*Radio Department Pacific States Electric Co.

(1—We have been assured by our members that such interference is sometimes very bad 75 miles from a Cottrell installation. The Technical Editor of *QST* would like to hear from all readers who are at present troubled by such interference. Please give as much detail as possible.

KFUH

'Somewhere East of Suez"

By Ralph M. Heintz*

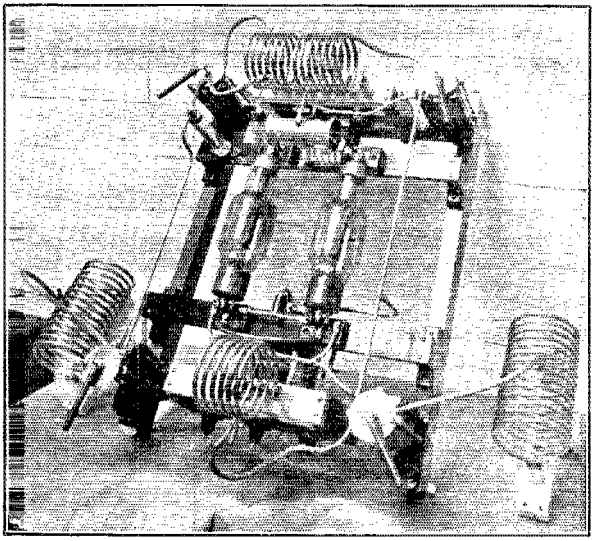
"Adventure, Romance, Blue Skies and Thou,
O! Radio beside me in the wilderness;
That were happiness enow".....
"Omar Kaimiloa"

SHE'S a good ship, a graceful big white craft; all beauty, and comfort, and staunchness. None of your ordinary pleasure yachts for the owner of the *Kaimiloa*. His ship must carry with it the salt tang of the old days; the days of white wings and plenty of rigging when seafaring men knew a lot more about where the wind would push them than they do nowadays. Even the name, an old Hawaiian word meaning "far searching" is in harmony with her quest, for the *Kaimiloa* is to be used not alone for pleasure, but will help make complete the World's Book of Knowledge. scientific data has already been gathered, of great value in establishing the root of the Polynesian race. Specimens of South Sea flora and fauna both from beneath the sea and from the specks of land dotting the sea have been gathered and placed in various museums where all may benefit. This work is being continued during the present cruise.

Just as should be expected, the *Kaimiloa's* radio equipment is unusually complete. During her first cruise, radio communication on ordinary ship's frequencies was seriously hampered by a tremendous blanket of tropical static. Her sturdy little One Kilowatt Navy Standard Spark Set simply couldn't compete with it. Not alone that, but reception of any kind, even from the super-powerful long wave stations was impossible for days at a time. Isolation of this kind was extremely trying to Mr. M. R. Kellum, the owner, as the transaction of business in connection with his interests was seriously hampered.

It was while returning from the first cruise, and while still in the South Seas that I received a radiogram which read substantially, "Build new transmitter—use your own judgment—meet your Honolulu three weeks". By the Grace of the Almighty and the Department of Commerce K F U H was granted 20, 40 and 80 meters in addition to her regular waves using the same call letters. Short waves were just attracting attention, so it was decided to take a flyer at them and work was started on the transmitter forthwith.

Confusion, which always attends a new departure in Radio, was rampant; experimenters couldn't agree on this and that; push-pull current supply and parallel tubes especially were condemned as le Bonque. The last straw was the announcement that the tuned-grid, tuned-plate circuit, a particular pet of mine, was no good whatever on super-short waves. This was certainly too much, so it was decided to disregard public opinion and proceed on the assumption that short waves are just as subservient to common sense as long ones and that a little difference in frequency is going to turn C.W. practice upside-down. Failure with any good circuit, is due in most cases, I believe, to lack of reasoning on the part of the individual. The features which commend a circuit for 200 should still commend it for 20-meter operation.



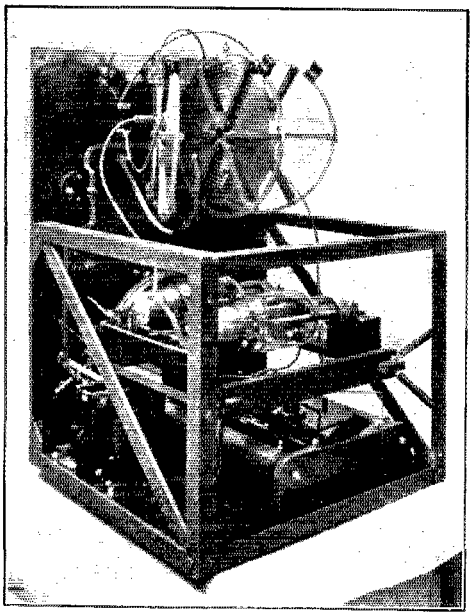
The short wave transmitter, antenna coupler and plate coils above and grid coil below. Antenna and ground loading coils to the right and left of set.

If steadiness, that is, freedom from change in frequency, is attained on 200

* President, Heintz & Kohlmoos, Inc., San Francisco, also 6GK, 6XBB.

meters, through employment of a certain circuit, the same circuit should produce steadiness on 20, if ordinary reasoning is resorted to in the design of the 20-meter set.

Of the self excited circuits, common to us all, the tuned-grid, tuned-plate is certainly the steadiest. There is every practical and theoretical reason why this should be so. It is not surprising, therefore that well-meant advice was cast to the winds and our old



Long Wave Set. Conventional Meissner Circuit. Range 200 to 900 meters.

and trusted friend of the past "tuned grid n' plate" was called to the aid of his party.

Steadiness is not the only advantage to be gained. There were constant complaints by short wave men about the grid leads and the grids themselves heating to a dangerous point, especially on 20 meters, when ordinary tubes were used. Some experimenters even went so far as to have special tubes built with extra heavy grids and grid leads. It will be remembered that with the tuned-grid, tuned-plate circuit the grid is excited through the capacity coupling between the plate and the grid; in other words most of the feedback takes place within the tube, thereby relieving the grid and grid lead of nearly all of the strain. Here the tuned-grid, tuned-plate circuit has a decided advantage.

It was at first thought advisable to resort to the good ol' method of building a "haywire" set on a "breadboard" and give her a try. "But", said Ol' Lady Reason, "what's the use. Either your reasoning is right or wrong. If you think you're right go ahead and build your set. It'll work". So the set itself was designed and built, using our past experience with the circuit as far as that would go and relying on Providence to take us the rest of the way.

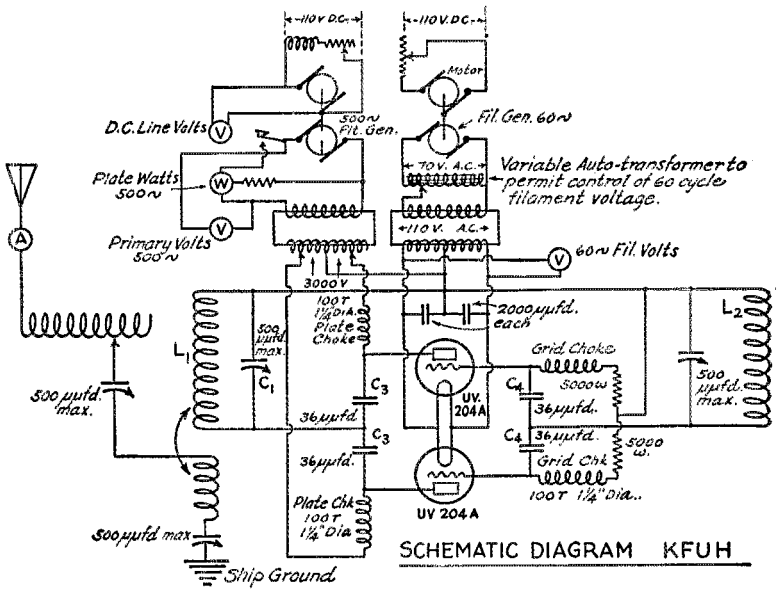
The set was complete, even to the paint and varnish, before we gave her the first dose. A nice long arc and the smell of burning pork told us she was oscillating, which she did right off the bat. And what's more, she went down and down. Finally we ran out of inductance—a half turn in the grid and a turn in the plate—still oscillating merrily on about 10 meters. This same 10 meter wave put 1½ amperes in a tube 4 feet long; which is only a matter of interest apropos of nothing in particular except that we were able to say "yaa-yaa" to the "boid" (you all know him) who said she wouldn't go down to 40.

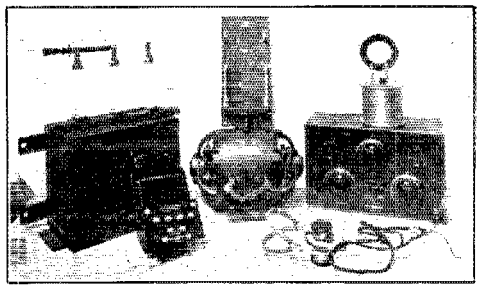
You will recall that the capacity coupling (always referring to the tuned-grid, tuned-plate circuit) of the tube itself on the lower frequencies is in some cases too feeble to effect complete excitation of the grid. In such cases a small variable condenser is sometimes employed between the grid and plate—that is a small capacity in parallel with the inherent coupling capacity within the tube. A more common and less desirable way is to supplement the inter-element capacity coupling with a slight inductive coupling. Around 200 meters the unaided inter-element coupling is in most cases about right but, as the frequency is increased, the inter-element coupling becomes more and more of a controlling factor until on super high frequencies the feedback becomes too severe and so must be partially neutralized. This was found to be most easily accomplished by coupling the grid coil with the plate coil in the reverse direction. This inductive coupling in order to serve its purpose need be but very slight, a distance of 20 to 30 inches with the coils in the same plane being sufficient, and the coupling is of course not critical. By this means the feedback is kept more or less constant over a limited band of frequencies; in this case between 10 and 90 meters. That is, when the feedback within the tube increases with frequency the erasing effect of the inductive feedback also increases, keeping the capacity feedback at a fairly constant excess.

The plate blocking condensers should be quite small, the reason for which is apparent. The plate LC circuit should be coupled as loosely as possible to the plates so that this circuit is influenced but slightly by the "parasitic" capacity of the tube and its "hangers on" such as the grid condensers, filament bi-pass condensers, etc., and "parasitic inductances" such as the plate and grid radio-frequency chokes and wiring.

Furthermore, the plate blocking condensers are in reality, grid coupling condensers in series with the inter-element coupling capacity which is in turn in series with the grid condensers. In other words, every attempt was made to isolate the power-supplying portion, of the circuit, *the tubes*, as much as possible from the frequency-controlling portion of the circuit, *the plate and grid LC circuits*, using only such capacities as are actually needed to transfer the energy available. As a matter of practice the plate blocking condensers need only be slightly larger than the capacity between plate and filament. By the same token and for the same reasons the grid condensers in case they are used should also be small and can be of the same size as the plate condensers. Grid condensers and leaks were not employed at KFUH because their use is generally fraught with difficulty on board ship; however they are included in the diagram for the benefit of those who employ them. Both the plate and grid condensers have a capacity of 36 μμfd and could well have been smaller, but, because RCA UC-1846 condensers fitted well into the scheme, they were used. Furthermore these condensers employ a sulphur dielectric which makes them unusually useful for short waves. UC-1803's may also be used to good advantage especially on fifty-watters. For the benefit of those who still believe that 2000 μμfd. blocking condensers are necessary to pass sufficient energy I may say that it was found possible to pass enough energy through the blocking condensers employed to cause the 5/16 inch tubing inductance to become unbearably hot; this of course without an antenna to absorb the energy. This was found to be true on 80 as well as 20 meters.

The diagram (Figure 2) shows what takes place within the circuit. Contrary to what should be expected from experience with the same circuit on longer waves, the tuned grid circuit (L_2C_2) on short waves is no longer the controlling factor as regards frequency. Instead the tuned plate circuit (L_1C_1), because of the relatively small blocking and grid condensers, controls the frequency; being very little affected by the grid circuit. The tuned grid circuit now becomes a controller of the output without interfering to any great extent (within limits) with the efficiency of the set, the plate cur-

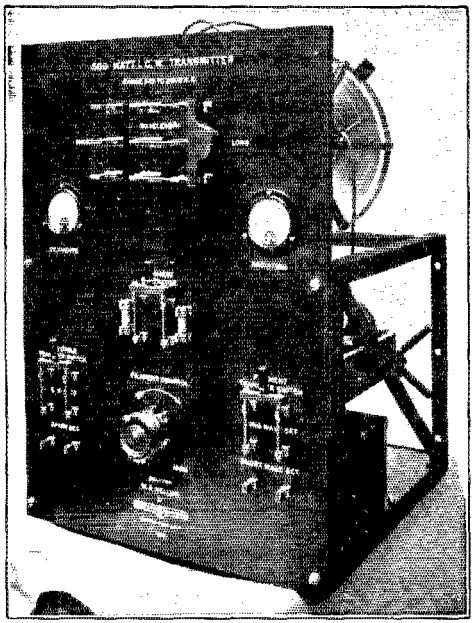




Accessories. Long wave antenna transfer switch, on top of plate transformer. Below auto-transformer for regulating filament supply. Plate transfer switch on top of filament rotary convertor. Wavemeter on top of receiver.

rent dropping at a fairly constant rate with the antenna input.

The parasitic capacities, C_5, C_6, and C_7 are in series parallel with each other and in turn are in series with the small C_3 and C_4. Because of the small size of C_3 and C_4 the possible effect of these parasitic capacities; that is variations in them is greatly



Long wave set which is also control panel for both ICW sets. Note transfer switches to change from CW to spark and from short wave to long wave ICW.

minimized. This is important. On longer waves we gave no thought to the change in capacity of the tube with a varying electron stream as the dielectric. Now we find these considerations valuable—even vital—to constancy of output frequency.

In order to make the best use of every advantage the two circuits, L_1C_1, and L_2C_2 are made "stiff"; that is C_1 and C_2 are made relatively large. By this means any change in the weak system C_3, C_4, C_5, C_6, C_7, could cause only a very small addition to or subtraction from this complex system of small capacities paralled with C_1 or C_2; (especially C_1) with the consequent possibility of only a minute change in frequency of output.

By making C_1 and C_2 large L_1 and L_2 must, of course, be small. This causes relatively heavy currents to flow in L_1C_1; and in L_2C_2, of course to a much less extent. It is important therefore, to keep the resistance of these circuits, especially L_1C_1 as low as possible, and particularly the apparent resistance due to phase displacement, caused, for instance, by the presence of certain dielectrics in this intense field. This last is certainly brought home when it is considered that a piece of bakelite held within the plate coil soon becomes too hot to hold with comfort.

The coils used at KFUH are held rigid by the spokes of porcelain "Massie" inductance insulators which some of you may remember from days gone by. Rigidity is still further insured by winding the coils of hard drawn copper tubing. The reason for these precautions is self evident when the swinging of the ship and the vibration of the engines is to be contended with. Any small change in L_1 (already small) would certainly produce a noticeable change in frequency. As a final precaution the entire set is swung on springs, the flexible leads in this manner being the antenna and ground connections, small changes in either of which have little or no effect on the frequency or output. This is superior to cushioning the tubes alone, the reason for which is clear. For installations on land such precautions are unnecessary. For instance in the installation at 6XAD the coils were made rigid enough to support themselves at the ends alone; permitting changeablity of coils for different wavelengths, and in addition eliminating dead ends and dielectrics in the field. This arrangement, while superior electrically, is impracticable on shipboard where clips are necessary in order to use rigid inductance supports.

The plates are supplied by the 1-K.W. 500-cycle generator which also supplies the spark set and the 500-watt ship's wave I.C.W. set which is included in the new equipment. This 500-watter which operates

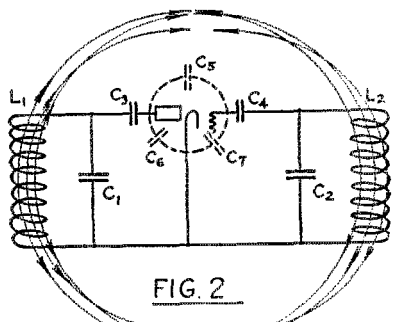


FIG. 2

on 600 and 706 meters has no place in this discussion except that this set also contains the controls for the short waver and such items as filament meter, transformers, protective devices, etc., which are common to both sets. The regular power and service meters contained in the Navy spark set are so connected that they serve all three sets. Three transfer switches are all that are required to change from one to another of

the sets and only a moment is required to change from 600 spark to 600 I.C.W. or to 40 I.C.W. using the same key.

A special transformer supplies the plates of the two sets the voltage being variable between 2000 and 3000 volts on either side of the center tap, 2500 being normal. This together with the usual generator controls makes the set very flexible.

In order to provide a desirable frequency difference between the filament and plate current a small rotary convertor is used, which supplies 60 cycle to the filaments. The filament voltage is regulated by means of a rheostat in the D.C. side of the generator which also serves as a starter. This prevents the filaments being brought to full brilliancy instantly, the time elapsing while the motor is gaining speed being made good use of.

By employing loading coils (of the same construction as the plate and grid coils) the operator has the choice of two antenna harmonics on both 20 and 40 meters. On 40 the operator has the choice of either the 3rd or 4th. The 4th harmonic gave the best results from the start and so far there has been no reason for a change to another nor has there been much use for the 20 meter wave.

The antenna is a vertical tapering cage 14 inches in diameter at the top and 90 feet high and is right among the rigging and shrouds. It drops straight down from a cross-tree on the fore-mast, so most of the signaling is done through a nice wet canvas filter to say nothing of a hundred thousand nice steel cable paths which are forever luring a poor unsuspecting wave to destruction. The arrangement is far from ideal but rigging simply cannot be dodged on a wind-jammer.

While the installation at KFUH may be declared a success, unusual distances on short waves are to be expected. Her success is due more, perhaps, to Fred Roebuck's unusual ability as an operator, than to the equipment. His good fellowship and friendliness on the air has given pleasure to whose who have worked him. He has sent a breath of the South Seas to lots of fellows whose only chance of getting there is to skid down on a heaviside reflection. He has already worked about everybody, which is all the more remarkable considering the many duties he has to perform aboard ship, which prevent his spending much time on the air.

The efficiency of any installation islimited, of course, by the receiving equipment. The receiver uses only detector and one step with Townsend's circuit which has been described in these columns. It is giving the transmitter enough to do to work everybody that can be heard. A number of these sets have been built so far, three of which are at sea on yachts and all are doing unusually good work. Success aboard ship, both with transmitting and receiving, is fairly difficult to attain and serves as more than casual recommendation. As regards selectivity KFUH had no difficulty in working through N R R L, 200 yards away and while both were on the same band; this while both were at Honolulu.

While push-pull self rectification is employed at both KFUH and 6XAD the same circuit was employed with equal success on the yacht Eloise (KFVM) where a single Fifty Watter was used with 1000 volts on the plate, the filaments also being lighted by D.C. She lays down good signals in the U.S. from Tahiti.

In conclusion I may say that KFUH handled thousands of words of regular traffic, more than 3000 words of which were cleared through 6AWT. She rarely has the slightest trouble in getting through and all traffic with few exceptions is handled "single". She went into operation early in May and has been in steady operation ever since. She will be at or near Papeete, Tahiti, for several months and from there will probably cruise around New Guinea, Australia and New Zealand. It is only through working a station that Roebuck can tell that he has been heard there. That is because no one knows where to send QSL cards. If cards are mailed to Heintz & Kohlmoos, Inc., 219-223 Natoma St., San Francisco, Cal., these will be remailed by the quickest route, thereby bringing joy and contentment to Hon. Op. Fred, and incidently give Pop a chance to see what the old heap is doing for a living. So, as they say in Hawaii, "PAU".

KFUH's Receiver

By P. J. Townsend*

THE receiver from which the pictures in this article were taken was built for Ray Newby who is using it aboard KFVM, yacht Idalia, enroute for Tahiti. Similar receivers are in use aboard KFUH and KFVT, The two latter were built in the Heintz and Kohlmoos Laboratories, where they are just completing another one for Major Mott.

After one glance at the pictures it will be noticed that the receiver is built along conventional lines and does not depend on sky hooks to support the coils nor does it require tubes with fantom bases. The circuit percolates on twenty meters just as

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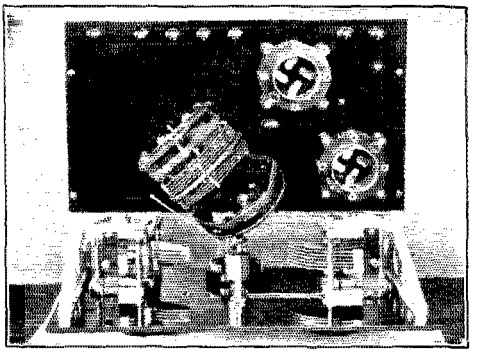
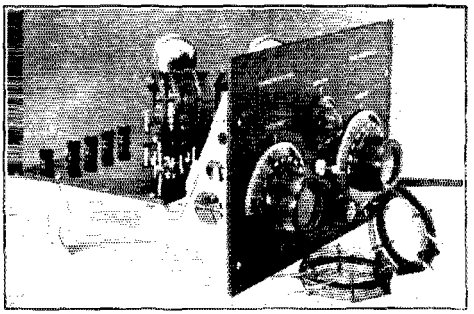
readily as on two-hundred meters or the broadcast waves.

Figure 1, is the circuit used in the above receivers and was developed through experimenting with the tuner as described by Reinartz in March, 1922, *QST*. In this same issue, or the one following it, two different writers, as I remember it, suggested using a feedback coil in place of the radio frequency choke in the plate supply circuit. I tried this but the results were not satisfactory until the combination of coils given for broadcast reception, Figure 1, was worked out. This arrangement had given such wonderful results on broadcast reception that it was only natural to fall back on the same circuit when I decided to see what was going on down on the shorter waves.

The construction of the coils may be determined from the photographs—the tickler is fixed and the secondaries are all constructed so that they may be plugged into a pair of Union phone-tip Jacks mounted on the sub-panel. Slots are cut into the cross arms of the coil supports to receive the wire. The 80-meter coil is wound two turns to the slot, giving nine





TOP AND SIDE VIEWS OF THE RECEIVER

banks of two turns each, each bank spaced 3/32" between centers of turns.

Eddy-current losses result from excess metal in the circuit; therefore don't use wire larger than No. 14, preferably No. 18,[1] especially in the coils. The ohmic resistance increases with sizes smaller than this. A condenser with rubber or bakelite end plates is preferable to one having metal ends providing the mechanical construction is good—thin plates are most desirable. In other

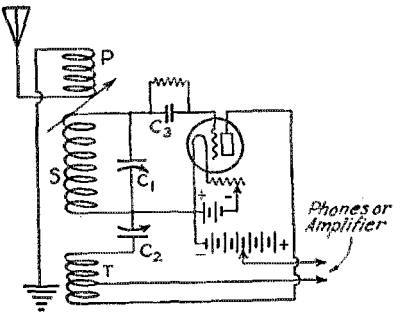


FIG. 1

BROADCAST

P—Any of the usual methods of coupling.
S—*Depending on the value of the condenser C1.*
T—10 turns tapped at the middle for plate supply lead, wound directly over or under filament end of secondary coil.
C2—250 uufd. C3—250 uufd.

20, 40 and 80 METER BANDS.

All coils 3" diameter and wound with No. 18 D.S.C.
P—5 turns, single layer not spaced and mounted so that coupling to secondary may be varied.
S—3 turns for 20M, 8 turns for 40M, 18 turns for 80M. Coils wound with turns spaced 3/32" between centers of turns.
T—5 turns tapped second turn from plate end for plate supply lead, leaving three turns for X circuit. This coil must be wound in the same direction as the secondary coils and mounted so that a ⅛" space is left between it and the secondary coil when plugged into place.
C1—150 uufd. C2—250 uufd. C3—150 to 250 uufd., not critical.

words—masses of metal are not to be tolerated at these frequencies.[2]

Referring to the photo of the top view of the set—notice how the coils are mounted well away from other apparatus. A Precise audio-frequency transformer is mounted under the sub-panel, clear in the back right-hand corner.

A variable grid-leak is quite essential and the only one that I have found satisfactory so far is the Electrad Variohm, 1/4 to 10 megohms.

The sockets used are the Heintz and Kohlmoos "NIL-LOS" sockets, which are exceptionally good for reducing microphonic noises due to vibration.

1—The best size depends on the coil diameter and the space between the turns. For such coils as ordinarily used a size as small as 22 may be good. See page 30 of *QST* for June, 1925.—Tech. Ed.

2—There seems to be a very general notion that all condensers with metal end plates are good and all those with insulating end plates are bad.

This is utter nonsense, either type can be excellent or worthless. When they are worthless it is almost always because of *poor joints* or *poor insulation, practically never because of losses in the solid metal parts.* It is true, however, that a metal end-plate can be troublesome when brought too near a coil.—Tech. Ed.

The One-Stage R. F. Amplifier

By P. L. Pendleton*

AS regenerative circuits have standardized along the lines of three-circuit tuners so has the addition of a stage of R. F. amplifier ahead of the detector assumed a certain definite form in the sets used today. Examples are the Crosley Trirdyn, Robert Reflex, National Regenaformer and the Marco No. 1. R.F. Kit. The successful performance of these and other combinations caused the Martin-Copeland Co. to instruct the writer to experiment further with this type of circuit and to design the apparatus for its construction from kit form. During this work results were obtained which are at variance with some of the reports recently published and it has been suggested that these will be of general interest.

A survey of the existing commercial types showed that the most interesting distinctions between the various hookups were in the method of controlling the tendency of the R.F. tube to oscillate; also that the control was in most cases accomplished by the specific dimensions and positions of the plate coil of the R. F. amplifier tube. This coil was generally combined with the detector grid coil to form a unit piece of apparatus (R. F. transformer) and it was decided to examine the relation of this unit to the whole circuit, to take advantage of the work that had been done by others and to design, if possible, an arrangement which would operate to good advantage through the broadcast band of wavelengths.

The R. F. Transformer

In the R. F. transformer ahead of the detector we usually have a coil of a few turns forming the plate inductance of an R.F. amplifying tube and another coil of a greater number of turns forming the grid circuit of the detector tube. The plate coil is the primary and the grid coil is the secondary of the combination, which is usually closely coupled.

In the case at hand regeneration in the R.F. stage was indespensable and appeared as a voltage of sufficient strength to upset utterly the calculated effects of primary and secondary voltages where the regeneration had not been taken into the calculation. As the voltage due to regeneration is variable within such wide limits we were forced to question the practical value of any mathematical work and to adopt other methods.

*Consulting Engineer, Martin-Copeland Co., Providence, R. I.

The Experimental Work

Current types of apparatus employed a wide range of coupling between the R. F. plate circuit coil and the succeeding grid coil, some units having the primary packed into a slot at one end of the secondary, other providing separate coils in pancake form from ¼ to 1 inch apart. A model assembly was therefore laid out in such a manner that all shapes and sizes of plate coil could be used and the coupling with relation to the detector circuit varied.

The experimental layout is shown in Fig. 1. The wiring diagram is shown in Fig. 2 and is conventional. A single circuit antenna system was chosen as it eliminated controls and gave louder signals on the popular short indoor antenna. Control of regeneration in the detector circuit is obtained after the Hartley or Reinartz method for reasons stated later on. Looking at Fig. 1, the right hand coil is in the R. F. grid circuit with its tuning condensers behind it. Next is the detector grid circuit condenser followed by the detector circuit inductances mounted on the feedback condenser. The R. F. plate circuit coil is at the left of the R. F. tube. This layout provides a wide separation of radio frequency and detector grid circuit coils which is a help in eliminating undesired feedback. Mar-Co Condensers and simple single layer solenoids were used as an aid in obtaining a condition of low resistance in the tuning circuits. Knife switch terminals were mounted on a movable rubber base and a number of coils made up with blade terminals so that they could be quickly interchanged while signals were being received. Specifically these coils were solenoids, flat spirals and multi-layer rectangular coils as shown in Fig. 3. The size of wire varied from No. 24 to No. 36 B. & S. and the turns ran from fifteen to sixty in coils of generally equal

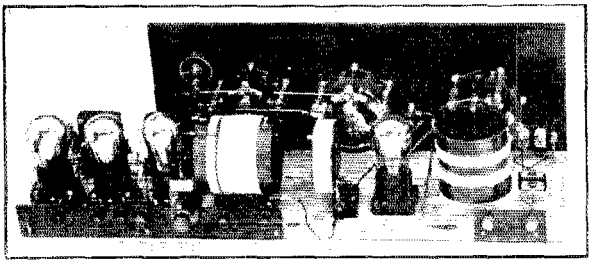


FIG. 1 THE EXPERIMENTAL SETUP

shape. The blade terminals were offset in order to allow the insertion of the coils until they were directly under the last few turns on the secondary and as thin tubing was used the coupling was quite close and could be varied to a distance of three or four inches. These coils were made in variety in order to remove the possibility of freak performance through the use of a certain style and absolutely no unusual phenomena were encountered along this line.

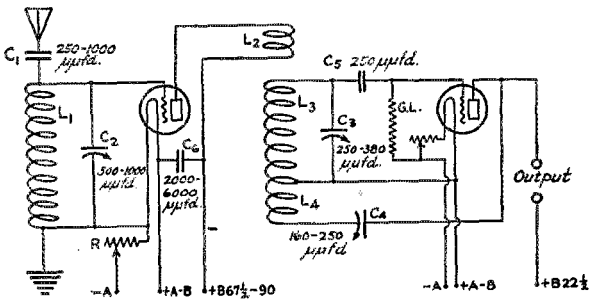


FIG. 2

CONNECTIONS OF THE SETUP SHOWN IN FIG. 1.

C1 is a small fixed condenser whose main business is to cut down the effect of the antenna capacity.

L1—C2 Antenna coupler or input tuner.

L2 Output coil of the R.F. tube which acts as primary for the R.F. transformer L2—L3.

L3 Secondary of the R.F. transformer. The coil is tuned by the condenser C3 and acts as the grid, or input, coil of the detector.

C4 Feedback condenser which controls the regeneration provided through the coil L4. L4 is wound as a continuation of L3. This scheme of regeneration control will be recognized as the one which was popularized by Reinartz. It was previously used, however.

C5 is the usual grid condenser, C6 the usual by-pass condenser. R and G L are the usual rheostats and grid leak.

With some types of headsets (or transformers if an audio amplifier is used) it is necessary to put an R.F. choke in the lead going directly upward from the word "Output." 200 to 300 turns of No. 30 to 40 B. & S. on one to two inch tube will make a satisfactory choke.

It was required that a coil be chosen which would couple the R.F. and detector circuits with as great a transfer of signal strength as possible, without sacrificing selectivity, and without causing uncontrollable oscillation in the R. F. tube circuits. It was also decided to do the work under actual operating conditions, accordingly tests were conducted on an outside antenna 65 feet long as representing an average condition. As an aid to the control of oscillation on the R. F. side the R.F. grid return was brought back to a point on the filament side of the rheostat. Type UV-201A tubes used as it was felt that more marked results would be obtained from a fairly heavy plate current A few hours' work with this layout gave us the following notes, which may be easily checked by any one desiring to perform an interesting experiment.

1. Excess of feedback coupling over and above that necessary to produce regeneration and any coupling between the elements of the detector plate circuit and the R. F. plate coil is a big factor in producing undesirable oscillations on the R. F. side. Tickler regeneration was tried at first and with sufficient turns to produce strong regeneration at maximum wave length settings the R. F. tube had to be turned down in order to stop oscillation on the short waves. With the same R. F. plate coil and the same coupling, the tickler was removed and nine turns of wire wound over one end of the secondary tube in series with a condenser was substituted as in the diagram. The R.F. tube circuits immediately ceased to oscillate from any cause not controllable by the feedback condenser which was the condition sought. This is probably due to the fact that even when the tickler was at zero coupling considerable current could flow in it generated by feedback from other parts of the circuit. With this method minimum setting of the feedback condenser cuts down the detector high frequency plate current variations to a point where practically no field exists in the feedback coil. Installation of a choke coil in the detector plate circuit did not appear to give any better results than that obtained from the R.F. reactance of the audio transformer

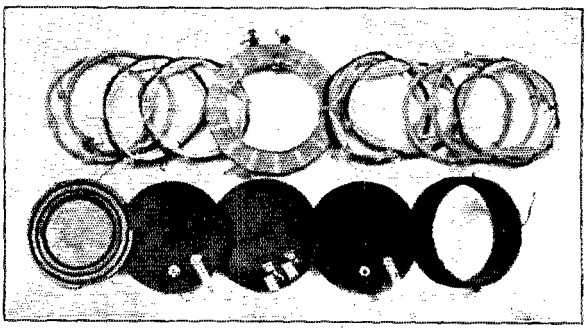


FIG. 3 COILS TRIED IN THE R.F. PLATE CIRCUIT IN THE POSITION WHICH IS MARKED L2 in FIG. 2.

primary. This would probably be necessary where a headset was used in order to eliminate body capacity effects.

2. The use of neutralizing circuits in this instance has no practical effect on selectivity, as even where feedback is neutralized the load due to mutual inductance is still effective varying with the coupling.

3. Resistance in the plate circuit coil of the R. F. tube is not desirable. Of two inductances having equivalent electrical dimensions and coupling the one having lowest H. F. and D. C. resistance will give better results. Where there is marked discrepancy in the resistance of the coils the gain from the use of the low resistance coils is easily perceptible on weak signals. This eliminates multi-layer windings.

4. Turns in the R. F. plate coil may be varied within wide limits without perceptible changes in the signal strength of a weak signal. Any decrease in signal strength due to a reduction in the number of turns may be renewed by an increase in plate current. It is apparent that the strength of the field surrounding this coil is the important factor and that this field may be produced by any combination of turns and current as in any field within limits. As the normal plate current is a fixed factor, the number of turns will vary according to the coupling which is in turn regulated by the required degree of selectivity. Limit on turns is reached when oscillations appear in the R. F. circuits.

5. The looser the coupling between the R. F. plate coil and the detector grid circuit coil the greater will be the signal strength of weak signals with noticeably sharper tuning, provided that looser coupling is compensated for by increased plate current, so that the relation between the fields remains constant and does not disturb the condition of resonance in the tuned circuits. In practice it was found that change in the coupling could not be altogether compensated for by increased R. F. plate current without slight re-turning. It was definitely proven however, and may be checked by anyone, that a decreased coupling followed by an increased plate current gives a definite increase in the signal strength of weak signals and in the selectivity of the combination.

6. No given dimension in the coils are so important that they must be adhered to in order to give noticeably better results than some other slightly different arrangement with the exception of resistance. Slight changes in the number of turns, the diameter or the shape of the R. F. plate coil cause no apparent difference in the reception of faint signals which cannot be compensated for by an adjustment of some other factor. Substitution of tubes passing less plate current than a U. V. 201A require a few more turns on the R. F. plate or detector feedback coils, increased plate voltage or closer coupling.

In connection with paragraph No. 5 it may be observed that the Roberts Reflex and Crosley Trirdyn provides loose coupling of the R. F. plate coil indicating that the importance of this feature has been noted. Both of these arrangements have proved by comparative test to be more selective than apparatus where the R. F. plate coil is wound in a bunch at one end of the detector grid coil and closely coupled to it.

After the above notes had been taken and rechecked the model assembly was completed as shown in Figure 1. Normal voltage was used on the filaments with 22½ volts on the detector and 67½ volts on the R. F. tube plate circuits as normal plate voltage. Conventional spacing of the apparatus gave a comfortable three inches between the R. F. plate and detector coils and at this distance twenty-five turns of No. 24 D.C.C. wire on the plate coil gave all the field that could be comfortably handled. The solenoidal form of winding was adopted on account of simplicity and efficiency. Comparative operating tests showed that this arrangement was more selective and gave better amplification of weak signals than any other apparatus that could be found of the same general type; the same location and energy collecting system being used for all. Accordingly it will be placed on the market

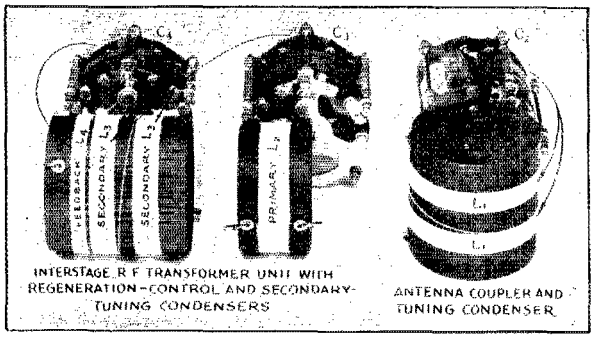


FIG. 4 A KIT OF PARTS DESIGNED IN ACCORDANCE WITH THE EXPERIMENTAL RESULTS AND CALLED THE "MAR-CODYNE."

The photograph is taken from the back, hence the circuit must be followed from right to left. The arrows indicate the coil to which each condenser is connected. Note the extremely loose coupling between L2 and L3.

Condensers C2 and C3, being tuning controls, are equipped with vernier dials while condenser C4 needs only a knob and pointer, its settings not being so exacting and having no definite relation to wavelength.

as Mar-Co Radio Frequency Kit No. 2.

This work was done under actual operating conditions where local conditions provided plenty of opportunity to test selectivity and offers general information for the proper design of apparatus for such a circuit. It will be found that the general rules given are covered by previous investigation and well known formulae and will apply in all cases where similar problems are to be solved. There are those to whom this article will reveal nothing new but it is believed that many will be glad to have the facts of the matter brought to their attention in a manner which can be readily understood and proven to be true by those interested in work of this nature.

Practical Hints

As has been stated, the number of turns in the plate coil L_2 (Figs. 2 and 4) must be changed to suit the tube used.

Table 1—Plate Coils.—3" tubing used

Tube in R. F. socket	Coils L_2
UV201A or UX201A	25 turns No. 20 S.C.E.
UV199 or UX199	50 turns No. 32 S.C.E. or D.C.C.
UX120	50 turns No. 32 D.C.C.
UX112	10 turns No. 18 D.C.C.

The UX120 and UX112 tubes are not recommended for use in the R. F. socket, as they usually give poorer response. On extremely loud signals they give a stronger response, but here it is not important.

In all cases the nearest edges of coils L_2 and L_3 are to be about 2" apart, or a little more.

Buying Tubes

When purchasing tubes for any receiving set they should be required to pass the following plate currents.

Table 2—Tube Voltages and Currents

Tube	Grid Bias	Plate Voltage	Plate Milliamps
UV201A or UX201A	-4½	90	5
UV199 or UX199	-4½	90	2
UX120	-22½	135	6
UX112	-6	90	2.4

Choice of Tubes

The R. F. tube should have a "C" battery of its own in order to avoid interaction.

The same C battery may be used for both the first and second audio tubes *if* the following tube combinations are used.

Table 3—Tube Combinations

First Audio Tube	Second Audio Tube
UV or UX199	UV or UX199
UV or UX201A	UV or UX201A
UV or UX201A	UX 112
UX120	UX120

The last combination is not recommended.

The better practice is to use a UV or UX199 in the first audio socket with a UX120 tube in the 2nd audio socket, and to run separate plate and grid battery lines to the two tubes, the proper voltages being shown in table 2. Ordinarily UX201A or UX199 tubes in the 2nd audio socket will give satisfactory volume. Where strong incoming signals overload these tubes the new UX112 or UX120 tubes may be used with the voltages shown in table 2. In all cases be sure to use the indicated "C" battery voltage to protect the "B" battery.

Aerials

A receiver with r. f. amplification will work on any conceivable kind of aerial, short or long, inside or out, bedsprings, piano frames, screen doors, etc., or no aerial at all. Nevertheless there is a certain type of aerial for every location which can be considered the best. The length of the aerial affects the selectivity of the set, the sensitivity at the ends of the dial scales, and the calibration of the dials. The second or detector circuit dial varies little with any aerial or location, the first or radio frequency stage being most ffected. With a short aerial from ten to twenty feet long the circuit is extremely selective and tunes well at the lower broadcasting wavelengths. Tuning may be critical and it may be necessary to turn the radio frequency tube well down or to reduce the radio frequency plate voltage in such a case to avoid undesirable R.F. oscillation. The longer wavelengths will be received more clearly with an increase in the length of the aerial, but there will be a slight decrease in selectivity and a change in the setting of the first dial. For general reception in congested districts use an inside or outside aerial thirty to forty feet long. In outlying districts use two outside aerials, one twenty to thirty feet long and one 75 to 100 feet long including leadins. With this arrangement and a two point switch maximum results can be obtained. These aerials should be well separated up to the point at which they reach the switch. Good reception on wavelengths above 300 meters for a long distance may be had with no aerial by attaching the ground wire to the antenna binding post. With this arrangement it is hard to control the set on the low wavelegths. Local reception never requires anything but a ground connection to the ground binding post for powerful signals. With this device it is possible to observe the degree of amplification at radio frequencies obtained with the first tube by turning this tube out and attempting to pick up signals with the detector and audio amplifying tubes alone.

Editor's Note

As used in the "Marco R.F. Kit No. 2" the coils not described in Table 1 are as follows: Antenna coil L_1, 47 turns of No. 20 S.C.E. Secondary coil L_2, 45 turns of No. 20 S.C.E. Feedback coil L_4 20 turns of No. 28 S.C.E. Secondary and feedback coils are on 3½" bakelized cloth (micarta) tubing. Other coils on 3" tubing.

Schnell Returns

THE U. S. Battle Fleet dropped anchor at San Diego on September 26, ending the 6-months' Australian-New Zealand cruise during which Lt. F. H. Schnell, U.S.N.R.F., A.R.R.L. Traffic Manager has been in charge of short-wave communication from NRRL, the flagship "Seattle".

Schnell has done a wonderful job. His low-power ham set on NRRL has maintained regular communication at extreme distances, often being the sole contact between the Fleet and land, and daily outperformed standard navy equipment of twenty times its power. The Navy will profit from these lessons, and thus he has distinctly advanced Navy communications, under actual service conditions and under the observance of the naval officers who need the communication. He has firmly cemented the bond between amateurs and the Navy and has brought to the Navy a vivid realization of the value of the amateur. Only as the years roll on will the value of his work, to both the amateur and the Navy become fully apparent.

Schnell has received a splendid letter of appreciation from Admiral Coontz, Commander-in-Chief of the Fleet. When it is realized that the Fleet carried 45,000 men, in running for a period of over six months, and that Schnell, a reservist, was the only one to receive such a letter, the value of his work and the extent of the Navy's appreciation is indicated. Here is the letter:

CinC File No.
A6-2(10-99)

UNITED STATES FLEET
U.S.S. SEATTLE, FLAGSHIP
19-Es-(0)

Passage Papeete, Tahiti,
to San Diego, California,
Sept. 21, 1925.

From: Commander-in-Chief, U.S. FLEET.
To: Lieutenant Fred H. Schnell, U.S.N.R.F.
SUBJECT: Letter of appreciaiton.
ENCLOSURE: (A) Copy of CinC USFlt file A-6 (10-92) of 16 September, 1925.

1. There is enclosed, for your information, a copy of the final report on superhigh frequency radio, for the cruise to Australia-New Zealand, 1925.

2. Upon departure from San Francisco, the fleet had had no experience in superhigh frequency radio. Upon completion of the cruise six months later the successful application of these frequencies for the fleet long distances work had been thoroughly tested and proved.

3. You have labored tirelessly for the success of the venture. The Commander-in-Chief takes pleasure in acknowledging the effectivness of your work, and in thanking you for your efforts.

4. The work you are doing in endeavor to make the amateur organization ready in event of National need, is an exceedingly important one. Through you, may I express my wishes for its happiness and success?

(Signed) R. E. COONTZ,
Admiral, U. S. Navy,
Commander-in-Chief,
UNITED STATES FLEET.

Copy to—
CNO
BuNav

Schnell has been detailed to Washington to report. He will broadcast to amateurs from NKF on Navy Day, October 27, and is expected back home in Hartford by early November. The complete story of his adventures on NRRL will be published in *QST* in the earliest possible issue. It relates the story of a classical event in the history of amateur radio—don't miss it.

—*K.B.W.*

Strays

New Intermediates

K—Germany
PR—Porto Rico
SR—Republic of Salvador

A.R.R.L. Headquarters announces with regret the resignation of its assistant secretary and assistant treasurer, Chas. A. Service, Jr., 11D, who is removing to Sarasota, Florida, to engage in business. With one brief separation Service was with Headquarters about five years, coming at a time when the staff numbered only eight or ten. Throughout his tenure he was the Headquarters office manager. Starting in radio in 1907, he was for years 3ZA of Bala, Pa., and has a long record of A.R.R.L. connections, being in turn District Superintendent, A.D.M., Division Manager, Director, and Vice-President of the League. His many friends at Headquarters greatly regret his leaving but wish him every success in his new location; we hope to hear him on the air as a "4" soon. Treasurer Hebert has assumed his duties as office manager, and A. L. Budlong, formerly Assistant Traffic Manager, becomes assistant to the Secretary-Editor.

The Pacific Coast Standard Frequency Station

By Henry H. Henline*

UPON learning that the Bureau of Standards of the U. S. Department of Commerce desired to arrange for the transmission of standard frequency signals from some Pacific Coast radio station, the Department of Electrical Engineering at Stanford University volunteered to make such transmissions. Since September 5, 1924, signals have been transmitted from station 6XBM according to the Bureau of Standards schedules except on a few dates when, due to unavoidable delay in the preparations, it was impossible to transmit some of the higher frequencies. Since April 20, 1925, all scheduled frequencies have been transmitted.[1] The range now being covered is 125 to 6000 kilocycles. This article will describe the transmitting equipment and methods of operation but will not deal with the frequency measurements or standards.

On account of the rigid requirements of constant frequency, wide range of frequency, quick adjustment to a certain frequency, and quick adjustment for maximum power output, the master-oscillator power-amplifier system was adopted by the Bureau of Standards for the transmission of all except the higher frequencies. The master oscillator is operated at low power output, and therefore its elements (i. e. tubes, condensers, coils, etc.) do not reach a temperature high enough to cause an appreciable change in the generated frequency. Since heating in the power amplifier tube does not affect the frequency of the master oscillator, the former can be worked at full power output.

In the installation and operation of the 6XBM equipment, circuit diagrams, descriptions of apparatus, and operating instructions supplied by the Bureau of Standards have been followed closely. Modifications were made only where local limitations of apparatus made them necessary.

The 125-1500 K. C. Set

Two transmitting sets have been installed. The first of these, that for the lower frequency range, (125 to 1500 K. C. or 200-2400 Meters), was constructed and adjusted by the author in collaboation with Mr. H. J. Walls who was sent to Stanford University by the Bureau of Standards for this purpose. (See his article, "The Standard Frequency Set at WWV", *QST*, p. 9 of Oct., 1924). The circuit diagram of the master oscillator-power amplifier set is shown in Fig. 1. The master oscillator is a UV-203 50-watt tube, and the power amplifier is a UV-204 250-watt tube.

For convenience in operating and for safety, an oil insulated switch with electromagnetic control is used for switches S_7 and S_8. The lamps are of such ratings and so connected that the master oscillator tube receives a plate voltage of 1000 volts under normal conditions. Condenser C_7 serves as a by-pass for radio frequency current, and thus causes the radio frequency voltage across choke coils L_3, L_4 to be very low. The resistance R_1 is used to keep the grid of the amplifier tube at the proper negative potential for best operation, and is set at about 175 ohms. Radio frequency voltage generated by the master oscillator is supplied to the grid of the power amplifier through the coupling condensers C_6 and C_5. C_5, which will withstand a high voltage, is used to protect the tube from damage in case the variable condenser, C_6, flashes over.

Keying is accomplished by opening the grid return circuit of the power amplifier. This isolates the grid, and causes it to accumulate a large negative charge which blocks the amplifying action of the tube. When this circuit is open, the master oscillator supplies some current to the antenna through the internal capacity of the amplifier tube, thus causing the spacing-wave which can be heard at a considerable distance. This spacing-wave does not interfere in any respect with calibrations being made from the signals, because all such calibrations should be made while the key at 6XBM is being held down giving a very long dash.

The procedure in the tuning of this set to an exact frequency is similar to that used in tuning the WWV transmitter which was described by Mr. H. J. Walls in *QST* for October, 1924. The master oscillator inductor, L_{11}, and condensers, C_{13} and C_{14}, are adjusted to produce approximately the desired frequency. The power output is kept low for the reason given above. With the capacity of the coupling condenser, C_5, reduced, the antenna circuit is tuned to resonance with the master oscillator frequency by adjusting for maximum antenna current and minimum plate current. Then, in order to secure maximum ouput, the capacity of C_6 is increased, and the plate tap on the antenna inductor is adjusted to bring the plate current to approximately normal value. Final adjustments are made by tuning the master oscillator to the exact

* Associate Professor, Department of Electrical Engineering, Stanford University, California.

1 These schedules appear regularly in *QST* and in the mimeographed releases of the Bureau of Standards. They have no connection with the A.R.R.L. system of Official Wavelength Stations.

frequency desired and by tuning the antenna circuit to it by means of the small smoothly-variable inductance L_1. The final tuning of the master oscillator is accomplished by the use of small variable condenser shunted across C_{13} and C_{14}. This

range of 1500 to 3000 kilocycles (wavelengths of 100-200 Meters) with the antenna circuit inductively coupled. Recent tests have shown, however, that the separate set described below operates more satisfactorily in this range of frequencies.

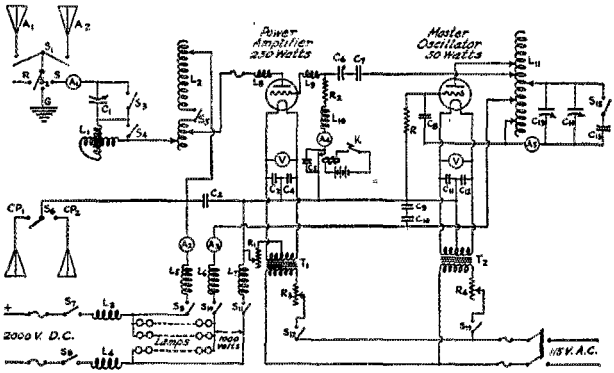


FIG.1 MASTER OSCILLATOR-POWER AMPLIFIER SET

FIG. 1. THE 125-1500 K.C. SET, USING A UV203 OSCILLATOR AND A UV204 AMPLIFIER.

INSTRUMENTS

A1—Radio frequency antenna ammeter, 5 amperes.
A2—D. C. amplifier plate meter, 1 ampere.
A3—D. C. oscillator plate meter, 250 milliamperes.
A4—D. C. amplifier grid meter, 100 milliamperes.
A5—Radio frequency meter in closed primary tuned circuit, 8 amperes.
V —A. C. filament voltmeters, 15 volts.

RESISTORS

R1—Oscillator grid-bias resistance. Slide wire rheostat set at about 175 ohms.
R2—Amplifier grid leak. Resistance wire on porcelain tube, 175 ohms.
R5—Oscillator grid leak, 5000 ohms.

CONDENSERS

C1—Antenna shortening condenser, 450 uufd.
C2—Amplifier plate-circuit bypass condenser, mica 3000V, 2000 uufd.
C3, C4, C11 and C12—Filament-tranformer bypasses, paper, 750V, .5 µfd.
C5—Keying condenser, mica, 3000V, 2000 ufd.
C6—Amplifier grid coupling condenser, air, variable with max. of 2000 µufd.
C7—Protective, mica, 3000V. 2000 uufd.
C8—Oscillator grid, mica, 3000V, 2000 uufd.
C9 and C10—Oscillator plate bypass, paper, total rated voltage 3500, total capacity .25 ufd.
C13, C14, C15—Primary tuned-circuit condensers.
C13—Air, variable, maximum 1250 uffd.
C14—Air, variable, maximum 450 uufd.
C15—Mica, total voltage rating 6000, total capacity 1000 µµfd.

INDUCTORS

L1—Antenna variometer, Stator: 4¼ turns ¼" copper tubing. Diameter of coil 7". Rotor: 5½ turns ¼" copper tubing. Diameter of coil 5⅛".
L2—Antenna coupler, Federal Telegraph Company 2 kw. loading inductor. 9 turns high-frequency cable in each of 18 single layer pancake sections. 16 turns bare copper wire at bottom for taps. Total inductance, approximately 3.77 millihenries.
L3, L4—Large iron core choke coils, acting as filters.
L5, and L7—R. F. choke coils 300 turns No. 24 B. & S. d.c.c. copper wire bank wound in two layers on 2½" cardboard tube.
L6—R. F. choke coil 600 honeycomb coil.
L8—Amplified plate choke, 6 turns No. 12 B. & S. bare copper wire. Diameter of coil ⅞".
L9—Amplifier grid choke, 9 turns. Otherwise same as L8.
L10—Amplifier grid-coupling choke. Same as L5 and L7.
L11—Primary tuned-circuit inductance. For 125 to 1500 kilocycles (200-1600 Meters).
Three spiral coils, two of 20 turns each and one of 16 turns, of copper strap 23/32" x 0.025" on redwood supports. Inner end starts 3¾" from center. Spacing ⅜". Outside diameter of 20 turn coils 21".
For 300 to 1500 kilocycles (200-1600 Meters), one of above 20-turn coils.

small condenser consists of a fixed plate 3 7/8" x 2⅛" and a circular plate 2¾" in diameter which is kept paralled to the fixed plate, but moved closer to or farther from it by a screw. This is turned by a wooden rod so the operator's hand is kept at some distance from the plates.

This set is, as has been said, used for frequencies from 125 to 1500 kilocycles i. e. wavelengths of 200-2400 Meters. It has been used for several schedules over the

The 1500-6000 K. C. Set

The circuit diagram of the high frequency set is shown in Fig. 2. That set is used for the frequency range 1500 to 6000 kilocycles, and is similar to the set used at the Bureau of Standards for this range. A UV-204 250-watt tube is used in a Hartley circuit.

In transmitting with this set, the antenna circuit is *not* tuned exactly to resonance. To tune for a given frequency, the antenna cir-

cuit coupling is made loose and the antenna condenser is set so the antenna is detuned. Then the plate, filament, and condenser taps and the condenser C_2 are adjusted to produce approximately the desired frequency with the plate current at a low value. The antenna coupling is increased, and the antenna condenser, C_1, adjusted to obtain maximum antenna current which will permit stable operation without exceeding the safe value of plate current.[2] If the output and efficiency are not satisfactory, the plate and filament taps are changed slightly. The final adjustments of frequency are then made by means of condenser C_2 and the small variable condenser which was mentioned above. This condenser is used with both sets, being easily transferred from one to the other. In the photograph it is seen standing on top of the high-frequency transmitter frame.

The oil switch represented by S_1 and S_2 in Fig. 1 and the choke coils L_3 and L_4 are used with the high frequency set also. By means of single pole double-throw switches placed in the plate supply leads just before they reach switches S_9 and S_{11}, these leads can be connected to either set. A single pole double throw switch in one side of the secondary of filament transformer T_1 makes possible the use of this transformer to heat the filament of either 250-watt tube. A double pole double throw switch used with the filament voltmeter makes it possible to use the same voltmeter on both transformer secondaries. For simplicity these double throw switches are omitted from the diagrams.

Fig. 3 shows both transmitters. The high frequency set is on the bench, and the master oscillator set occupies the structure shown in the right hand half of the photograph. The two antenna ammeters and antenna switch are on the wall.

The master oscillator set occupies much more space than is necessary for the parts now being used. On account of the necessity of installing it at a minimum cost, space was allowed for a large oil insulated variable condenser which was later found to be unsatisfactory. Uncertainty as to the final form of antenna and master oscillator inductors caused the allowance of more space than necessary for the forms adopted. Provisions were made for installing four 250-watt tubes in the power amplifier.

The antenna inductor of the master oscillator set is on the left hand end of the upper shelf, and the master oscillator inductor is near the center of the shelf. The master oscillator tube is just to the left of the inductor and behind the 2" x 4" upright. The coupling condensers, C_6 and C_7, are just to the left of this upright. The master oscillator condensers, C_{13}, C_{14}, C_{15}, and the ammeter A_5 are to the right of the inductor. The variometer is just below the

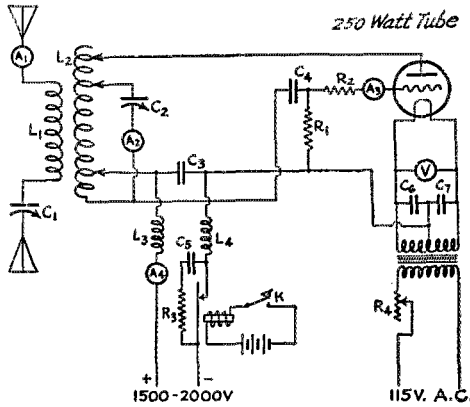


FIG. 2 HIGH FREQUENCY SET

THE 1500-6000 K. C. SET, USING A UV-204 TUBE IN A HARTLEY CIRCUIT, INDUCTIVELY COUPLED TO THE ANTENNA.

INSTRUMENTS

A1—Radio frequency antenna ammeter, 1 ampere and 5 ampere instruments used as required.
A2—Radio frequency primary tuned-circuit ammeter, 15 amperes.
A3—Radio frequency grid ammeter, 1 ampere.
A4—D. C. plate current milliameter, 500 m. a.
V—A. C. filament voltmeter, 15 volts. Same voltmeter used on both sets by means of a transfer switch.

RESISTORS

R1—Grid leak, 5000 ohms.
R2—Current limiting resistance, 50 ohm graphite rod.
R3—Resistance wire on porcelain tube, 175 ohms.

CONDENSERS

C1—Antenna-shortening, Variable air, 150 uufd.
C2—Tuned primary-circuit, Variable air, 400 uufd.
C3—Plate-bypass Mica, 21000 volts, 4000 uufd.
C4—Grid Mica, 3000 volts, 2000 uufd.
C5—Keying, 3500V, .25 ufd.
C6 and C7—1 ufd., 1750 volts.

INDUCTORS

L1—Antenna-tuning, Spiral coil containing 6 turns of copper strap 23 32" x .025" starting 2⅝" from center and spaced 1" between turns. See foto).
L2—Primary tuned-circuit. For 1500 to 3000 kilocycles: Spiral coil containing 10½ turns of copper strap 2 3/32" x 0.025" starting 3¼" from center and spaced ½" between turns.
For 3000 to 6000 kilocycles
Strap same as above. 4¾" turns starting 2¾" from center and spaced 1 5/16" between turns.
Each of the above mentioned coils is wound on a bakelite frame and has an outside diameter of 17".
L3—Plate supply R. F. choke. 170 turns No. 25 B. and S. d. c. c. copper wire in single layer on 3¼" cardboard tube.
L4—100 turns. Otherwise same as L3.
The coils L1 and L2 are mounted so as to slide readily on two hardwood rods which pass thru their frames near the centers. The resistance R2 is used to limit the capacity current which flows between grid and plate and grid and filament. This current would be excessive at the highest frequencies if not limited in some manner. The resistance has very little effect at the lower frequencies for which the set is used.

2—These hints should help out some of the many members who have been unable to get satisfactory operation from their master-oscillator sets.

antenna inductor. Just to the left of that is the dial of the antenna condenser. The last three instruments at the right hand end are for the speech amplifying and modulating equipment which has not been completed. The switches showing on the front panel are, from left to right, a small single pole for controlling the 2000-volt oil switch, three large single pole switches, (enclosed so only the handles show, and represented by S_9, S_{10}, and S_{11} in Fig. 1) two single-pole for controlling the filament transformers, a double-pole double-throw used to transfer the filament voltmeter, and a filament switch for

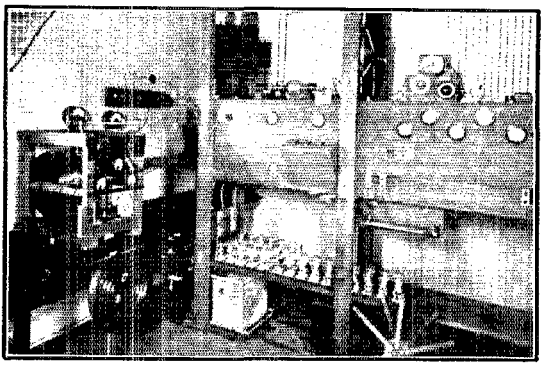


FIG 3—THE TWO TRANSMITTING SETS

the speech amplifier. The telegraph relay, choke coils, resistors, master-oscillator filament-transformer, some fixed condensers, etc, are in the space back of the instruments. The lamps used to obtain 1000 volts for the master oscillator are on the lower shelf. The oil switch is in the galvanized iron tank on the floor, and the power amplifier filament transformer is in the black tank to the right of the switch tank. The extra pair of coils necessary in the master oscillator circuit for the lower frequencies is leaning against the lower shelf.

The Antennas

With the two antennas shown in Fig. 4, it is possible to transmit frequencies throughout the range of 125 to 6000 kilocycles. The two antennas are stretched in one line between two wooden uprights which are mounted on the tops of towers. These same towers also support short sections of various types of power transmission conductors used for corona loss measurements and other high voltage investigations. The transmitting sets are installed in the small light-colored, wood building at the center of the photograph.

The longer antenna consists of 6 cables, each containing 7 strands of No. 18 hard drawn copper wire, arranged in the form of a hexagonal cage with the distance between parallel sides about 30 inches. It is 150 feet long and approximately 85 feet above the ground. The down-lead is a cage about 4 inches in diameter containing 6 No. 12 copper wires. The shorter antenna is similar to the longer, but the distance between parallel sides is 12 inches and its length is 25 feet. The down-lead is a cage of 4 inch diameter containing 4 No. 12 copper wires. Both antennas are insulated by porcelain rods having a length of about 12 inches between the hardware at the ends. The longer antenna is used for frequencies from 125 to 1000 kilocycles, and the shorter is used for frequencies between 1200 and 6000 kilocycles.

One counterpoise is about 4 feet above the ground, and extends over the full length of the space between the towers, about 220 feet. It consists of 4 cables (similar to those used for the antennas) spaced 4 feet apart. The shorter counterpoise (used for the higher frequencies) consists of 6 No. 12 copper wires 60 feet long and spaced about 6 feet apart. It is under the shorter antenna, and is about 10 feet above the ground. Both counterpoises are used between 125 and 1350 kilocycles. The shorter is used alone for the higher frequencies.

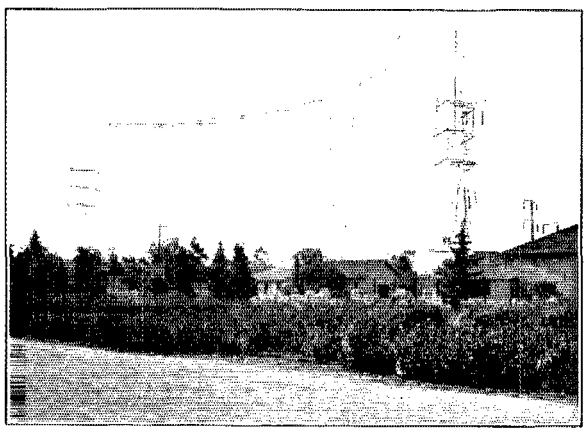


FIG. 4—THE TWO ANTENNAS ABOVE THE EXPERIMENTAL POWER LINE

Antenna currents produced by the master oscillator set have varied from 0.6 ampere at 3000 kilocycles to 5.6 amperes at 600

cycles, and reports concerning the reception of signals seem to indicate that they can be heard on most frequencies throughout the Pacific Coast area. The high frequency set has produced antenna currents from 0.4 ampere at 3600 kilocycles to 3 amperes at 2200 kilocycles, but little is known regarding its range.

Complete record of parts used, tap positions, condenser settings, etc., for each frequency transmitted, are kept. With these, the adjustments necessary for approximately any desired frequency can be made within a few minutes. As a final preparation previous to the transmission of frequencies in a given schedule, the set which is to be used is accurately adjusted for each frequency, and any changes in settings are noted. The operator is usually able, then, to make the necessary changes and tune for a new frequency well within the four minute period alowed between transmissions.[3]

3—This is certainly a remarkable comment on the usefulness of a notebook and a wavemeter. Most stations seem to be unable to shift to another wave accurately unless they take the better part of an hour for the job. A few can do it in short order but are not particularly accurate about it. The station that can shift rapidly and accurately is a rare one.

WWV and 6XBM Schedules

THE standard frequency signals from WWV, Washington, D. C., and 6XBM Stanford University, California, are as follows. For further information regarding these signals see page 34 of the March issue of *QST* and Bureau of Standards Letter Circular No. 92. The former can be obtained from *QST* Circulation Manager, Hartford, and the latter from the Bureau of Standards.

SCHEDULE OF FREQUENCIES IN KILOCYCLES

Approximate wave lengths in meters in parentheses

Time*	Nov. 5	Nov. 20	Dec. 5	Dec. 19	Jan. 5	Jan. 20
10:00 to	3000	125	300	550	1500	3000
10:08 p.m.	(100)	(2400)	(1000)	(545)	(200)	(100)
10:12 to	3300	133	315	630	1650	3300
10:20 p.m.	(91)	(2254)	(952)	(476)	(182)	(91)
10:24 to	3600	143	345	730	1800	3600
10:32 p.m.	(83)	(2097)	(869)	(411)	(167)	(83)
10:36 to	4000	155	375	850	2000	4000
10:44 p.m.	(75)	(1934)	(800)	(353)	(150)	(75)
10:48 to	4400	166.5	425	980	2200	4400
10:56 p.m.	(68)	(1800)	(705)	(306)	(136)	(68)
11:00 to	4900	205	500	1130	2450	4900
11:08 p.m.	(61)	(1463)	(600)	(265)	(122)	(61)
11:12 to	5400	260	600	1300	2700	5400
11:20 p.m.	(55)	(1153)	(500)	(231)	(111)	(55)
11:24 to	6000	315	666	1500	3000	6000
11:32 p.m	(50)	(952)	(450)	(200)	(100)	(50)

*Eastern standard time for WWV, Washington, D. C. Pacific standard time for 6XBM, California.

Strays

8CTE reminds us that the water in the drip pan from the ice box is distilled water and can be used in storage batteries and chemical rectifiers, if it's manufactured ice.

The Vancouver Division Convention

HELD under the auspices of the British Columbia Amateur Radio Association, Inc., at Vancouver on August 29-30, first Vancouver Division (2nd Annual 5th Canadian District) Convention turned out the best convention yet.

The convention started off at 2 P. M., with a good gathering of hams, for a visit to the studio and station of CNRV, one of the best broadcasting stations in Canada, which is operated by the Canadian National Railways. Several hams from Tacoma, Wash., arrived at 3 p. m. and were conducted to the club rooms where a traffic discussion was held for nearly an hour. The gathering then adjourned to allow the visitors to secure quarters and get prepared and "refreshed" for the banquet, which was held in the Grosvenor Hotel banquet hall. Forty hams, B. C. L.'s and guests were seated and, after much QRM from whistles, soup, etc., managed the four courses without any accidents. Elliott's Ham Orchestra rendered several selections while awaiting the arrival of Mr. Walker of the Willard Battery Co. Mr. Walker gave a very interesting talk on storage batteries which was absorbed by all present. The next speaker, Ed. Brooks (5BJ), gave an interesting talk on "Radio in the Forest Service," accompanied by photos of the apparatus he operates. Mr. Wilcox, Manager of the Vancouver Radio Show gave a short outline on what the show would be like and extended a cordial invitation to all hams to attend. Mr. Fred Elliott (5HB) talked for some little time on the activities of the local club and if everything he said took effect the club has a very rosy future. Bill Rowan (5GF) Vancouver Division Manager talked on the activities and non-activities of the division. He urged greater cooperation throughout the division and with our brothers to the south.

By this time a few more hams arrived on the late train from Tacoma and after priming up on the remains of the banquet let her rip. A telegram from Mr. A. A. Hebert sending his regret and the best wishes of headquarters was read.

The gang broke up around midnight, some went home and others went joyriding. Everyone gathered again next morning and the visitors were shown around the city. Mr. Weingarten, Director of the Northwestern Division, was there, just to sort of look over his gang. Hi!

Thus closed another successful hamfest in Vancouver which sets a high standard for the next convention to shoot at.

—*Ed. S. Brooks.*

Key-Thump Filters

OVER a year ago *QST* warned that the key thump must be gotten rid of. In the last two months our correspondence shows an increased interest in doing this. As more stations put in good filters they find that they cannot leave the key in the 110-volt line—for a good filter will take out the keying just as well as it will take out the 60-cycle ripple in the rectifier output.

Looking at the diagram in Fig. 1, if we put the key at A we will not get a key thump

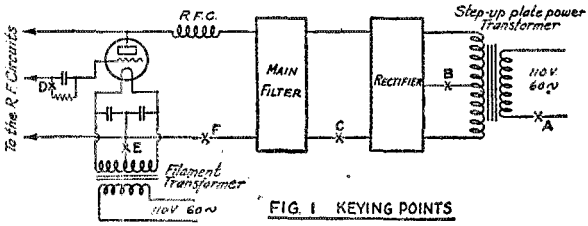


FIG. 1 KEYING POINTS

—neither will we get any keying. This is because the filter will take out both the keying and the A.C. Only a very poor filter will work with the key at A—a good one will cause all the dots and dashes to have long "tails."

If we put the key at B things will be just a shade better, but will still not be

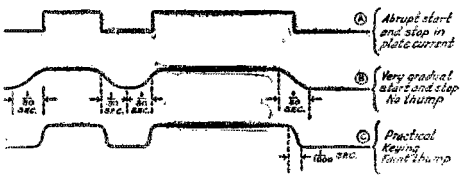


FIG. 2 KEYING THUMPS

anywhere near good enough to send decent Continental code.

If the key is put at C things will remain about the same as at B.

A key at D will cause a beautiful key thump—and there isn't much of anything that one can do about it either. Some relief can be gotten by putting a condenser across the key, but there is a chance that the tube will stop oscillating—and keep on taking power. Besides that the key-thump hasn't really been helped much.

A key at E will also thump, and again there isn't much of anything that one can do about it. This connection has the advantage that it stops the tube (positively) from taking power when the key is open. Therefore the circuit is often used, which is too bad for the neighbors.

Finally at F we have a keying location that positively stops the tube and also lets us do something about the thump. To be sure the keying location has some other disadvantages, for instance that the high voltage plate supply passes directly thru the key. This isn't dangerous with the sets using 5 watters, a little care will avoid trouble with 50 watters and the chap who uses 250 watters is supposed to be rich enough to supply the necessary keying relays, etc.

The Key Thump Explained

Just what is a keying thump anyway? In effect it is this. If the tube is started to oscillating too suddenly it will "jolt" the antenna and send out a "click" that can be heard at almost any wavelength if one is near the sending station. Perhaps this is clearer when one remembers that such a "jolt" is exactly what the antenna received when a spark sending set was used.

Looking at Fig. 2, if we throw the plate power on and off suddenly as shown at A we will have strong keying thumps and interfere with nearby receivers at many wavelengths. If we key as at B the tube starts and stops gradually enough so that there is very little thump. In practice it is good enough to key as at C.

The Cure

Now then, we must start the tube gradually and stop it gradually. We can't very well use a Bradleystat for a key so the thing must be done in another way. Figure 3 shows one possible way. Here we have a "'main filter" which we make as good as possible so as to obtain D.C. Now it is far too good to let the keying thru. Next we go thru the key, K, and then thru a small "keying filter" which is only good enuf to "round off the corners as in C, Fig. 2. This

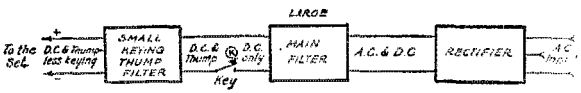


FIG. 3 THE CURE

combination does the trick. The small filter stops the thumps but lets the keying thru—the big filter takes out all the A.C. ripple and everything is well.

FILTER CIRCUIT	RESULTS	
	Key in negative supply lead	Key in common lead as at E in Fig. 1
PLATE SUPPLY (A) TO TUBES	Very bad at start and stop	Violent thump both ends
L (B)	No thump at start Thump and arc at stop	Very bad thumps both ends
L (D) C	Faint start thump. Faint arc and thump at stop	Bad thump both ends
L L (E) C	Very faint thumps at both ends No arc	Very bad both ends
L L (F) C C C	0 thump 0 arc	Very bad both ends
L L (G) C C C	0 thump at start Faint thump at end	Very bad
L L (H) C	0 thump 0 arc	Very bad
(I) C	Strong thump at start Faint at end	Very bad
(J) C C C	Strong thump at start None at end	Very bad

NOTE – In all diagrams L is one coil of an Acme 500 M.A. 1.5 Henry double choke. C in all cases is a "73" 1 μfd. condenser rated at 1500 V.

FIG. 4

The Keying Filter

We already know what the main filter should be (although is seldom is). It should have a 30- to 100-Henry choke coil, and a pair of shunt condensers of not less than 2 microfarads capacity each. Such filters have been described several times in *QST*,

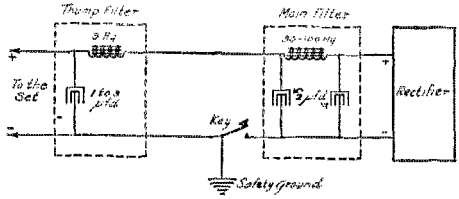


FIG. 5 COMPLETE DIAGRAM

the last time being quite recently. The "keying filter" has also been described in *QST* and we herewith reproduce a cut showing some experiments made at Beekley's former station 1WC. In these tests the rectifier-main-filter combination was replaced by a storage battery delivering 700 volts, otherwise the connections were as shown in Fig. 4. The rest of the test is explained by the figure. Combinations E, F, G, & H are seen to give good results.

The Complete Circuit

The final complete circuit indicated by all this is shown in Fig. 5.

—*R. S. K.*

A. R. R. L. Information Service Rules

1. Before writing, search your files of *QST*. The answer is probably there.
2. Do not ask for comparisons between advertised products.
3. Put the questions in the following form:
   - A. Inclose a stamped self-addressed envelope. Envelope without stamp from foreign countries.
   - B. Number the questions and make paragraphs of each.
   - C. Print the name and address.
4. Address all questions to Information Service, American Radio Relay League, 1711 Park Street, Hartford, Conn.
5. Keep a copy of your question and diagrams and mention that you did. Postcards will be disregarded.
6. State whether or not you subscribe to *QST*.

The Making of a Radio Receiver

By Virgil M. Graham*

THE first work which is done in the development of a radio receiver is the circuit experimentation. This is carried on in the laboratory under direction of the Engineering Department and is merely to determine the working characteristics and the possibilities of the proposed circuit. After this work is completed rough laboratory models are made up to test the circuit under actual working conditions. When these models are made the probable design of the finished product is kept in mind so that the rough model will give an accurate prediction of the performance of the finished receiver.

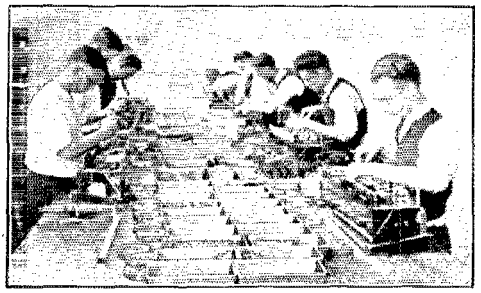
The experimental stage being completed, the engineering of the set begins, and semi-final models are made from plans drawn by Engineers. The work on these models is done in the Experimental Shop, superintended by the Engineers, to see that every detail is correct and according to their plans.

The wiring and testing of these models is done by the laboratory after the mechanical work of making and assembling is completed by the experimental or model shop. These models are used for the addition of any improvements or revisions which are necessary until they represent what seems to be the final model.

ASSEMBLING THE CHASSIS OF A RADIO RECEIVER

The Drafting Department proceeds to make drawings from these revised models. When these drawings are completed or while they are being prepared the Experimental Shop makes up the finished models according to the drawings in order to check them before they are sent to the factory. The finished models are used to make the final check of the operating characteristics of the set under various conditions and also for the completion or the revision of the drawings.

After the Engineering Department is thoroughly satisfied with the operation and construction of the models the drawings are sent to the factory for preparation of stock and construction of the necessary tools. The Engineering Department cooperates in all possible ways with the factory in determining methods of manufacture.



WIRING RADIO RECEIVERS

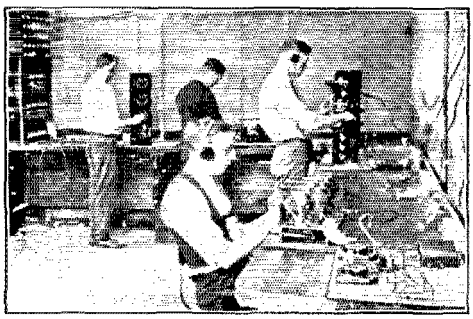
Now we come to the manufacturing stage of the radio receiver. The first work that the factory does is to make tools for the manufacturing of various parts used in the set. While the tools are being made and tested the Purchasing Department takes care of the buying of the raw materials and also of the parts such as meters, knobs, etc., which are purchased complete. As soon as the tools are ready, the various departments in the factory make up quantities sufficient to supply the first "Factory Order" for sets and the Assembly Department begins the assembly of various small parts such as balancing condensers, coil forms, etc. Not until all the materials are obtained and all the parts ready can the assembly proceed.

The chasses of the sets are assembled and taken to the wiring bench. Here the cable and bus wiring is put in and, since the sets made at this factory are neutrodynes, the angle of the radio coils adjusted very accurately. This angle is determined by the physical location of the radio-frequency apparatus in the receiver and is within a very few degrees of the angle of Professor Hazeltine's calculation.

When the sets are completely assembled and wired they are taken to the testing room where they are given a preliminary electrical test to determine if all the circuits are functioning properly and a very thorough

* Engineer of the Stromberg, Carlson Telephone Mfg. Co.

mechanical inspection. After this test the set is balanced and again inspected and sent to the Calibrating Bench where the calibration cards are carefully made from the dial readings of the set at several wavelengths. From this bench the radio receiver is taken to the final electrical inspection where it is given a very thorough test for all operating



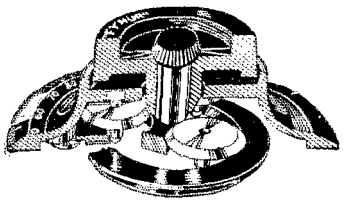
NEUTRALIZING THE RECEIVERS

charactertistics. A screened room used for neutralizing the radio receivers. This screen shielding minimizes the disturbing commutator noises, etc., from the rest of the factory, so that an accurate balance can be obtained. After this test the sets are sent to where they are placed in the cabinet.

The set is placed in the cabinet and polished, it is ready for packing. The packing must be done very thoroughly and carefully as the set must stand rough handling during its journey to the future owner for whom all the detailed work has been done.

The Fynur Slow Motion Control

BY means of a set of beveled brass wheels which are attached to the dial, the slow motion control knob operates through traction. There being no gears in the system all back-lash and lost motion is eliminated. The larger knob

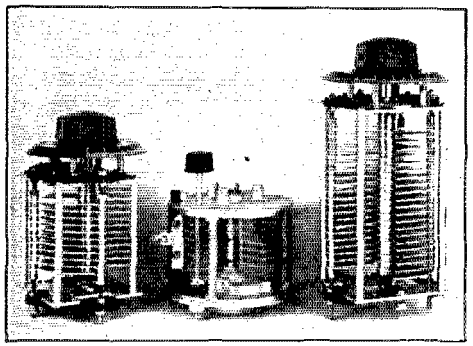


operates independently of the slow motion knob, allowing rough tuning adjustments to be made with the larger knob and the hair splitting adjustments with the smaller knob. The motion is surprisingly smooth and easy. This control dial can be mounted on the condenser shaft without drilling any holes in the panel. The dial is attached to the condenser shaft by means of a small set-screw which can be gotten at from the front side of the panel.

The very small bakelite button in the center of the control dial adjusts the tension of the slow motion dial. Simply loosening or tightening this small button makes the slow motion either very easy or rather stiff. The dials are manufactured by August Goertz & Company, Inc., of Newark, N. J. They should find great use in short wave tuners.

Variable Transmitting Condensers

THE photograph shows some new variable condensers designed especially for transmitters. The two outside condensers are Nationals and the center one is an Acme. The Nationals can be obtained in a variety of capacities with various flashover voltage spacings. The particular condenser at the left has a maximum capacity of 150 μμfd. and is "double



spaced." The flashover voltage of this condenser is around 3,000. The center condenser is a double spaced Acme receiving condenser provided with the Acme rubber tire vernier. This condenser has a maximum capacity of 250 μμfd. and a breakdown voltage of about 3,000. The right hand condenser is a big National brute having a maximum capacity of 450 μμfd and a flashover voltage of 3,000. The National people also make a 100 μμfd. model having a ⅜ inch spacing between plates and a flashover voltage of 6,000. The latter condenser is admirably suited to use in primary as well as secondary circuits in transmitters using overloaded 250-watt tubes.

Strays

Another of the Headquarters Staff has forsaken the ranks of the Single. John M. Clayton, our Asst. Technical Editor, and Miss Noma M. E. Sharp were married on Aug. 8, 1925.

Keeping A Log

By A. L. Budlong, Asst. Traffic Manager

THE other day a letter was sent to a certain second district station asking for confirmation of a transmission during January. That man kept no log, and if it hadn't been for the fact that he had two cards to prove the transmission in question, he would have lost all credit for reaching South Africa on 22 watts! Moral: *Keep a log.*

In view of the above-mentioned incident it will not be assumed that everybody keeps a log; instead we will say, "Everybody *should* keep some sort of log." The true happening just related furnishes one good reason; another is that you can't win a Hoover cup without one; it enables you to prove or disprove transmissions; if the next-door B.C.L. complains to the R.I. that you were transmitting off-wavelength or out of hours, you can prove him wrong (if he was wrong) and that will make you happy; if, on the other hand, the B.C.L. was right, then you will get it in the neck as you should, and that will make it nicer for the rest of us.

Now as to the form the log should be

4-2-25					
P.M.	11:25	(5IN)	39.5	R-5	QRN
	11:50	CQ	Nil	QRN	GN
4-8-25					
P.M	8:00	CQ u 6CGW	40	R-4	
4-13-25					
A.M.	12:06	CQ	40		
	2:10	(1BAN)	42		
	2:55	(8PL)	CW lil	QSS	40
P.M.	1:20	(1AID)	40	fair	NIL

Fig. 1

in: Our observation is that logs are very much like antennae and transmitting circuits. Every station owner is convinced of the fact that his particuiar style of log is the best, the easiest to keep, and the most logical, and he proves it by the fact that after trying several methods he finally came to use the present one. In spite of this, however, we have seen nearly as many different kinds of logs as there are stations. There isn't any real argument against this. If you find a style of log that fits your needs exactly, then that is the best type for you. As long as it tells you enough to identify calls, keep track of transmissions, changes in the circuit, etc., that is, after all, all that is necessary. Some folks of a more methodical trend of mind will want to record weather conditions, barometer, QRM, and exact wavelengths. Others will want simply the bare facts such as time, call and whether worked or heard.

You, therefore, need feel no alarm over the possibility that this article is going to try to push the author's favorite style of log down your throat and insist it is the one-and-only log that is all a good log should be. Instead, the aim is to present several representative types of logs now in actual use by various League members, and then to leave it to you whether you want to adopt any of them, or take

DATE
APRIL 10, 1925

E.S. TIME	CALLED	CALLED BY	
3:25 P.M.	CQ	8BRC	

Fig. 2

from each a few suggestions that you will incorporate in a style of your own brew.

We will start with the simplest style, and let 3DW talk about it. His talk originally was a nice article (as were the others following) but we haven't space, so will have to cut him a little short. Sorry, 3DW.

3WD's Log

Advocating the simple log, he says, "In plain and everyday words, the more elaborate the log, the more time, care and pains you will have to give it, and if you are running any kind of a ham relay station, you haven't got this time, and don't let anyone kid you otherwise. The log book presented herewith is simply an ordinary stenographer's note book, costing from ten to thirty cents, and about 4¼" by 8½". It takes up but little room on the operating table, and has the advantage that when you fill up the pages in one direction, you turn the book over and have another set of pages to fill.

"Rule up a dozen pages in advance, first with a column for DATE and TIME. Second, a column for the station call that you

DATE
APRIL 10, 1925

E.S. TIME	CALLED	CALLED BY	ANS X WKD (X)	
3:25 P.M.	CQ	8BRC	X	

Fig. 3

either worked, heard or called. After that you can leave the rest of the page blank, or rule it up for wavelength, QRN and QRK. Brackets around a call mean he was worked. If you just call a station or hear a station, you can make up your own designating signs, or use abbreviations before or after the call letters.

"Fig. 1 shows what a sample page looks like:

"Of course I have copied this, and it is not so neat in the original handwriting."

Well, fellows, there's one idea. 3DW wisely leaves it to the individual operator to stick in his own breed of fancy fixings, and there is room to do it.

8CEO's Log

We now come to something a little more detailed, suggested by A. W. McAuly, 8CEO. He is in favor of standardization within limits, and says in this connection,

"There are a few facts which we are all agreed should go down in a log, and the log sheet can be standardized to that extent at least. The first necessary fact to be recorded is the date, so in most cases the date is written at the top of the sheet near the center. I can see no disadvantage to making this standard practice, and believe it is common now, though not necessarily universal.

"The next fact to be recorded is the time, and this may well be the first column at the left, even though the call should be entered before the time is marked.

"The next two columns almost always show the station calling and whom called. of transmission time is also noted. Thus, for the complete log, we have Fig. 4.

"We can enter the results of tests, and if lengthy, we can write across the whole sheeting, ignoring the columns and still keep it looking neat, provided the sheet is ruled crosswise."

All of that is good dope, and a good many of you may like that "X" and "circled X" idea for "called" and "worked". Here at headquarters, we were about 50-50 for and against.

DATE
APRIL 10, 1925

E.S. TIME	CALLED	CALLED BY	ANS X WKD (X)	REMARKS Call tmw			
3:25 P.M.	CQ	8BRC	X	B28	1s, 2r	at 3 P.M.	4:00 P.M. finish

Fig. 4

The next speaker is the Quebec D.M., J. V. Argyle, and he advocates the still more detailed type of log sheet.

J. V. Argyle's Log

Ruminating on logs generally, Argyle says, "After many trials of different methods of log-keeping, one has been in use at this station which has stood over a year's test, and still appears to 'fill the bill' as well as ever. When cards arrive, a glance at the log will confirm or disprove them; if someone asks 'QSB pse', the log gives the answer no matter how late the request arrives.

"A good comparison may be had for

DATE	TIME	CALL	W H	My Wave	His Wave	His QSB	My Sigs	His Sigs	Weather	REMARKS
10	0310	7ABB	H		73	CW		R7	Rain	Clg CQ es 8AWJ
11	0120	g2NM	W	80	101	RAC	fair	R4	Rain	He faded—swings too

Fig. 5

This makes our log so far look like Fig. 2.

"Now imagine the situation indicated. Suppose we would like to get hold of 8BRC. We answer his call. It should not take another entry to record this simple fact; a cross "X" should be enough and would take a very narrow column. See Fig. 3.

"If we get him, we circle the cross; if we don't it stands as a logged CQ call by 8BRC, and also a record of a call by our own station.

"Assuming we get him, we may want to send traffic, ask for traffic, or just chew the rag. By leaving the rest of the sheet blank and heading the column 'Remarks', we can use it for anything. If traffic, 9ZT's 1s, 2r tells the story. By using A, B, C, D, or E for the wavebands and following them with the condenser setting, we can log his QRH. B-28, for instance, means that he is on the 80-meter band, and 28 is the condenser setting. The end comparing the DX or traffic value of the various wavebands, and if interested, the effect of weather or daylight may be found quickly. If a change is made at the station, the log shows the effect of it any time you want to know it. Memory does not work very well for the ham—he quick-

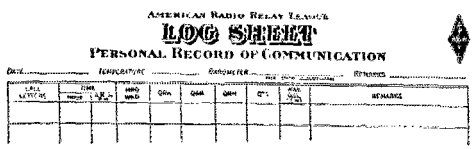


Fig. 6

ly forgets the day he changed from a cage to a single wire, and that card from Australia reported signals QSA around the time the change was made. If the date and time of the change was known for

sure, we would know whether to keep the single wire or go back to the cage. The log would tell him.

"The form of the log is ten narrow columns and one wider one. (See Fig. 5. Note that 'W' means 'worked', and 'H' means 'heard'. Suggest that 'C' for 'called' would come in useful, too—A. T. M.) If an R.A.C. signal is fairly smooth, a bar is placed under the 'R', and if the

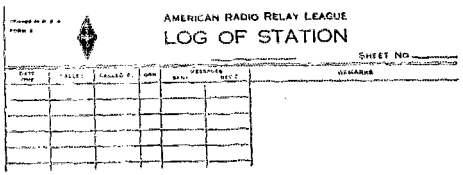


Fig. 7

ripple is bad, then write a bar under the 'A'. Simple and convenient."

For comparison, a couple of "made-up" log sheets are shown in Figs. 6 and 7.

General Remarks

One thing we wish to stress very much is that every change you make in your transmitter should be noted in the log. As Argyle says, our memories are tricky things, and the exact date of the change from a coupled Hartley to a four-coil Meissner, or from a cage to a single wire, is soon forgotten. No matter what the change is PUT IT IN THE LOG. Even if you only change the grid clip two turns, make a note of it. It may come in handy sometime when you want it most.

Well, fellows, we have tried to stress the importance of a log, and have given you plenty of ideas for log sheets to work on. From the several different types of sheet, pick out the one you want, or take from all the articles certain ideas to be incorporated in your pet version of the ideal log, and then go ahead.

The main point is KEEP A LOG.

Dakota Division, Minnesota State Convention

The first Minnesota State Dakota Division and fifth annual Convention of the Southern Minnesota Radio Association combined was held at Mankato, Minn., on September 19th. The session opened under the direction of A. D. M. Cy Barker, 9EGU. A state experimenters' section was organized which is to direct more active experimental research and to cooperate with the "X" section of *QST*. The meeting continued with a discussion of the A.R.R.L. traffic system.

The afternoon technical session was addressed by J. K. Hilliard who spoke on "The Characteristics of Inductances" and was followed by J. P. Barton who spoke on the "Design and Construction of Short Wave Wavemeters." Both men are on the research staff of the University of Minnesota. 9EGG (½ doz.) proved in the contests that he was the code shark while 9BAY showed his superiority at eating crackers. At the executive meeting of the S. M. R. A. the following officers were elected: Clarence Rogness, 9EGG, President; H. J. Palmer, 9BTZ, Sec-Treas.; Elbert Asch, 9BIY, Young Squirt.

At 7:30 a banquet was held in the grill room of the Saul Paugh Hotel. The banquet was well attended by B.C.L.'s and was featured by addresses which dealt with the cooperation and good will between the listeners and amateurs. The convention then adjourned and the amateurs distributed themselves to nearby transmitting stations to pound brass. The success of the convention, which was largely due to Palmer, 9BTZ, was enthusiastically acclaimed by all those attending.

Strays

In our April issue we solicited expressions from amateurs desiring a monthly callbook supplement service, to demonstrate to the Department of Commerce how keen the need was. There was a wholesale response and the Department was duly impressed. When it came actually to undertaking the work, however, it unfortunately was found impossible because of limited printing appropriations and the Department was regretfully forced to abandon the idea. This is hard news for all of us but there seems no help for it until Congress gives the Bureau of Navigation more money. Meanwhile A.R.R.L. Headquarters is examining the supplement idea to see if anything along this line can be undertaken by Headquarters. A further announcement will be made.

International Radiotelegraphic Conference to Be Held

There has been no international radiotelegraphic conference since 1912. Shortly after that time the laws and regulations relative to International Radio needed considerable revision and rewriting due to the rapid advances made in the ever changing art. It is with a great deal of pleasure we look forward to the International Radiotelegraphic Conference to be held in Washington in the spring of 1926. At this conference the subjects to be discussed will range all the way from measures for international supervision of radio communication by high power transatlantic stations to the various and sundry problems of the broadcast listener and the amateur.

The Raytheon Rectifier

By Miles Pennybacker*

ALMOST every radio amateur at one time or another has asked himself why the S-tube idea could not be developed and applied to commercial B-battery eliminators. Perhaps he will be somewhat surprised to learn that this work has been going on for the past three years and that satisfactory models of such a rectifier were put under test over a year ago.

The new tube is known as the Raytheon Rectifier and already several companies are in production on specially designed parts as well as complete B-eliminators.

Before going into the qualities of the tube it may be worth while to review some

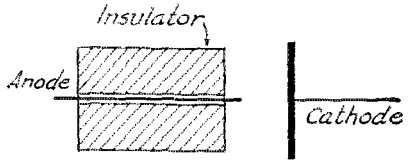


FIG. 1

of the fundamental electrical laws that have made it possible, and to look into the history of its development. To make a rectifier commercially practical, it was necessary to eliminate the major difficulties that have handicapped the old style rectifiers. These older types were invariably characterized by one or more of the following drawbacks:—

Short life.
Low current output.
Low voltage output.
Poor regulation.
Poor rectification.
Instability, or changing characteristics.

It was apparent that to get away from these hazards a new departure must be made along radically different lines. This Mr. C. G. Smith determined to do some five years ago, and he was rewarded by the discovery of the "short path principle" which may be said to be the foundation upon which the Raytheon rectifier is built. By the application of this principle he has been able not only to move entirely free from handicaps of thermionic emission and chemical conduction, but also to make sensational advances in the design of gaseous rectifiers.

This short path principle, like most fundamental laws, may be stated in very simple words—"A rarified gas is an excellent insulator between points which are in close proximity." This of course is in absolute contradiction to what one would expect, since every one has observed that the nearer two oppositely charged electrodes are to one another, the more readily a spark jumps between them. But let us consider what causes this sudden flow of current.

When a difference of potential exists between two cool metallic surfaces separated by a gas, the few free electrons that are in that gas move toward the anode at a rate dependent upon the potential gradient, or volts per inch, along the gap. The current due to these free electrons is so small as to be entirely negligible, since neutral atoms and molecules of the gas are in an overwhelming majority over the active electrons. As the gap is decreased, the potential gradient is increased and these relatively stationary molecules are bumped harder and harder by the successive collisions of the electrons on their way to the anode. Now as the gap is shortened still more a point is reached where the electrons attain sufficient velocity between collisions to knock off an electron from a gas ion, thus vastly multiplying the number of positive and negative particles. The gas by this sudden change has now become an excellent conductor. In fact its resistance may be so low as to be comparable to that of a good metallic conductor.

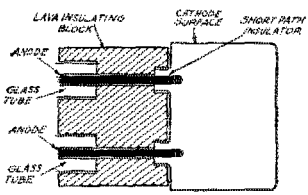


FIG 2a

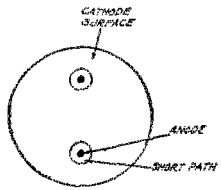


FIG 2b

This phenomenon of gaseous conduction is seen to be dependent upon the electronic collisions with atoms which produce ionization, since there can be no appreciable conduction without ionization.

Hence, if the gas pressure is reduced so that the distance between molecules is enormously large compared to their diameters, and if the electrodes are sufficiently close together that an electron traveling in a straight line between them stands a very slight chance of striking a molecule, the ionization will be practically nil. Even a very marked increase in voltage will not

* Sales Engineer, American Appliance Co., Suffolk Building, Kendall Square, Cambridge, Mass.

cause a current flow since the number of electronic collisions with molecules is negligible. So we now have a gaseous insulator that is dependent only upon its dimensions and not upon voltage for breakdown.

But why this principle is of such great importance in a rectifier is still another story, and one that is just as strange in

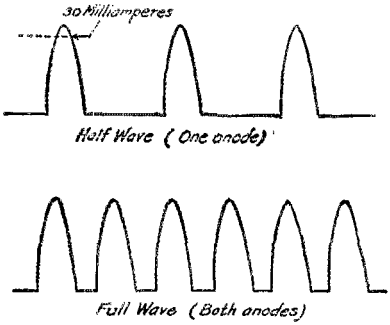
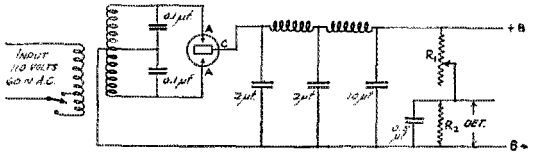


FIG. 3 SHAPE OF CURRENT WAVE BEFORE BEING FILTERED

many of its details. Let us see where it is applied.

It is a well known fact that in a gaseous tube which has one electrode larger than the other the current will flow readily when the large electrode is negative, but less current will flow when the polarity is reversed and the smaller electrode is made negative. The effect becomes more and more pronounced as the smaller electrode is reduced in size, until a point is reached at which the current in one direction becomes absolutely negligible, and we have a rectifier with no objectionable "back current". The practical difficulty is to keep the anode surface small, as some sort of conducting metal is necessary to join it to the external terminal, and unless this portion of the conductor is well insulated it will take a large share of the back current discharge. It would seem easy to insulate all but the very tip, as in Fig. 1, but as yet no insulating material has been found



R_1 is a variable carbon resistance of 10,000 to 100,000 ohms
R_2 is a fixed resistance of 10,000 ohms

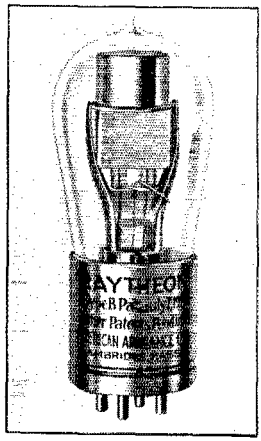
FIG. 4

that would satisfactorily stand up under the temperature and the disintegrating effect of intense discharge in such close proximity.

It is here that a good insulating ring was needed to withstand the strains near the tip, and the short path principle literally stepped in to fill the gap.

Figs. 2a and 2b illustrate diagramatically the way the anodes are insulated from the cathode in the Raytheon tube. The "little tin hat" which gives the tube its unique appearance is shown in cross section in Fig. 2a. The entire inner surface of this hat is the cathode, but it has been ingeniously shaped to utilize the short path principle as an insulator. Since the discharge cannot pass between the parts which are in close proximity, only the tips of the anodes are struck by electrons, therefore the lava insulator is far enough away to be free from the disintegrating effect of the high local temperature.

Not only does this expedient establish the reliability and life of the insulator, but by making possible a decrease of effective anode area and eliminating the back current even more important results are achieved. In fact, it is in the deleterious effects of back current that other types of



THE RAYTHEON RECTIFIER TUBE

gaseous rectifiers have generally met defeat. The limitation of space prevents more than a mere enumeration of the inherent drawbacks of back current. These may be listed in the order of their importance as follows:

Disintegration of the electrodes and shortening of tube life.

Extreme difficulty of filtering out hum.

Low voltage output.

Low current output.

Poor regulation.

Fig. 3 shows an oscillogram of the current in one anode of the Raytheon. No trace of back current is discernible, as the wave does not fall below the zero axis.

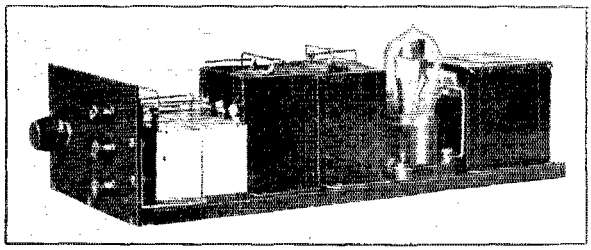
Still another feature of the construction shown is the totally enclosed cathode. By this expedient the discharge is entirely controlled and directed, whereas by any other

construction it would be free to wander around the surfaces within the tube, building up static charges and producing noises in the set.

Since it was thus possible to limit the discharge to one definite area, a special study was made with a view to obtaining a surface of best operating qualities. During the past three years, under the direction of Dr. V. Bush of Massachusetts Institute of Technology, a special heat treatment has been developed that not only lowers the voltage drop within the tube but so effectually prevents disintegration of the metal that the life of Raytheon tubes under normal usage has been lengthened many years. In fact, under continuous operation at 50 milliamperes output there has been no sign of diminishing life after 10,000 hours of test.

But there is still another feature that the wide-awake radio fan will look for before buying or building a set particularly designed for this tube, and that is regulation.[1] In other words, assuming that the tube will deliver sufficient voltage and current to take care of his present five tube set, what will it do on the ten tube superheterodyne that he may purchase later in the season? Furthermore, what about operating the new high-voltage tubes that are now recommended for the last stages of audio frquency amplifiers? The Raytheon tube will deliver a voltage as high as 150 if required, and will sustain its delivered voltage remarkably well under various current loads. How well the voltage is maintained is partly a function of the filter circuit, but with the transformers and chokes designed for this tube,[2] a regulation curve similar to that shown in Fig. 5 may be expected. This curve shows the voltage variation at the output terminals of the filter circuit, in other words the plate supply voltage to the radio set, when from one to twenty tubes are used. It will be found far superior to a thermionic characteristic under the same conditions.

Fig. 4 shows the circuit particularly recommended for use with this tube. Professor F. S. Dellenbaugh, already well known to the readers of *QST*, has taken a leading part in the development of this circuit, particularly with regard to the use of 0.1 microfarad condensers across the transformer secondary. The values of capacity in each of the three legs of the filter circuit are not critical, but any wide variation from the suggested values of 2, 2 and 10 are not advisable. There are some six manufacturers on the market with specially designed transformers and choke coils, all of which give good results. All metal cases should be grounded to the "—B" terminal.



A RAYTHEON RECTIFIER AND FILTER UNIT FOR "B" BATTERY ELIMINATION

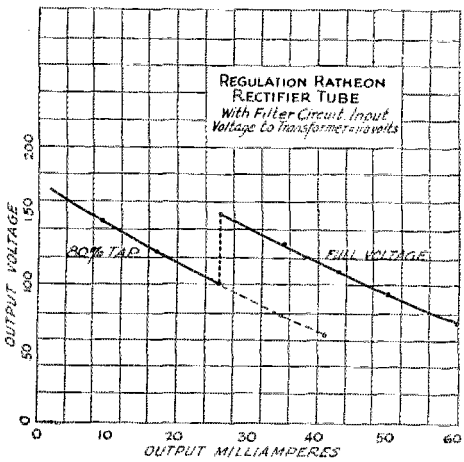


FIG. 5
Curve showing regulation of transformer, Raytheon Tube and filter: i. e., the regulation of the complete battery substitute.

With reasonable care in the selection of parts and in construction, this B—eliminator will be found to produce excellent results on any type of receiver. The first cost is practically th last, thanks to the long life of the Raytheon rectifier.

1. The meaning of "regulation" can be explained as follows. Suppose that the rectifier-filter delivers 50 milliamperes at 150 volts to a receiving set. Now if we disconnect the receiving set the voltage of the rectifier-filter will go up a little. Suppose that it becomes 160 volts, 10 volts higher. We then say "The regulation from full-load to no-load is 10 volts."

We can also say, "The regulation from full-load to no-load is 7½%. Usually we say only, "The regulation is 7½%."

The same rule fits other electrical and mechanical devices, no matter whether we are speaking of voltage, current or speed.—Tech. Ed.

2. The parts, as well as the complete battery-substitute, will be marketed by several makers before this issue of *QST* is on the newsstands.

Navy Developments in Crystal-Controlled Transmitters*

EARLY in July of 1923 the United States Navy placed in commission the Naval Research Laboratory at Bellevue, Anacostia, D. C. This laboratory was built to carry on research in the many fields affecting naval efficiency and is under the direct control of the Assistant Secretary of the Navy. It is available to the various Naval bureaus for the solution of problems under their cognizance. Five large and modern concrete structures, located on the banks of the Potomac three miles below Washington, house the laboratory activities. One of the main sections of this splendid laboratory is the Radio Division, operated under the supervision of Commander A. Hoyt Taylor, U. S. N. R. F., Physicist, U. S. N. For a number of years prior to the war, Dr. Taylor was at the University of North Dakota, and at the University station, 9YN, he showed great interest in short wave apparatus. 9YN was one of the best-known amateur spark sets in pre-war days. As soon as the United States entered the war, Dr. Taylor offered his services to the Navy and commenced his Naval Radio Research work. He has been Superintendent of the Radio Division of the laboratory since its organization. He has always been an advocate of the use of short waves, and the various transmitters at NKF show splendidly the correctness of his assertions that short waves were much to be desired in long distance work.

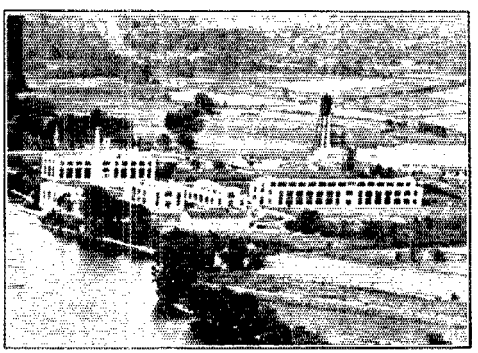


Fig. 1 GENERAL VIEW OF U. S. NAVAL RESEARCH LABORATORIES.

Photo Courtesy U. S. Navy

Shortly after the oscillating properties of the Piezo electric crystals were first made known and demonstrated, Dr. Taylor and his associates at the Naval Research Laboratory realized that crystal controlled transmitters should prove ideal for short wave work, and there followed a series of very rapid and thorough experimental tests. They have resulted in the highest powered crystal-control station in the world—at Bellevue.

A short review of these various experimental sets is interesting. On May 1st, 1924, Associate Engineer Crossley set up a 5-watt crystal-control oscillator followed by a 5-watt amplifier and that followed by a 100-watt amplifier. This was the first crystal-control transmitter ever constructed, designed to put more than 10 watts into the antenna. It operated on a wavelength between 500 and 1000 meters. During the month of June, 1924, Associate Engineer Young and Dr. Taylor experimented with a crystal-control power-amplifier transmitter on 100 meters. This was a low-powered set using two UV-210 tubes, one of which was crystal controlled. This was probably the first *high* frequency transmitter putting out more than 5 watts, crystal-controlled. No tests with distant stations were made with this transmitter because the crystal was cracked in an effort to see how high a voltage could be used on the crystal-controlled tube.

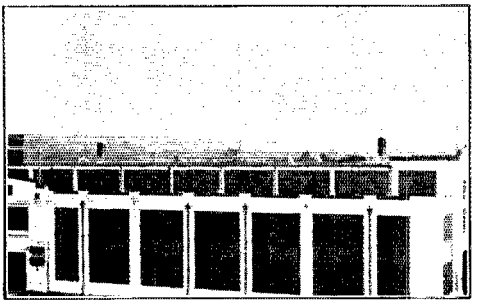


Fig. 2 THE HIGH POWER SHORT WAVE ANTENNAS.

The short antenna on the right is the 25.5-meter antenna and the center one is the 71.3 meter one with its reflecting pole at the left.

Photo Courtesy U. S. Navy

In July of 1924 a transmitter in the wavelength band between 500 and 1000 meters, with an output of 200 watts, crystal controlled, was built by Associate Engineer Crossley. On July 19th this was increased to 360 watts. On September 15th, Associate Engineer Gebhard started a crystal-controlled master-oscillator for use with a high powered set. He introduced the principle of "balanced amplification" with crystal control on October 1st, and on the 25th of Oc-

* Released by permission of the U. S. Navy.

tober Dr. Taylor and Associate Engineer Gebhard built a 250-watt transmitter with crystal-controlled balanced-amplifier which was installed as the master oscillator in the new high-power set operating on 76.6 meters. By the 8th of November, 1924, the output of this set was increased to 10 kilowatts in the antenna and was tested with 1XAM. On the 29th and 30th of November it was tested with Australian and New Zealand stations working on 73.1 meters. On December 4th the Navy Department handled traffic with NBA and NPL on 73.1 meters.

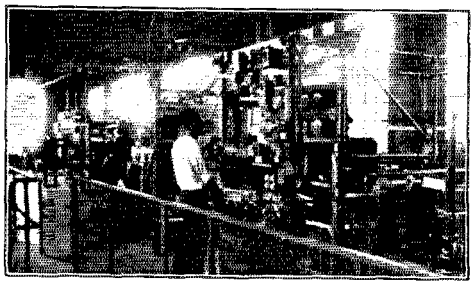


Fig 3 GENERAL VIEW OF THE HIGH-POWER GALLERY.
The 10-K. W. 71.3-meter transmitter in the foreground.
Photo Courtesy U. S. Navy

This set is unquestionably the first real high-powered crystal-controlled set in the world.

By December 31st, 1924, Associate Engineer Crossley's set on the mid-range wavelength had been increased to about 2 kilowatts output. By May 25th, 1925, this set was putting out nearly 5 kilowatts, and on June 12th, 1925, the power had been raised to 8 kilowatts. On August the 10th this output was increased to 12.4 K.W., and as far as is known this is the highest powered crystal-controlled set in operation today in the intermediate band of wavelengths. In the meantime the set on 73.1 meters has at times put out nearly 15 K.W. Another set putting one kilowatt in the antenna on 87 meters was put in operation on January 1st, 1925. A one-kilowatt set operating on 16, 20.8, 32 and 41.7 meters was installed on March 1st, 1925, and a set operating on 17 meters was put in operation with about 300 watts in the antenna on July 1st, 1925. The set at NKF, operating on about 54 meters, which was so well-known to all amateurs at home and abroad, was converted to crystal-control and first tested with 1XAM on 54.4 meters on January 16th, 1925, and with 6ARX on January 20th, using the half-wave of 27.2 meters. This set was shipped to the U.S.S. *Seattle* and tested out during the Australian cruise, using the call NRRL. It gave a very poor account of itself on the cruise, however, due to repeated failures of the generator supplied for operating the set. The regulation of the generator was so extremely bad that it is nothing short of a marvel that the set ever operated at all. Nevertheless, it did accomplish some very good long distance work and it is still used for handling traffic. Unfortunately the *Seattle* has never operated on the 27.2 meter wave on account of the erratic behavior of the generator. The first use of a crystal control in an aeroplane was made in March 31st, 1925. A set using 201-A tubes, crystal-controlled, and operating on a wavelength of 28.3 meters, was heard about 1000 miles. Since then there has been much development work done on aeroplane crystals. The 52A plane set with which many amateurs have recently become familiar operates on 25.2 meters and consists of a UV-210 tube (7.5-watt output) crystal-controlled.

The 25.5-Meter Set

The latest achievement at Bellevue consists in the production of a set controlled by a crystal and putting about 10 kilowatt into the antenna on 25.5 meters. In a very recent 24-hour test the 25.5-meter signals of NKF were copied steadily at NPU in Samoa. The antenna for the 25.5-meter set consists of a 30-foot length of an inch and a half iron pipe on top of the "high power" building. This is the antenna at the extreme right of the photograph showing the high power short wave antennas. This pole is insulated from the top of the building by a large Pyrex bowl on which it rests. It is guyed by means of four ropes attached to

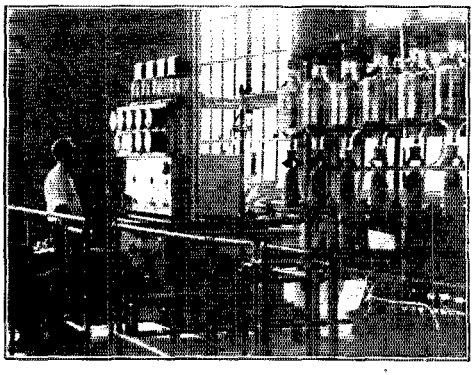


Fig. 4 THE 6 PHASE 50 K. W. RECTIFIER UNIT.
Associate Engineer Gebhard in front of the 10-K. W. 25.5 meter set.
Photo Courtesy U. S. Navy

the pole near its top. A semi-circular fan arrangement of horizontally placed iron pipes acts as a counterpoise. The lead-in from the antenna comes through a window-pane into the high power gallery of the building.

The set (Fig. 4 at the extreme left) uses

a crystal which controls a UV-210 tube, causing the tube to oscillate at 51 meters; a single 204-A tube as the first intermediate power amplifier which also acts as a frequency doubler changing the wavelength from the crystal tube to 25.5 meters; and a last stage using one 20-K.W., G. E., water cooled tube, which is neutralized or balanced and which amplifies at 25.5 meters. The outfit is normally operated to give a little more than 10 K.W. in the antenna. The antenna current is around 20 amperes. All of the tubes are heated by 25-cycle current, which is obtained from the city power main. The direct current generator furnishing the plate supply for the intermediate frequency amplifier is a 7-K.W., 10,000-volt, G. E. machine. A 15-kilowatt, 12,000-volt generator is also available. The high power D.C. supply (Fig. 4 at the extreme right) is obtained from a G.E., 6-phase, Triple T, 25-cycle rectifier which uses a bank of 6 huge G.E. kenotrons delivering a key load of 75 K.W. or a steady load of 50 K.W. at 15,000 volts D.C. This rectifier bank is used on all of the high power amplifiers of all of the sets. Adequate protective devices are installed on this set and on the power panels so that the operation of any of them is al-

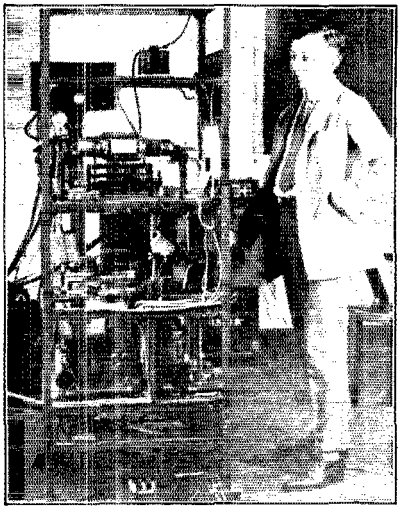


Fig. 5 ASSOCIATE ENGINEER YOUNG (L. C.) and the 1-K. W. 16, 20.6, 32 and 41.3-meter set.
Photo Courtesy U. S. Navy

most fool-proof. If the exhaust water which cools the tube varies in temperature between certain limits or if the water pressure to the tube becomes too high or too low circuit breakers automatically cut off the plate voltage. If anything goes wrong on any one set it is disconnected from the high power rectifier without disturbing any other set that may be in operation from this rectifier. The 25.5-meter set has indicating meters (shown in the photograph) to show the exact current and voltages in various parts of the circuit. The filament voltmeter shows the line voltage to all filaments; a 0-500 voltmeter shows the plate voltage for the UV-210 crystal-controlled tubes; a 0-2500 voltmeter shows the voltage of the

Fig. 6 THE 300-WATT 17-METER EXPERIMENTAL TABLE.
Photo Courtesy U. S. Navy

C-battery machine and a simple instrument indicates the plate voltage of the first amplifier tube (UV-204A); a 0-20,000 voltmeter indicates the operating voltage of the second amplifier tube; a 0-30 R.F. ammeter shows the antenna current; a 0-500 millimmeter shows the plate current of the first amplifier and a 0-5 ammeter the plate current of the second amplifier. A high C battery voltage of 1300 volts is used on the amplifier tube. This voltage is obtained from a separate generator. Although this set has been in operation only since August 3rd, it has given a very excellent account of itself and will probably be one of the main transmitters at NKF.

The 73.1-Meter Set

Another set that has proven of considerable value to the Navy is the 71.3-meter crystal-controlled set. This set is used for Navy traffic with NBA, NPL, NPG and other stations and virtually replaces the 350-K.W. arc at NSS during the night. NSS continues to handle press and Navy broadcast at night but NKF does all of the traffic work after dark. The 71.3-meter set uses a single vertical pole about 50 feet high, made of 1½-inch iron pipe with a counterpoise arranged similar to the 25.5-meter counterpoise. A reflecting pole (Fig. 2 at the extreme left) is placed one-quarter of the operating wave-

length from the main pole. This reflecting pole is tuned to the operating wave and gives directional properties. The transmitter itself is similar to the 25.5-meter set except that the crystal controls one UV-210 tube oscillating at 71.3 meters and both of the power amplifiers are tuned to amplify at this wavelength, no frequency changing scheme being used. The set normally puts 10 kilowatts into the antenna although on several occasions it has been used with an output close to 15 K.W.

The Marine Corps Crystal-Controlled Set

Dr. Taylor and his engineers have just completed the design of two crystal-controlled transmitters for use by the U. S. Marine Corps on wavelengths between 35 and 70 meters. These sets are under construction at the Naval Laboratory and are about the prettiest pieces of transmitting work we have seen in a long time.

All of the apparatus is mounted on a brass angle frame. The panel is a large brass plate and the "baseboards" behind the panel and the partitions between the oscillator and the amplifier are of brass. The sets are designed for use on alternating current throughout and represents what we consider the ideal form of crystal control set for amateur use. The crystal controls a pair of UV-210 7.5-watt tubes connected in a full wave rectification circuit. The first intermediate frequency amplifier consists of two UV-203A tubes which also act as frequency doublers and the last stage consists of two UV-204A tubes acting as straight power amplifiers and operating at the double frequency of the first amplifier.

Control Points

Any of the NKF transmitters can be controlled from a number of places. The 71.3-meter set is usually controlled from the Navy Department's office in the Army and Navy Building in Washington. The 41.3-meter one-kilowatt crystal set is usually controlled from NKF's operating shack. This shack is built into the bottom of one of the steel towers on top of the main building at the laboratory. In the shack one finds a short wave receiver, a heterodyne wavemeter, a key and a generator starting switch, all mounted on the operating table. Nothing else in the way of radio apparatus is in the shack. No experimental work is done here as this is merely an operating room. No operating schedules are maintained during the daytime, but there is an operator on watch all night, every night. A great deal of amate..r work and communication with short wave sets on the various ships of the Navy is done every night. The shack with a big 1-K.W. crystal-control set is the envy of every ham who has seen the place.

—*J. M. C.*

New England Division Vermont Convention

ON the road to Poultney, Vermont, you see signs calling attention to the fact that you are in the "Heart of the Slate Country;"—there should be another sign; the "Town of Hospitality." With the homes of our brother "Hams" thrown wide open to the visiting amateurs from most of the New England States the second annual Vermont convention was called to order on Friday afternoon, September 4th, by Geo. D. H. Wood, President of the Radio Council. A most delightful hour was passed in renewing "air acquaintances" and meeting old friends. The treat of the day, however, was the trip to Lake St. Catherine, known as the Switzerland of New England, where a good staunch motor boat was boarded which took the visitors around the lake, giving everybody a most enjoyable time. Too bad 1XU and 1ARE just missed the trip by getting lost. A decided novelty was introduced for the evening by the Committee having taken over the Opera House and presenting the film "Cytherea." New films from the Radio Corporation were to be shown but unfortunately they were not received for the performance. With the scattering of the "boiled owls" to the different active stations the day ended satisfactorily to everybody.

Saturday morning started bright and early with arrivals from Syracuse, Rochester and Whitall, N. Y., joining the others for the events of the day. There were lectures and addresses by Dr. Elliot White, Director for the New England Division, who told in good plain language what takes place in a Transmitting Tube; F. E. Handy, Acting Traffic Manager, demonstrated to every one's satisfaction that he knows his technical stuff besides supervising the traffic department; A. A. Hebert, the League Treasurer, related the activities of our A.R.R.L. during the past year.

The Ladies' Aid who furnished the "eats" for the banquet should be congratulated on furnishing a mighty good dinner. Geo. R. Town, 1CQM, who acted as Toastmaster, sprung a surprise in introducing Rev. Wilson, who made one of the best speeches of the evening; there is th making of a "ham" out of him fellows. Get after him, so you can replenish your ranks.

With the awarding of the prizes, the Convention closed with vocal selections well rendered by the Pythian Quartette and a big vote of thanks goes to Wood, 1AEY; Kerr, 1AJG; Town, 1CQM and Colvin, 1AC and the Poultney Executive Radio Council for sponsoring this convention.

—*A.A.H.*

Why Not Screened Condensers?

By L. W. Hatry*

THERE has been current the statement that metal endplate condensers suffer from an eddy-current loss that is sometimes comparable to loss in a bad dielectric. How much of this has been based on measurement and how much on chimerical guess is outside of the writer's power of divination. At any rate it seems absurd where there are so many plates already that there should be appreciable losses in an extra two plates.

If the eddy-current loss theory is not tenable, we must look for a possible source of error, easily overlooked but reasonable. This the writer proceeded to do, because of disbelief.

Please notice the diagram. It illustrates the construction of a typical low-loss condenser with the dotted lines suggesting the field about it—the electrostatic field.

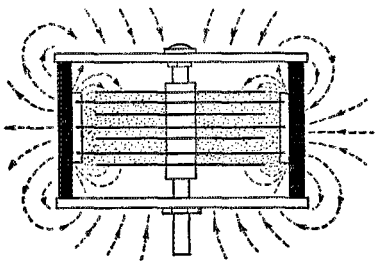


FIG.1 TOP VIEW, WITH FIELD SUGGESTED IN DOTTED LINES

When the condenser is set at minimum capacity the field about it becomes quite extensive. The end-plates, connected as they are to the rotor, oftentimes very nearly an integral part of the rotor, have a definite capacity relation to the stator. Since the distance from the end plates to the stator is often rather great the lines are apparently quite well spread out.

As a practical proof of this the writer used a wood slab which was of sufficient size to keep the hand well away from the condenser. He proceeded to move the board gradually toward the condenser at the side, (see Fig 2) and was surprised to find that he was easily able to detune a steady carrier while still an inch from the condenser. When the wood was directly against the edge of the end-plates and ⅛th inch from the stator plates a condenser reduction of about 1 micromicrofarad was necessary for re-tuning the signal. To make certain that the condenser was being affected and not the coil, a second test was made. The wood was stuck vertical, behind the rear endplate of the condenser. The coil was to the

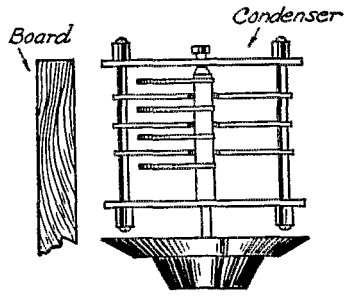
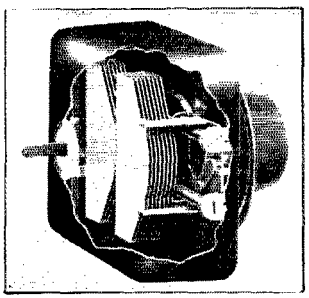


FIG. 2

rear and right of the condenser and the board test was made on the left of the condenser. This affected the carrier note to no apparent extent. (The coil was a torrid, by-the-way.) Since this second test put the wood much closer to the coil, it was evident that the condenser must have been the thing affected. The condenser plates were half interleaved.

This all points to the fact that unless our measurements of condenser resistance are done with such a condenser well up in the air tied to a string, we are likely to suffer rather high losses due to the stray field wandering through nearby poor dielectrics. Since this isn't the way condensers are usually mounted the measurements cease



How's this? At the moment of editing this article there has arrived the new "All-American" condenser which is in exact accord with the author's reasoning. It is a condenser of the straight-frequency type enclosed in a brass shell in which there is a large thin mica window through which the stator connection emerges.

* Information Service, American Radio Relay League, Radio Editor, Hartford Times, Hartford, Connecticut.

to mean much. It also points out that it behooves the builders of sets to give their condensers some edge room that has not been allowed them. It possibly explains, too, high resistances at minimum capacity adjustments.

Finally, it begins to look as though we should completely inclose our condensers; or else, construct them with shafts of non-metallic material, insulation end-plates and with the binding rods stopping as short of the condenser proper as possible. All of this is to confine the electrostatic field to the condenser and to prevent its taking excursions into nearby parts of the set.

Official Wavelength Stations

THE A.R.R.L. Official Wavelength Stations that have been appointed by Messrs. D. C. Wallace and C. M. Jansky, Jr., are as follows:

NKF	3ZW	6TS	9BGK
NRRJ.	4BY	6XAD	9BMR
WNP	4XE	6XAG	9DOA
1BZQ	5AGN	6ZE	9DXN
1AAC	5AKN	6ZH	9EGU
1AVW	5EW	6ZW	9EIB
1AWW	5MN	7ACI	9IG
1CK	5OX	7BU	9XAX
1CPQ	5ZAV	7GE	9XI
1IV	5XHB	7GQ	9ZA
1MK	6BCP	7ZX	9ZT
1XAM	6BGM	8AA	a2CM
1ZL	6BQB	8BZT	c3NI
1ZO	6CAE	8EQ	e4FV
2CLA	6CDN	8GU	e9AL
2DS	6CDY	8GZ	g2NM
2MU	6CGW	8XC	g2OD
2WC	6CPX	8ZG	z2AC
2XI	6CVO	9AAL	
3APV	6LJ	9AXQ	
3BE	6TI	9BGH	

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

"u 9ZT 76" or "u 9ZT 180" or "u 9ZT 42"

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

All correspondence regarding O.W.L.s should go to D. C. Wallace, 54 Penn. Ave., Minneapolis, Minn.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912.

Of *QST*, published monthly at Hartford, Conn., for October 1, 1925.

State of Connecticut } ss:
County of Hartford }

Before me, a Notary Public in and for the State and county aforesaid, personally appeared K. B. Warner, who, having been duly sworn according to law, deposes and says that he is the business manager of *QST* and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 443, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, The American Radio Relay League, Inc., Hartford, Conn., Editor Kenneth B. Warner, Hartford, Conn.; Managing Editor, F. C. Beekley, Hartford, Conn.; Business Manager, Kenneth B. Warner, Hartford, Conn.

2. That the owners are: (Give names and addresses of the individual owners, or, if a corporation, give its name and the names and addresses of stockholders owning or holding 1 per cent. or more of the total amount of stock.) The American Radio Relay League, Inc., an association without capital stock, incorporated under the laws of the State of Connecticut, President, Hiram Percy Maxim, Hartford, Conn.; Vice-President, Chas. H. Stewart, St. David's Pa.; Treasurer, A. A. Hebert, Hartford, Conn.; Traffic Manager, F. H. Schnell, Hartford, Conn.; Secretary, K. B. Warner, Hartford, Conn.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent. or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear on the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements, embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association or corporation has any interest direct, or indirect in the said stock, bonds, or other securities than as so stated by him.

5. That the average number of copies each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the six months preceding the date shown above is ..... (This information is required from daily publication only.)

K. B. WARNER.

Sworn to and subscribed before me this 6th day of October, 1925.

F. L. Pratt, Notary Public.
(My commission expires February 1, 1929.)

Strays

The 3rd District Executive Council is getting out a monthly magazine "Radio Graphic" which is going free of charge to all 3rd District amateurs. A limited number of copies are available to anyone upon application to the Council, 942 East Schiller Street, Philadelphia, Penna.

Experimenters' Section Report

THE purposes of this section have been: (1) To provide contact between people interested in the same class of radio experimentation; (2) To distribute the information gained to the amateur world through *QST;* (3) To provide outlines of the experiments; (4) To assist experimenters by advice and information.

The first purpose has been reasonably well accomplished by distributing to all members a classified list of the membership, indicating what each man is interested in. The second purpose has also been accomplished when the material was suitable and space in *QST* was available. The third and fourth purposes have not been at all well accomplished. Quoting from page 21 of October *QST*, "Increasing *QST* work is making it more and more difficult for the Technical Staff to take care of the necessary experimental outlines, schedules and correspondence."

Help Needed

We indicated in our October note that there was a hope of making arrangements whereby additional help might be available for the Section. The proposed plans did not work out and it will now be necessary to form new ones. It seems no more than fair to receive suggestions from the membership of this Section so that any change can be made with your advice and approval.

What is Necessary?

The biggest difficulty, of course, is the lack of some person at the Headquarters office able to devote his time partly or exclusively to the Experimenters' Section. Older members of the League will recollect that the League's traffic affairs were originally handled as extra work by A. A. Hebert who was at that time General Manager of the League. Increasing correspondence finally necessitated a Traffic Manager. A parallel solution for the Experimenters' Section does not seem to be advisable because the work of this Section is intimately connected with *QST* and can best be handled by a member of the Editorial Staff who will be in touch with non-commercial radio things in general through the correspondence of the magazine.

This man is not now available; which leads to consideration of other means.

Volunteer Outline Writers

A possibility, which seems attractive to the Technical Editor, is that the work of writing the outlines of the different experiments can be placed in the hands of members of this Section. It is comparatively easy for a man to write an outline of one experiment, with suitable suggestions, references, precautions. etc.; but it is quite another thing for the two members of this Technical staff to undertake writing 43 outlines of the same sort.

Such few outlines as were originally prepared have now been completely exhausted and have in part gone out of date. The problem is therefore an immediate one. We will be pleased to receive the names of men whom you regard as able to write good outlines which can be mimeographed and distributed. The writer of the outline will receive due credit on the outline and in *QST*. Volunteer outlines, or offers of outlines, will be gladly received.

The Subject

The problems of the Section follow. Although outlines have been made for 16 of these problems a general revision is advisable; therefore all problems are open for new outlines.

THE ANTENNA CIRCUIT

A-1. BEST OPERATING WAVELENGTH FOR SENDING ANTENNAS.
A-2. Counterpoises—height, size, shape, wire-spacing, insulation.
A-5. Imperfect dielectric in field of antenna and c.p.
A-6. Ground vs. C.P. for C.W. transmission.
A-7. LOOP TRANSMISSION AND RECEPTION.
A-9. Underground Antennas with special attention to static elimination.

RECEIVING SETS

R-1. The super-heterodyne for C.W. below 200 meters.
R-2. Improvement of the standard regenerative set.
R-3. TESTS OF RECEIVING INDUCTANCES, SIZE AND SPACING OF WIRE, METHOD OF WINDING, SPACING, INSULATION, EFFECT OF "DOPE."
R-5. A really GOOD R.F. amplifier for waves below 200 meters.
R-6. Audio amplifiers—quiet and with good peak at 1000 cycles.
R-10. EFFECT OF CHANGING L/C RATIO IN TUNER SECONDARY (see No. 2).
R-11. TESTS OF GRID LEAKS AND CONDENSERS.
R-13. NAA Tests.
R-14. Send-receive sets.

TRANSMITTING SETS

T-1. HOW WE CAN DO AWAY WITH KEY THUMPS AND SURGES THAT BLOW TUBES AND INTERFERE WITH BROADCAST RECEPTION.
T-2. Keying methods—best location of key.
T-4. KEYING MOTOR GENERATOR SETS AND RECTIFIERS WITH BIG FILTERS.
T-5. Development of a GOOD wavechanger.
T-6. Efficiency of various rectifiers.
T-7. TRANSMITTING INDUCTANCES, compare helix with pancake, flat strip with edgewise, and tube and litz.
T-11. HARMONICS FROM TUBE TRANSMITTERS.
T-12. Tyzer signal. (See *QST*, October, 1923, page 15).
T-13. MERCURY ARC RECTIFIERS.
T-14. Loop transmitters.
T-15. Portable transmitters.
T-16. AMATEUR ARCS.
T-18. FILTERING "SINK" RECTIFIERS SO LOCAL MUSH IS ELIMINATED.
T-19. Sending circuit tests of all sorts.
T-20. All tests in the 20-meter band of wavelengths.
T-21. All tests in the 5-meter band of wavelengths.
T-22. All tests in the 77-centimeter band of wavelengths.
T-23. Directional transmission.
T-24. Crystal-controlled transmitters.

GENERAL
G-1. Wired Wireless.
G-2. Tests of insulation at radio frequencies.
G-3. Effect of weather, barometer and moon on radio conditions.
G-4. Static elimination.
G-7. Best size for sending antennas.
G-8. WORKING SENDING ANTENNAS ON HARMONICS.
G-9. Resonance wave coils.
G-10. Radio surveys of all kinds.
G-11. Reflection and refraction of radio waves.

The following problems have been completed and removed from the list. (See p. 37, *QST* for July, 1925). A3, A4, A8, R4, R7, R8, R9, R12, T3, T8, T9, T10, T13, T17, G5 and G6.

A Field Organization

The outlines once written it becomes an open question whether the man who writes the outline should thereafter handle experimental work under that outline or whether the thing should then be handled from Headquarters for the sake of better coordination with *QST*. Obviously the first plan will remove more work from 1711 Park Street, but it may also impose on the outline writer an amount of correspondence that he cannot handle. This difficulty has been encountered in the field organization of the Traffic Department, although the traffic correspondence is mainly brief while the letters of experimenters are usually exceedingly long, and full of knotty questions that require detailed answers.

There is the situation, what are your wishes?

Note

All correspondence should be addressed, as usual, "Experimenters' Section, American Radio Relay League, 1711 Park St., Hartford, Connecticut."

Canadian A. R. R. L. Convention at Montreal, Que.

Nov. 26, 27, 28

THE Quebec, Ontario and Maritime Divisions have decided on a combined convention to be held in Montreal, November 26, 27 and 28th. Now Canadian Hams, here is your opportunity to meet each other, discuss your own problems and plan your activities for the coming year; also, you will have the pleasure of listening to some of the best lectures to be given by prominent men, not only in the amateur field but in radio in general. All U. S. Hams are cordially invited to come.

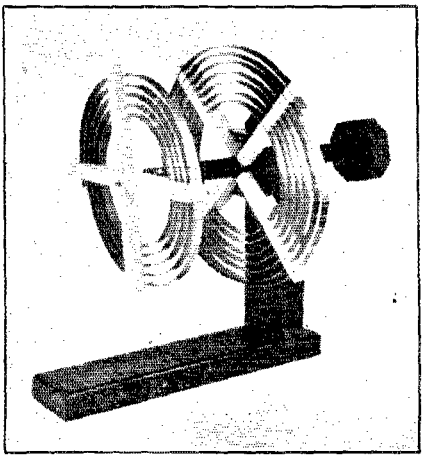
The Hotel Windsor has been chosen as the Headquarters for the convention.

Here is your opportunity to do a kindly act by writing to Jack Argyle, Division Manager, 493 Decarie Boulevard, Montreal, Que., telling him that you will be there.

—*A.A.H.*

New Transmitting Inductances

THIS set of inductances was designed for use in modern tube sets on short wavelengths. It consists of spirally wound brass ribbons insulated and supported by well paraffined maple strips. The coils are designed for use as primary and secondary inductances and are supplied in 20-, 40- and 80-meter sizes. As the spacing between turns is fairly large the distributed



capactiy of the inductances is small. The coupling between the two coils is easily varied by the knob at the left. This knob is attached to the wooden shaft to which the secondary is bolted. The wooden shaft slides in a square brass bushing set in the vertical post which holds the coils. The inductances are supplied ready-wound with the supporting frame finished and ready to assemble. Altogether a neat and good job. They are made by J. Gross & Company of New York City.

Central Division Ohio State Convention

AT Toledo, Ohio, November 5, 6 and 7th, The Toledo Radio Club will stage this years convention, and the Hotel Waldorf is the place where the gang is to gather for three days of conviviality.

The convention committee has planned for one of the biggest events ever held and if you remember the past two conventions you should not miss this one. The "gang" at Toledo has made up its mind to surpass all the others.

OHIO! OHIO! OHIO! DON'T FORGET THE DATES.

And you might write the Toledo Radio Club, 1313 Jefferson Ave., Toledo, O., telling them to make your reservation.

—*A.A.H.*

I.A.R.U. NEWS

I. A. R. U. Growth

Sections of the Union are now established in the U. S. A., Canada, France, Great Britain, Germany, Belgium, Holland, Spain, Switzerland and Brazil—a total of ten. The German Section has chosen Dr. A. Esau, of the University of Jena, as its National President, while the Holland Section has chosen Mr. R. Tappenbeck, nPCTT. At this writing Spain is voting between Mr. Moya of eAR1 and Mr. Castano of eAR2, while Belgium, Brazil and Switzerland are determining their candidates, with every indication that Brazil is going to be unanimously for Mr. Carlos Lacombe, bz1AC.

The total membership of the Union on September 23d was 698. Listed by countries having ten or more members, it is as follows:

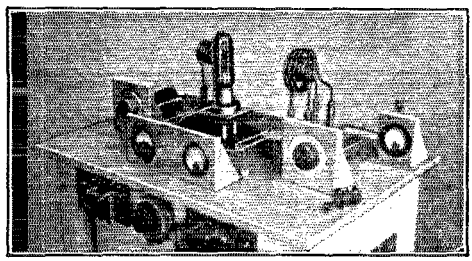
Belgium	25
Brazil	35
Canada	20
Great Britain	60
France	33
Germany	103
Holland	45
Italy	13
Spain	40
Switzerland	32
U. S. A.	264
14 other countries	31

This membership response is disappointingly small, particularly from the United States and Canada with their thousands of active amateurs. Transmitting amateurs everywhere should realize that the I. A. R. U. is an important and growing body of the hams of the world, destined to become as vast, as influential and as helpful in international affairs as A.R.R.L. has been to the amateurs of North America, and fully deserving of their support. The A. R. R. L. has withdrawn from foreign affairs, except to the extent that its services may be requested, and considers all international matters the affair of the Union. American amateurs who do not join the I.A.R.U. will be without representation in international matters, while the foreign sections that have been organized contain practically 100% of the transmitters in those countries. Let the applications roll in, fellows, and do your part to help this great movement—particularly you amateurs of the U. S. A., Canada, and Australasia.

Most of the energies of the Union to date have been devoted to organizing work. Now that we have ten sections we are able to begin to function. At this writing a great variety of matters are receiving the serious study of the Union's Executive Committee, and it is expected that some interesting announcements of official determinations will be possible in the near future.

International Wavelengths

One of the subjects which the Executive Committee is studying is the matter of the division of wavelengths. One of the sub-committees of the April Paris Congress rendered a report on this subject. They considered that they were discussing principally interference between countries of the same continent and therefore concluded that the question of better intercontinent operation devolved into finding wavelength bands for four groups of nations: the continent of Europe, Canada and Newfoundland, the U. S. A., and the rest of the world. Considering the so-called 40-meter band, they proposed the following subdivision:



THE TRANSMITTER AT 6ZAC-NPU, PAGO PAGO, SAMOA, OPERATED BY CLIFF DOW.

The continent of Europe	47 to 43 meters
Canada and Newfoundland	43 to 41.5 meters
The U. S. A.	41.5 to 37.3 meters
The rest of the world	37.3 to 35 meters

This proposal has not yet been adopted by the Union, but experience in Europe is demonstrating that something very similar would be advantageous. Quite a few European amateurs are today using wavelengths between 35 and 43 meters, parti-

cularly between 35 and 40 meters, and bad interference is resulting, particularly in the reception in Europe of signals from Australia and New Zealand. In response to numerous requests the International Secretary-Treasurer proposes that the amateurs of Europe tentatively adopt this proposal as a working basis, pending the determinations of the Executive Committee. In other words, European amateurs are asked, in the interests of coöperation and the minimization of QRM, to operate on the waves from 43 to 47 meters, and particularly to discontinue their present operation between 35 and 38 meters. This will result in a big improvement in two-way communication, it is felt sure.

—*K. B. W.*

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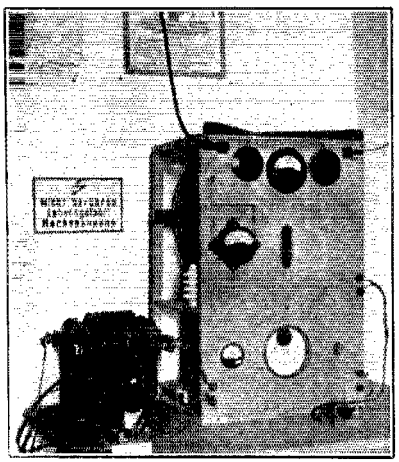
u2AER reports hearing two Tasmanian amateur short wave stations, a7DX and a7JB, QRH about 40 meters.

On August 17 6AWT connected WAP and NRRL with each other for their first two way communication. NRRL reports hearing WAP's phone and one of the airplane sets using UV-201-A's.

Mr. Rolf Formis, kY4, Alexanderstr 31, Stuttgart, Germany reports that there are over 41 call letters assigned to German amateurs. In addition there are over 50



THE 10 WATT TRANSMITTER AT RUTTENBURG, GERMANY. THE FIRST GERMAN STATION QSO U. S.

"Deutsche Empfanger's" (German Receivers) whose co-operation is very valuable. In order to save postal fees a service has been organized whereby all postal matter intended for German amateurs is to be sent to the Traffic Manager, Mr. Formis, and mailed once a week to the addresses.

Mr. John Trevor of New York City reports hearing PCMM on 26 meters working PKX.

The Transmitter and Relay Section of the Radio Society of Great Britain is to be congratulated upon the excellent beginning it is making with *"T. & R. Bulletin"*, a monthly British amateur magazine. A good job OM's—and more power to you. Full of live traffic data, constructional articles and theorecital considerations applied to amateur problems the *Bulletin* should fill a definite need in Great Britain. Copies can be obtained for a shilling from T. & R Bulletin, 53, Victora Street, S. W. 1, London, England.

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u1CMX established the first 20 meter communication with Brazil when he worked bz1AB on August 30th at 7:30 p. m.

All communications to Belgian amateurs should be addressed to Radio Club Belge de l'Est, 50, Rue Tranchee, Verviers, Belgium; or to Reseau Belge 11 Rue du Congres, Bruxells, Belgium. Mr. Constantin Haumont is now Traffic Manager of the Reseau Belge.

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d7EC is the only Danish station in operation at this time. On the morning of August 29th he worked a station 6ZK in Palestine and on August 31st he was QSO bz1AB.

On the 10th of September the first two way communication between Germany and the U. S. was had. An amateur in Rottenburg worked u2AKB. The photograph of the German transmitter is shown herein. The transmitter uses a 10 watt Telefunken tube in a loose coupled Hartley circuit with 1,500 volts at 50 cycles A. C. The QRH is 40 meters.

Mr. W. G. Dixon, g5MO, Secretary of the British Section reports as follows: Judging by the splendid DX work that has been done on 45 and 23 meters during the past summer it is thought that progress from now on will suffer no seasonal limit. There are a number of areas on the face of the globe that remain to be conquered. As a section we would welcome tests on prearranged schedule with any country that has not connected with us so far. We suggest that in order to save time requests for tests be sent by radio (when possible) and that three weeks grace to the test date will facilitate prearrangement on our part. The secretary will be pleased to arrange tests for anyone. Since our last report Chilian 1EG has opened up, working two way with g2KF and g2LZ. Fine business OM's—we want more of it. NRRL has been in contact daily all this month and

some interesting work has been done. NUMM, the U. S. S. *Litchfield* has also worked several of our stations while in the vicinity of Christ Church, N. Z. NTT, the U. S. S. *Scorpion*, was first QSO g5SI and since with a number of others while in Eastern Mediterranean and Black Sea waters. 2OD is back with us after a vacation and has resumed regular schedules with a2CM and has worked a stack of "A's" and Z's and NRRL and NUMM. g2NM reports working NRRL every morning since he was 600 miles East of Sydney and for 8 days while in Wellington Harbour on phone an hour and a half a day. During this time it appears the local representative of the United Press of America here appeared rather skeptical of these tests but retired satisfied after putting four questions to Schnell, all of which were correctly replied to (F. B. Schnell!) one answer being especially sent to Commander Crosse. g2NM has also had some good reports in his speech from a3EF, rMA8, bz1AB, bz2SP and from Mosul in daylight. He also worked a large number of A's and Z's and NUMM. g2LZ is going strong as ever and besides being one of the first to work Chile he has also connected with m1B, NRRL, NUMM and NTT while the latter was near Bulgaria. g5LF has completed his new shack and reports QSO the Antipodes almost every morning. g6LC has worked z2AC and 12 Yanks in one morning. g5BV lost an 80 footer, tied the antenna to a chimney below the counterpoise and has been working the U. S. as good as ever. g2GO has been in touch with u4SA for 25 minutes with an input of only 12 watts. g2CC works the U. S. quite often and reports very good results from the Hertzian antenna—visible for miles around at night! g6RY has been on a vacation but is back again now. g5KO has his bug swinging as of yore and reports QSO u4SA. g2XV has had tough luck with three masts this year—the fourth one holds, tho, and he is working all over the Continent. g2IH works Brazil often but has not hooked any Yanks yet. g2OV is reported by Mosul as the best British station heard there when he is using an input of only *three* watts. We welcome g5NJ, the first licensed station on the air in North Ireland, although Mr. Neill has been well known to us by reason of his helpful reports of receptions in the past. Attention should be called to the new British Post Office Station g5DH. This station, although often heard calling CQ for long periods is *not* a ham station, but is engaged in Government work only. In conclusion we would like to hear more Canadians on the air around 40 meters. Only three contacts with Canada have been reported this month.

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g6LJ reports nw4XYZ who gave his QRA as Berven, Stavanger, Norway. Probably the first Norwegan, but why OM, why the dizzy call?

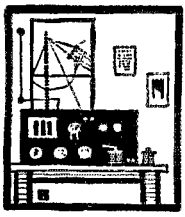
Mr. R. Tappenbeck, President of the Dutch Section of the I.A.R.U. informs us that the Dutch Section has instituted a QRA Department under his management. The object of this Department is to keep an up-to-date record of the calls and QRA's of

ON BOARD NRRL IN NEW ZEALAND. FROM LEFT TO RIGHT; z2XA (SR), z4AR, NRRL, z2XA (JR), zLAX, z2AC.

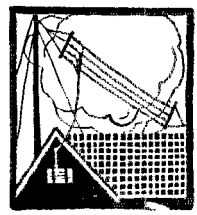
all Dutch amateur, experimental and short wave commercial stations, and other stations that may be of interest to the amateur. The QRA of all foreign amateurs will be kept on record and an effort will be made to keep it up-to-date for the benefit of the Dutch members of the I.A.R.U. The QRA-Department will be glad to put any foreign amateur in touch with any Dutch amateur. All QSL cards sent to the QRA Department will be forwarded immediately to the addressee. Everyone is urged to put sufficient postage on all correspondence. Address Mr. R. Tappenbeck, Hoogduin, Noordwijk aan Zee, Holland.

M. R. Audreau, Secretary of the R.E.F. (The French section of the I.A.R.U.) writes as follows: During the month of August amateur transmission in France let up considerably, caused, no doubt by so many of the "8's" being on vacation. f8EV Aintedeles pres d'Oran, Algeria was QSO a number of times with New Zealand 2AE. 8EV uses one 50 watt tube with 800 volts on the plate. A direct coupled Hartley circuit without antenna or ground is used. He complains of the difficulty many foreign amateurs have in reading his call. Many mistake the E (..-..) for a UI, whence comes the difficulty in exchanging QSL cards. f8TOK succeeded, on August 10th, in working z2AC for 45 minutes. On August 14th he was also QSO NRRL then at Wellington. f8TOK states that having heard NRRL from the very first it is interesting to note his signals were always best when he was most distant. 8TOK was also qso NUMM while at Lyttleton, N. Z. f8TK has made a

(Continued on Page 54)



Amateur Radio Stations



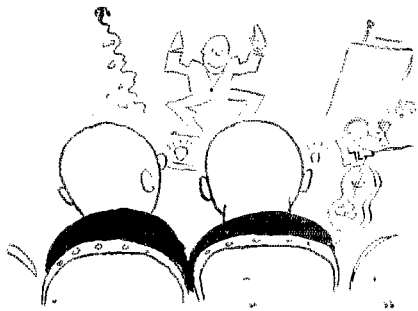
c3EN, Ottawa, Canada

THE antenna at c3EN is a two-wire flat top 50 feet high and 60 feet long. The counterpoise is a single 60-foot wire directly underneath the antenna. The station is located only six blocks from the broadcasting station CNRO. The power in the transmitter varies from two 5-watt tubes to one 5-watt tube to two 201-A's depending upon financial conditions and upon the life of the 5-watters. The plate supply is obtained from a 1000-volt transformer and a 28-jar rectifier seen at the right of the photograph. The transmitting circuit is a Hartley. Filament supply is obtained from a toy step-down transformer, center tapped.

The receiver is a single circuit one. The secondary is coupled to the antenna by virtue of a few turns of the antenna wire twisted around the grid lead of the detector tube. Two stages of audio frequency amplification are available, although only one stage is all that is generally used. The receiver operates over the 20- and 40-meter bands.

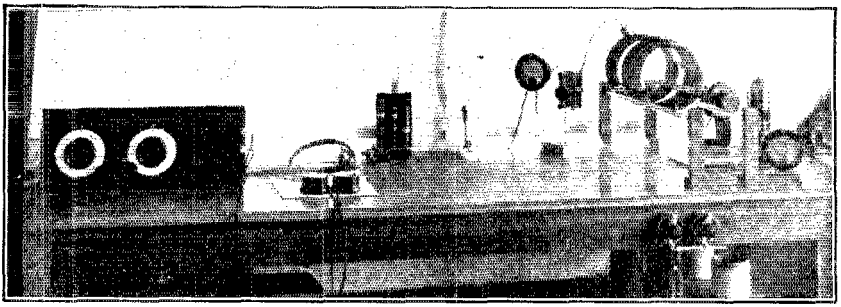
Although c3EN is not a high power station it has reached out very well, having covered the best part of the U. S. and the whole of the Atlantic Coast. Jimmy Cotter the owner and operator of the set is an enthusiastic A.R.R.L. man and is a member of the R.C.C. On his operating table Jimmy has a local telephone for quick QSRing of local messages.

One of the interesting things about 3EN is the fact that it was assembled almost entirely by a blind person. Years ago Jimmy lost his sight when a box of dynamite caps exploded in his hands. He went to the school for the blind at Brantford and after finishing school returned to Ottawa, where he got the radio bug. His apparatus has been assembled from hook-ups *read* to him by the various Ottawa amateurs!



A PAIR OF BALDIES

5ACL, Dallas, Texas



M. E. LAWSON of 815 Stewart Drive constructed a large part of the apparatus at 5ACL. The outfit has been going since June, 1924, and has a very good record both in traffic work and in DX. The aerial is a four wire cage 75 feet high and suspended vertically clear of all neighboring trees, houses and telephone wires. The counterpoise is a three wire fan shaped affair 50 feet long.

The transmitter consists of a single 203-A tube operated in the regulation coupled Hartley circuit. Lawson says he did not have the nerve to "debase" the tube, fearing it might be broken in the process. Plate supply is furnished by two motor-generators in series. The total output from the generators is about 500 watts at 860 volts. Two single-layer R.F. chokes changed the note at 5ACL from a poor wobbly A. C. sound to what is reported as a good D.C. "whistle." The filler is made up of a one and a half Henry choke and six 1-microfarad condensers. The primary and secondary coils are homemade. The turns in both coils are well spaced to reduce the distributed capacity of the coils. The coils are mounted above the table on glass towel rods. Keying is done in the negative generator lead. Three 5,000-ohm grid leaks are shunted across the key and they are responsible for the compensated wave that puzzles so many operators.

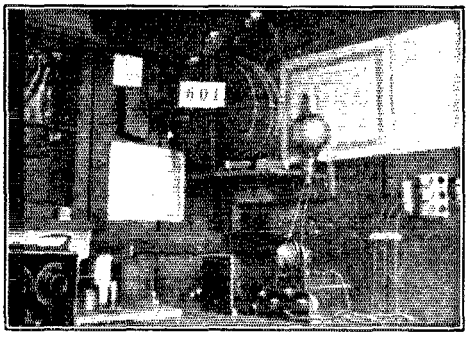
The receiver is a regenerative one à la Schnell's. A single stage of audio frequency amplification is used. The receiver works on a separate antenna.

6OI, Stanford University, California

THIS station is the property of Brandon Wentworth and is located in a small shack on a high hill back of Stanford University. During the past season 6OI has done some of the best DX work on the West Coast and next winter he will be back stronger than ever.

The aerial used for transmission on 80 meters is a semi-vertical four-wire cage 55 feet high and 85 feet long. For 40- and 20-meter transmission an aerial consisting of one 30-foot No. 12 enamel wire hung vertically is used. The counterpoise is a similar wire. The aerial and counterpoise are brought into the shack through Pyrex bowls. The antenna inductance is suspended from these bowls also.

The transmitter's circuit is a Meissner with three coils. The coils are spirals of three-eighths-inch brass ribbon having a maximum diameter of four inches. At the time the photograph was taken a Mullard 250-watt tube was used. This tube has since been replaced by a 50-watt tube immersed in oil. The primary circuit is tuned by means of a double spaced receiving condenser across the plate and grid



coils. The antenna circuit is tuned by a similar condenser in series with the inductance and counterpoise. The plate supply

is obtained from a 4400-volt transformer center-tapped. This supply is rectified by means of four "S" tubes, no filter being used. A separate filament transformer heats the tube filament.

The receiver is a low loss regenerative set using a Magnavox baseless tube as a detector and one stage of audio frequency amplification. The secondary of the receiver is tuned by means of a vernier condenser whose control is handled without and body capacity. Three coils are needed to cover the amateur bands. A separate aerial and ground are used for receiving.

The list of DX 6O1 has done is beautiful. He has worked all states but Delaware; all Canadian Districts; Mexico, Porto Rico, and was the first station in the U. S. to work WJS. The list of Australian and New Zealand stations worked by 601 looks like a *QST* list of Calls Heard. He was one of the first to work j1AA and was QSO this station often on 80, 40 and 20 meters, having worked him on 20 in daylight. For several months he supplied KFUH with press every night while the Kaimiloa was in and around Tahatti. NRRL has been worked almost every night and 6ZAC at Samoa and 601 are often QSO. In addition to having a splendid DX list Wentworth certainly has not forgotten traffic handling. His traffic list is an excellent one.

8BNH, Akron, Ohio

SINCE 1919 8BNH has been in operation and has been located at 42 South Union Street, Akron. The transmitter is located on the third floor of the house and is operated by means of two relays from the receiving room on the second floor. The filament voltage to the tube is controlled from the operating table by a resistance in the primary of the filament transformer. From the window near the transmitter the whole city of Akron can be overlooked as the house is on top of a large hill. The transmitting aerial is a single wire 80 feet long and 65 feet high. The counterpoise is a two wire fan ten

feet off the ground and 60 feet long. The transmitter uses one 203 tube in the inductively coupled Hartley circuit. Plate voltage for the tube is supplied by a 3000 volt transformer feeding four old style "S" tubes. The input to the tube is normally 140 milliamperes at 1200 volts. A normal antenna current of 1.6 amperes is obtained when operating the set on 85 meters—the 3rd harmonic of the antenna.

The receiver is a low loss set using a detector and one stage of audio frequency amplification. New Zealand, France, England and Holland are heard regularly. 8BNH was one of the first in his section to log PCII in the winter of 1923. Slabaugh has received over 1200 cards but says there is plenty of room for more of them and he is anxious to have cards from all stations hearing 8BNH. The station is an Official Relay Station and handles lots of traffic.

I. A. R. U. NEWS

(Continued from Page 51)

series of connections with Australian, New Zealand and American amateurs during the month of August. 8TK uses 45 watt tubes in a symmetrical Mesny hook-up. f8UT has made the following low power tests; with u1CMX with an input of 3 watts 1CMX reports his signals as R4; with fn2ND received as R6 with one watt input and with Aberdeen g2VX using only .3 watt. This was on wavelengths between 70 and 80 meters and with plate voltages between 20 and 200. f8WAG was able to work z2AC on 43 meters, 2AC being on 29 meters. The Reseau des Emmetteurs Francais, the French section of the I.A.R.U. is at the entire disposal of all amateurs in order to give them information needed concerning amateur transmission in France. Correspondence should be sent to the President, Jack Lefebvre, f8GL. 20 Avenue Didier Gagny, Seine et Oise; or to the Secretary, M. Robert Audureau, f8CA, 29 rue de Bretagne, Laval, Mayenne, France.

It appears that the first two way communication between Italy and New Zealand was accomplished by i1RG and z4AK on May 31, 1925.

During the first week of August nOBA and nOBQ succeeded in working several New Zealand Stations. PC7 has been QSO WNP

(Continued on Page 58)

Calls Heard

1BAT, W. Roxbury, Mass.

4ask, 4cu, 4er, 4fm, 4jr, 4js, 4oa, 4oi, 4oy, 4pi, 4rm, 4rz, 4sc, 4sh, 4tv, 4tx, 4ur, 4ux, 5aaq, 5aid, 5agn, 5apm, 5zai, 5ce, 5jf, 5ms, 5nj, 5nq, 5oq, 5uk, 5wi, 6aij, 6atu, 6bas, 6bgz, 6bjx, 6bsb, 6cdy, 6cig, 6cmq, 6cgw, 6csw, 6ct, 6fa, 6jp, 6rw, 6sb, 6vc, 6xg, 6zh, 6sz, 7au, 7ls, 7it, 9aaw, 9abe, 9adk, 9aeb, 9atq, 9aud, 9bbh, 9bbj, 9bcs, 9bpy, 9cbe, 9cdv, 9ciw, 9cki, 9crd, 9crh, 9cuo, 9dcx, 9eez, 9egg, 9egn, 9eht, 9ff, 9kq, 9ky, 9mn, 9tg, 9tj, 9ph, 9xn, 9zt. Eng.: 2kz, 6rm. Mex.: 9a, xda, 1af. P. R.: 4rl. Brazil: 1ab. Hu.: 6buc, 6aff. Aust.: 2lo, 2dy, 3xo, 2ds, 2yi. N. Z.: 1ao, 2ac, 2xa. Naval: nsf, nkf, nerkl, nve, numm, npg, ncgl, ukfl, nisv. Comm.: wqn, wqo, wiz, wir, lpz. Can.: 1ar, 2cg, 3aa, 3en, 3qs.

Frank R. Day, 53 Ashland Place, Brooklyn, N. Y.

25 to 45 Meters.

4ai, 4aj, 4ask, 4bq, 4cu, 4du, 4ee, 4er, 4fl, 4fw, 4jr, 4kj, 4lv, 4oa, 4oy, 4pi, 4pz, 4rm, 4wj, 5ac, 5ado, 5ail, 5akn, 5akz, 5ank, 5ax, 5co, 5gq, 5he, 5jf, 5nj, 5nq, 5oq, 5ov, 5rg, 5se, 5uk, 5vl, 5vq, 5zai, 6agk, 6bcp, 6bsc, 6bjd, 6cgw, 6css, 6csw, 6dah, 6nj, 6nq, 6sb, 6vc, 7lu, mlaa, mlb, mlk, pr4rl, pr4sa, f8ct, f8di, ssmzs, z2ac, z4ak, g2kg, kaga, npcmm. Russia: rdw, rlpz, a2cm, wnp, wap, nsf, npl, nas, nev, nkf, wir, wiz, wqn, c4cr, c4gt. Unknown: am, xda, xam.

A. E. Scarlett, 23 Cooley Place, Mount Vernon, N. Y.

All on indoor antenna.

6agk, 6aij, 6amm, 6bur, 6cgw, 6che, 6cka, 6ctv, 6dai, 6dh, 6vr, 7uz, c5hc. Canal Zone: nisr, 99x, z1ao, z2az, z2aq, z2xa, z4aa, z4ak,. z4ag, z4al, z4ar, a2bb, a2cm, a2cs, a2ds, a2ij, a2lo, 2tm, a2ui, a2yi, a3ef, a3tm, a3xo, a3lm, a3yx, a5ah, ane, rarl, rbal, rcb8, 6zac, npu, nrrl, npm, mlaf, m1b, m9a, xda, bz1a, f8ct, f8gs, ffw. Off Africa: sgc, wap, wnp, q2lc, 22mk, nve, kaga, kpof, npcmm, npcuu, pr4kt, pr4rl, pr4sa, g2kf, g2ka, g2nm, g5by, g5dh, g5nn, g6rm, g6tm.

2AER, John Hollywood,
33 Peters Place, Red Bank, N. J.

150-200 meters: 5cb8, g2kf, f8bd, pr4je, pr4kt, pr4rl, pr4sa, sgl. 70-110 meters: bb4, bzur, wjs, c4ch, c4cr, c4dq, c4eo, c4gt, c5ba, c5bz, c5ef, c5gf, c5go, crsj, qdz, q2lc, q2mk, d7ec, g2fm, g2kz, g2nb, g2nm, g2od, g2rb, g5ma, g5pz, g5rz, g6nf, f8ab, f8bf, f8ct, f8ds, f8fq, f8gm, f8go, pox, hu6ceu, noba, nonl. Honduras: bw, i1co, i1er, i1fr, i1rt, jja2 (??). Luxumbourg: 8ao, mlaa, mlaf, m1fr, m1n, z2ac, z4aa, z4ak, pr4kt, pr4sa, car2, car6, agz, ak5, bf, kioz, nwd, n5a, xk. 40 meters: rbal, rcb8, lpx, lpz, a2av, a2bb, a2bk, a2cm, a2ds, a2cs, a2dy, a2ij, a2jw, a2lo, a2tm, a2yg, a2yh, a2yi, a3bd, a3bm, a3bq, a3ef, a3tm, a3xo, a3yx, a5bn, a7dx, a7jb, vis, nrrl, bb9, beber, bz1a, bz1ab, bz2sp, bz7aa, q2by, ch1eg, ch2ld, d7ec, g2kf, g2mj, g2nm, g2od, g2pz, g2sz, g2yt, g5dh, g5lb, g6gh, g6lj g6rm, g6tm, f8bf, f8ct, f8ee, f8sm, fyz, pow, pox, wnp, wap, hufxl, kie, kio, kfuh, nrrl, npm, hu6buc, noba, i1er, j1aa, j1ww, ane, pkx, mlaa, mlaf, m1n, mlj, m9a, xal, xda, z1ao, z1ax, z2ac, z2xa, z3ao, z4ag, z4ah, z4ak, z4al, z4ar, numm, pr4ja, pr4je, pr4kt, pr4oi, pr4sa, pr4rl, pr4ur 20 meters. pr4sa, pox.

5PU, Norman J. Blankenship,
1003 East Maple St., Cushing, Okla.

40 Meters.

1aci, 1akb, 1gl, 2afo, 2aiv, 2alu, 2bbx, 2clg, 2yi, 3afq, 3afo, 3agt, 3ajk, 3zo, 4aj, 4bv, 4cu, 4er, 4pi, 4rm, 4rl, 4si, 6agb, 6ach, 6aio, 6ajl, 6awt, 8aul, 8cyn, 8dll, 8nt, 8pl, mlaf, m1k, m9a, a2bb, a3ef.

6AJM-6CJP, Box 16 Lemon Grove, Cal., San Diego County.

40 Meters.

1aao, 1aep, 1af, 1ahg, 1ajx, 1alw, 1are, asy, 1avz, 1awe, 1bk, 1bke, 1cmx, 1cxx, 1er, 1py, 1rr. 1uw, 2aan, 2agw, 2asv, 2bbx, 2bck, 2bee, 2brb, 2cmu, 2cwj, 2cyn, 2cyx, 2gk, 2ha, 2kg, 2qa, 3bms, 3bva, 3cjn, 3me, 3ot, 3qt, 4cr, 4cu, 4dd, 4dv, 4fl, 4ft, 4fv, 4fw, 4gt, 4gw, 4io, 4jh, 4nw, 4rm, 4sa, 4si, 4tv, 4tx, 5aag, 5ac, 5acf, 5acl, 5acm, 5acz, 5ado, 5adz, 5aec, 5agl, 5agn, 5ago, 5agu, 5ajz, 5ahd, 5ahr, 5aiu, 5ajh, 5ajj, 5akb, 5akl, 5akz, 5alj, 5ame, 5amw, 5apg, 5apm, 5apq, 5apy, 5aql, 5aqs, 5agt, 5auw, 5arn, 5awv, 5asd, 5atf, 5atk, 5atq, 5atv, 5atx, 5aur, 5axb, 5bz, 5hi, 5in, 5jd, 5kc, 5lg, 5nj, 5nq, 5nw, 5oq, 5ot, 5ov, 5ox, 5ql, 5rg, 5sl, 5ty, 5uc, 5uk, 5vf, 5vs, 5wi, 7aab, 7acy, 7adm, 7aek, 7afo, 7akh, 7akk, 7ald, 7av, 7bj, 7cw, 7dd, 7df, 7gb, 7gj, 7gp, 7gr, 7ij, 7kf, 7ku, 7lu, 7ly, 7mf, 7mz, 7nj, 7nt, 7nx, 7ob, 7ot, 7oy, 7rl, 7si, 7sl, 7uj, 7nz, 7wu, 7ya, 7uk, 8ac, 8aek, 8afm, 8afn, 8agw, 8aj, 8ajf, 8ajs, 8aly, 8abx, 8apw, 8awb, 8ann, 8aum, 8avl, 8ayy, 8baf, 8bau, 8bcj, 8ben, 8bf, 8bgn, 8bqa, 8bub, 8cas, 8caz, 8cbp, 8chk, 8cnl, 8cvi, 8daw, 8dem, 8dnn, 8do, 8drs, 8dsn, 8eq, 8er, 8ji, 8jj, 8na, 8nt, 8pl, 8tx, 8uf, 9acq, 9adm, 9ado, 9aek, 9aey, 9agl, 9aij, 9aim, 9aio, 9akf, 9akz, 9al, 9amm, 9amx, 9apm, 9arc, 9ato, 9aww, 9avg, 9avv, 9aij, 9aim, 9aio, 9akf, 9akz, 9al, 9amm, 9amx, 9apm, 9arc, 9ato, 9aww, 9avg, 9axq, 9bcx, 9bc, 9bem, 9beq, 9bff, 9bgk, 9bht, 9bkr, 9bml, 9bpn, 9bpt, 9bpy, 9bub, 9bwb, 9bxq, 9caa, 9caw, 9cbf, 9ccs, 9cdv, 9ce, 9cea, 9cfi, 9cld, 9clo. 9co. 9cro, 9ctg, 9cul, 9cuo, 9cwv. 9cvn, 9cos, 9cwn, 9cxx, 9cyd, 9czb, 9czz, 9dac, 9dad, 9dan, 9dbb, 9dbz, 9dcx, 9ddp, 9ded, 9dek, 9dex, 9dfh, 9dga, 9dge, 9dh, 9dhu, 9dhz, 9dmj, 9dmz, 9dng, 9dpx, 9dqr, 9dqu, 9drd, 9dtt, 9due, 9dug, 9duh, 9dvr, 9dwi, 9dwx, 9er, 9eak, 9eas, 9eep, 9efs, 9efy, 9egh, 9eht, 9eiv. 9ejy, 9ek, 9ep, 9es, 9ey, 9hp, 9ig, 9mn, 9og, 9ox, 9pl, 9qr, 9ry, 9sn, 9sv, 9nm, 9uq, 9wo. Special or experimental calls: 1xn, 1yb, 1yd, 2xbm, 5zai, 5zm, 8xe, 8zg, 8zu, 9xi. 9xl, 9zt, 9zk. Navy: nisr, nqg, nrrl, nkf, nba, npn, npm, npo, npg. npn, nirx. Commercial: 1px, 1pz, wiz, wqj, wgh, kie, woq, ane, 6xo, aga, m1a, m1b, m1k, m1n, mlaa, m1ae, mlaf, m1x, mbx, m9a, c3co, c4gt, c4rr, c5ct, c5gt. Honolulu: 6aff., fxl, 6asr, 6buc, 6tq. Porto Rico: 4sa, z4aa, z4ak, z4ar, z4ag, z2ac, z2ae, z2xa, a2cm, a2yi, a3bq. Samoa: 6zac, rbai, nonl, gznm, g2od, jlaa. Marquesas Hemds. Navy: nisr, milm. Special: kfvm, nrrl, wap, m3y, 8ba, 8eb, 85z, i1er, ch1eg, p1hr, p1hk.

6ASD, 2347 Lucerne Ave., Los Angeles, Calif.

1anq, 1any, 1are, 1fx, 1nqg (qra?), 1te, 1zm, 2act, 2bxl, 2afp, 2ahm, 2aim, 2bbx, 2bur, 2cgj, 2dx, 2gy, 2kr, 2la. 2np, 3bv. 3bce, 3btv, 3bva, 3chg, 3eu, 3ot, 3xb, 4aue, 4bv. 4eg, 4fg. 4gt, 4js, *4km*, 4rm, 4si, 4tn, 5aaq, 5ade, 5ado, 5agn, 5aid, 5ail, 5akn, 5akz, 5alj, 5ame, 5apa. 5apm, 5aqa. 5arn. 5ary, 5ask, 5asv, 5ba, 5ce, 5co. 5ms, 5ox. 5pa, 5se, 5uk, 5ux, 5va, 5wa, 5xbh, 5zai, 7aek, 7ald, 7af, 7gi, 7it, 7kg, 7nx, 7uz, 7ya, 8alf, 8aly. 8by, 8ben, 8bhm, 8bpl. 8ced, 8cyi, 8dal. 8dkk, 8dno, 8eq, 8gi, 8gz, 8pl, 8rk, 8tk, 8tx, 8uk, 8zz, 9ado, 9aef, 9adr, 9aek, 9aey, 9apn. 9atq, 9bcx, 9brg, 9bpb, 9bvh, 9bwo, 9cea, 9ccs, 9cjw, 9cld, 9cvn, 9czz. 9dac. 9dbb, 9dcc. 9dkv, 9dpx, 9duc, 9dvr, 9dwn. 9dwz, 9dzn, 9ecc. 9efs, 9eht, 9ek, 9ff, 9hp, 9oo, 9pn, 9tj, 9um, 9wo, 9xn, 9yav, 9zk. New Zealand: 4ak. Canada: 2aa, 4aa, 4gt.. Hawaii: 6aff. Mexico: 1b, 1k, 9a. Naval: nkf, npg, nrrl, eom: wir, wiz. Unknown: hjd, xal, ya2.

6CSW, 2330 Hillhurst Ave. Hollywood, Calif.

40 Meter Band

1aao, 1ajo, 1azd, 1bgw, 1bqi. 1ka, 1xg, 1yb, 2agw, 2ahm, 2aof, 2brb, 2buy, 2ebg, 2cs, 2cxl, 2pf, 2zbb,

3cdk, 3cel, 3ll, 4ask, 4do, 4fj, 4iv, 4oa, 5apl, 5oq, 5rg, 6ajl, 6asr, 6boi, 6buc, 6tq, 6zac, 8agq, 8bkq, 8caz, 8cwk, 8djp, 8eo, 8gz, 8jq, 8zm, 8zz, 9afx, 9akk, 9aoi, 9atq, 9ayp, 9bbh, 9bcn, 9bmx, 9boj, 9bsp, 9bvh, 9bwb, 9bwx, 9cdw, 9cjw, 9clo, 9cwo, 9dkv, 9dmj, 9dmx, 9eae, 9ez, 9ph, 9pn, 9se, 9uq, 9vo, c-4ax, 4bv, 5ct, 5gt, m-1x, m-1b, ch2ld, ch9tc, rafl, rbal, rbf3, rfa3, z1ao, z1ax, z2ac, z2ae, z2xa, z1ag, z1ak, z1al, z1ar, a2bb, a2bc, a2jw, a2rj, a2yi, a3bd, a3bm.

J. F. Keller, 400 Perry St., Bucyrus, Ohio.

40 Meters.

6abj, 6ac, 6agk, 6aij, 6ajl, 6ake, 6amm, 6awt, 6bam, 6bcl, 6bde, 6bkh, 6bq, 6bqu, 6bur, 6bwa, 6bvs, 6cae, 6cbj, 6che, 6cgw, 6cmq, 6cqa, 6css, 6ct, 6cto, 6cpo, 6dac, 6dab, 6deb, 6fa, 6gx, 6hu, 6hm, 6jp, 6qi, 6oi, 6ws, 6vc, 6vr, 7aek, 7bj, 7dj, 7ij, 7nx, 7uj, 7ya, a2bb, a2cm, a2ds, a2lo, a2tm, a2to, a2yi, a3bd, a3sa, a3xo, a7jb (qra?). z1ao z1ax, z2ac, z2xa, z4aa, z1ag, g2kf, g2nm, g2sz, g6gk, g6zk, g6zx, mbx, mia, miaa, mlb, mlg, mij, mlk, min, mlq, mix, m9a, miaf, pr4sa, q2mk, rafl, yift, npcmm, sgc, hu6cpo, hunpm, kpof, kpoy, kpox, kaga, Samoa nup, Samoa 6zac, earl, nrrl, nkf, nisr, nisf, nggz, ncg, nvu, negl, nqgl, napg, nisp, npn. Misc: vdm, wap, wnp, ane, rdw, Unknown: xal, af2, zk, fw.

8CNL. Dayton, Ohio.

6aq, 6aqp, 6amn, 6agk, 6apk, 6atu, 6ary, 6awt, 6bau, 6bbv, 6bjx, 6bqr, 6bur, 6bve, 6cah, 6cgw, 6cdy, 6ct, 6cto, 6cuk, 6csw, 6crs, 6cix, 6cns, 6css, 6cgo, 6chs, 6cdy, 6dab, 6dag, 6dah, 6fa, 6vc, 6ws, 6ts, 6tx, 6zh, 7ay, 7it, 7lu, 7nt, 7ij, 7uj, 7uz, 7ya, mlaa, miaf, mib, min, mlk, mli, mlax, m9a, g2kf, g2nm, g2po, g2sz, g2od, g5lf, a2bk, a2cm, a2ds, a2yi, a3ef, z2ac, z2xa, z4aa, z4ak, pr4oi, pr4sa, pr4rl, Nrrl, nve, npg, nkf, nas, wap, vdm, q2mk, ber, Samoan 6zac.

"8JQ," 2711 Espy Avenue, Dormont, Pittsburgh, Pa.

40 meters.

a2ay, a2bc, a2bk, a2cm, a2ds, a2ij, a2rj, a2tm, a2yg, a2yi, a3bd, a3bq, a3ef, a5bg, a7jb, z1ax, z2ac, z2ae, z2aq, z2cp, z2xa, z4aa, z4ag, z4ak, z4al, z4ar, raf-1, raf-2, rba-1, rcb-8, chleg, chler, ch2ld, bzla, bzlab, bz2sp, f8co, f8ct, f8eu, f8fq, f8sm, f8yor, f8es, g2dx, g2kf, g2lz, g2nm, g2sz, g2wj, g5dh, g5lf, g6rm, g6tm, Ier, Ilmt, Ilro, d7ec, hu6ajl, hu6asr, hu6buc, hufx-1, hunpm. Others, wap, wnp, nrrl, nisq, nisr, kfuh, vdm, vmg, ane, k3aa, 6zac, b4yz.

8RY, Arthur C. Bates, Sullivan, Ohio.

a2cs, a2yh, a3bq, a3ef, a3tm, a3yx, a5ah, a5bn, a9dr, 64rs, f8ec, f8ct, f8fq, f8jct, f8yor, g2nm fone, g2nb, g2kf, g6rm, g6tm, hufx1, kfuh, hu6aff, hu6buc, ilco, mxda, mlg, mij, mlx, mlaa, mlaf, nosv, pr4rl, pr4ur, q2lc, q2mk, ssmzs, 6az, 6dh, 6li, 6nw, 6sk, 6wt, 6aao, 6agk, 6amm, 6aqp, 6aav, 6bas, 6bbv, 6bvq, 6bva, 6cah, 6csa, 6dag, 6dam, 7lu, 7ly, 7uj, 7uv, 7aek, canal zone 99x, z1ao, z1ax, z1ag, z4al, z4as, z4av, 6zac, ane, pkx, vmg, naj, npm, npu, negl, nedj, nisq, nrrl, nve, wap, wnp, wvz.

8SE. Ypsilanti, Mich.

6ac, 6agk, 6amm, 6awf, 6bbv, 6bcp, 6bjd, 6bjv, 6bni, 6bq, 6blc, 6blr, 6bvs, 6cah, 6cdy, 6ccj, 6cgc, 6cgw, 6chx, 6cnc, 6css, 6ce, 6cto, 6daa, 6dab, 6dah, 6dai, 6dan, 6dam, 6dao, 6dh, 6fa, 6js, 6sb, 6vr, 6xad, 6zh, 7dd, 7df, 7ek, 7ij, 7it, 7na, a3fv, a2yo, a3ef, (a3yv), a3bd, a2ds, z1ao, z2xa, z4ak, z4ar, mlaa, mlb, mlk, mlx, m9a. Pr. 4sa, pr4rl, pr4io, c4aa, c4cr, c5ef, c5jf. 2xa2 qra? Naj, nrrl, nkf, wap.

9LV, Milwaukee, Wisc.

1ar, 1ch, 1el, 1ef, 1fn, 1nt, 1py, 1te, 1wl, 1xg, 1xu, 1zs, 1aac, 1aao, 1aap, 1aci, 1aep, 1ahg, 1amu, 1anq, 1axa, 1azl, 1bgc, 1bqk, 1bvl, 1byx, 1bzc, 1cab, 1cak, 1cjj, 1ckp, 1cmf, 1cmp, 2bc, 2gk, 2mu, 2nf, 2zw, 3adu, 3aev, 3agb, 3ahk, 3apn, 2bbx, 2box, 2bpb, 2bur, 2buy, 2bxj, 2cbg, 2cft, 2ccj, 2chu, 2cnk, 2cth, 2cul, 3bz, 3io, 3jw, 3kg, 3ll, 3ot, 3aao, 3apv, 3awh, 3bel, 3bnu, 3bta, 3bva, 3chg, 3ckg, 3ckj, 4eg, 4er, 4fl, 4jr, 4mi, 4oa, 4rl, 4rm, 4sh, 4si, 4tv, 4xe, 4aad, 5ae, 5he, 5jf, 5kc, 5nj, 5qs, 5uk, 5va, 5ql, 5aaq, 4aec, 5agn, 5akz, 5amh, 5ask, 5atv, 6ct, 6li, 6afg, 6agk, 6bhv, 6bev, 6bgv, 6bjx, 6csw, 6cto, 6dab, 6dah, 6dai, 7aek. Canada: 2cg, 3aa, 3gg, 3xi, 3ael. Australia: 2bk, 2tm, 2yi, 3bd, 3ef, 3tm, 3xo. Naval: nas, nkf, npm, nrrl, nsf, numm, nve. New Zealand: 1a, 2ac. Porto Rico: 4rl, 4sa. Special ane. dc7, gbe, sgc xda, wap, wvz.

99x, U S Naval Air Station, Coco Solo, C. Z.

1aac, 1aci, 1are, 1bes, 1bgw, 1blu, 1bvl, 1bzp, 1caw, 1er, 1uw, 1xu, 2bbx, 2bkr, 2bur, 2cty, 2ds, 2dx, 2ha, 2kf, 2lu, 2mu, 2nf, 2wc, 3bva, 3cei, 3ckg, 3hif, 3lw, 4aae, 4ask, 4cu, 4jj, 4oa, 4rl, 4rm, 4sa, 4tv, 5acl, 5amw, 5atv, 5ax, 5kc, 5nj, 5uk, 5va, 6bhz, 8alf, 8apo, 8bi, 8ben, 8bhm, 8bit, 8boa, 8bzi, 8cuk, 8daa, 8djp, 9ado, 9ake, 9aot, 9atq, 9bbj, 9bcx, 9cea, 9ch, 9csg, 9duc, 9ell, 9hp, 9mn, 9xh, 9xn, 9zt, c1aa, c1ei, q2by, q2mk.

NRRL, USS Seattle, Australia

1my, 1ar, 2xaf, 2cty, 2bbx, 3bva, 3ckg, 3aao, 4oi, 4fu, 4oa, 4au, 4bt, 4tv, 4rl, 4js, 5zai, 5ew, 5agn, 5jd, 5akz, 5atv, 6dcf, 6ark, 6bkv, 6asv, 6li, 6btm, 6cnc, 6jp, 6xbn, 6che, 6vr, 6bmw, 6tq, 6fa, 6bjj, 6cev, 6ct, 6xad, 7def, 8bgn, 8ey, 8jj, 8avl, 9all, 9bht, 9ek, 9afk, z2ae, z1ax, z1ao, z2gj, z4al, g6lj, g6tm, g2sz, g2kf, g6rm, a3yx, a2ds, a3bd, a2yi, a2cm, a3bm, a2bb, f8bf, f8ee, m1b, m1aa, 1ler, c4gt, nosv, o2ld.

R. J. Evans, Renito, Jaurez No. 3, Vera Cruz, Mexico

1anq, 1are, 1ayt, 1byx, 1ckp, 1cmf, 1pl, 2afn, 2aim, 2bee, 2bum, 2cgj, 2cnk, 2by, 2lu, 2xaf, 3awa, 3awh, 3bva, 3mv, 3vx, 4aah, 4ask, 4cu, 4er, 4fl, 4gt, 4it, 4ja, 4mm, 4pi, 4rm, 4sa, 4si, 4tn, 5aaq, 5ae, 5aez, 5ado, 5acc, 5afd, 5agn, 5ahr, 5akz, 5amw, 5aph, 5apm, 5atv, 5ew, 5jf, 5kc, 5kk, 5ms, 5nq, 5nr, 5oq, 5ot, 5rg, 5rn, 5uk, 5va, 5wa, 5zai, 6zl, 6ajm, 6aqp, 6ary, 6awo, 6awt, 6btm, 6bye, 6csw, 6ct, 6dab, 6dah, 6dcf, 6fa, 6jp, 6tx, 6tz, 6vo, 6vc, 6xp, 6zac, 8akp, 8alf, 8aul, 8ayy, 8bfk, 8bgn, 8bhk, 8bnh, 8boy, 8bsc, 8buy, 8byn, 8byo, 8ced, 8ckf, 8dal, 8dgl, 8dsh, 8eb, 8gz, 8ln, 8pl, 8sf, 8xk, 9aaw, 9ado, 9adr, 9cef, 9aeg, 9akf, 9amx, 9aot, 9atr, 9bbj, 9bcd, 9bcx, 9bht, 9bpy, 9bwn, 9ccb, 9ccz, 9cdf, 9cdw, 9cjw, 9ckh, 9cxx, 9czz, 9dbf, 9dex, 9dka, 9dol, 9dpx, 9dqr, 9dqu, 9dvr, 9dzn, 9ebx, 9ecc, 9eez, 9eht, 9ek, 9eky, 9ff, 9hw, 9mn, 9oo, 9pz, 9tc, 9tj, 9uq, 9wo, 9xn, 9zt.

11ER, Santangeli Mario, via S. Eufemia, No. 19, Milan, Italy.

1aae, 1abc, 1aof, 1ajo, 1ayq, 1azd, 1bom, 1byt, 1cam, 1caw, 1ch, 1ckk, 1cln, 1ei, 1el, 1ts, 1us, 1xa, 1xg, 2amj, 2bqt, 2ua, 3awh, 3cbg, 3cbl, 3cal, 3cm, 3mq, 3mv, 3uy, 4al, 4ask, 4ax, 4fl, 4it, 4oi, 4oy, 4rl, 4ur, 5alj, 5alz, 5ew, 5jd, 5nf, 5nq, 5oq, 5zai, 8ac, 8ay, 8bch, 8bsm, 8ccn, 8ckm, 8cu, 8cyd, 8daa, 8dal, 8ds, 8ee, 8ex, 8fv, 8gi, 8sj, 8tx, 8uk, 9bgr, 9dpx, 9ff, 9fj, 9hp, a2cm, rba1, chleg, ch2ld, ch9tc, miaa, z1ar, z4aa, z4as.

g6LJ, S. K. Lewer, 32 Gascony Ave. London, N. W. 6, Eng.

40 Meter Band.

1aao, 1aap, 1aay, 1abp, 1aiu, 1air, 1ams, 1axa, 1bcs, 1byx, 1bzp, 1cak, 1ck, 1cln, 1cmf, 1cmx, 1ckp, 1arh, 1fb, 1ka, 1mb, 1pl, 1si, 1uw, 1xg, 2afn, 2ahm, 2brb, 2bxj, 2cgj, 2cxl, 2ff, 2gy, 2ha, 2cre, 2lu, 2wc, 2wr, 3aha, 3apv, 3bhv, 3bta, 3bva, 3mv, 4ask, 4er, 4fm, 4js, 4kj, 4tj, 4tv, 6cgw, 7ob, 8avl, 8ay, 8bfe, 8bnh, 8er, 8gi, 8gz, 8jq, 8pk, 9arx. Porto Rico: 4oi, 1rl, 4rx, 4sa. Mexico: 1b, 1k. Brazil: 1a, 1ab, 1ac, 1af, 2sp. Chile: 2id, 9tc. Argentine: af1, af4, bai, cb8. Australia: 2cm, 2ij, 2jw, 2lo, 2yi, 3bd, 3bm, 3bq, 3ef, 5bg, 5bm, xa7jb. New Zealand: 1ac, 1ao, 1ax, 2ac, 2ae, 2xa, 3ld, 4aa, 4ag, 4ak, 4ai, *4ar*, 4as, 4av. Special: wap, wnp, nkf, nkfl, nerk1, nsf, ntt.

Noba, E. J. Wiering, Zwaerdecroonstraat 62b. Rotterdam, Holland.

40 Meters.

1go, 1pl, 1ka, 1sl, 1uw, 1aao, 1aci, 1arh, 1axa, 1ahl, 1ccx, 1cmx, 1cmp, 2ba, 2age, 2ark, 2cth, 4kt, 4sa, 4rr, 8sf, 9bht, c1ar, rcb8, rafl, bz1ac, m1dh, z1ax, z2ac, z2xa, z4ak. Special: wap, wnp, wir, wiz.

80 Meters.

1ab, 1al, 1bm, 1cx, 1rr, 1fd, 1jy, 1sm, 1sk, 1xz, 1zs, 1ajg, 1ajx, 1ck, 1fd, 1arv, 1axu, 1avb, 1bds, 1bgq, 1bkr, 1bvl, 1bwx, 1bwx, 1bsp, 1ckp, 1cre, 1cit, 1cre, 2ag, 2bg, 2cw, 2gc, 2gk, 2ig, 2axf, 2bgi, 2blm.

2bre, 2bum, 2epd, 2cub. 2evf, 2evj. 2exy, 2xbb, 3ab, 3hg, 3hh, 3hj, 3oi, 3oq, 3adb, 3ajd, 3bjp, 3bwa, 3bwt, 3bqp, 3epd, 3xar (qra?), 4eq, 4jc, 4io, 4sa, 4tj, 4xe, 8add, 8aly, 8ddl, 9dmj, clar, cleb.

F. White, 46 Ellice St., Wellington, N. Z.

1bes, 1anq, 2lu, 2cty, 2cbz, 2xaf. 2agw, 4oa, 4fl, 5ew, 5uk, 5afd, 5zai, 5oq, 6aiv, 6awt, 6aww, 6aff, 6asv, 6aqp, 6ake, 6bfm, 6bmw, 6buc, 6bgy, 6emq, 6et, 6ecy, 6cgo, 6cgw, 6eax, 6cuk, 6cmu, 6dc, 6jp, 6zac, 6zh, 6fa, 6xad, 6vc, 7oo, 8ac, 8avl, 8alf, 8bq, 8gz, 9hp, 9pj, 9ckn, 9ded, 9eht, 9ef, 9xn, 9aed, 9bht, 9uq, 9bed, 9atq, 9tc, m1x, m1b, f8fq, rcb8, numm, kfuh, npn, npu. nve, nedj, gejn.

H. C. St. John, 82 Gibbes Street, Rockdale, N. S. W. Australia

1aay, 1aac, 1are, 1aep, 1ch, 1ii, 1ka, 1pl, 1uw, 2aiu, 2bgi, 2bpb, 2ctv, 2cvj, 2evu, 2lu, 2mu, 2wc, 2wr, 3bct, 3ot, 4af, 4er, 4fm, 4fs, 4oa, 4rl, 4rm, 4si, 5amw, 5acl, 5acz, 5agn, 5agu, 5akz, 5atv, 5afd, 5amb, 5asv, 5aph, 5ew, 5jf, 5kc, 5nq, 5tg, 5uk, 5zai, 5zl, 6awt, 6awo, 6apk, 6aoi, 6aij, 6aqp, 6ary, 6aww, 6ase, 6aiv, 6aff, 6akz, 6amm, 6ac, 6bvy, 6bfn, 6bur, 6btm, 6bjj, 6bi, 6bhz, 6bve, 6bjv, 6bcl, 6cfe, 6cmt, 6cfi, 6ccy, 6cix, 6che, 6cgw, 6cai, 6cls, 6cnc, 6cpg, 6cmq, 6ccp, 6csw, 6clp, 6ccy, 6cbb, 6cto, 6chs, 6dcf, 6dab, 6dah, 6dck, 6eb, 6ea, 6fa, 6ih, 6jp, 6li, 6lw, 6nx, 6rw, 6tx, 6uo, 6vc, 6vr, 6xad, 6zac, 6zd, 7aek, 7ay, 7de, 7it, 7ly, 8aj, 8apw, 8axn, 8ayy, 8bee, 8cnl, 8dfk, 8eq, 8pl, 9ado, 9agl, 9apm, 9all, 9bpt, 9bdw, 9cbb, 9cdv, 9czz, 9cld, 9ded, 9dct, 9dvw, 9duc, 9dpx, 9dwn, 9dbf, 9dwn, 9dvr, 9ek, 9eht, 9efy, 9ff, 9hw, 9oo, 9pz, 9uq, 9xn, 9vav, c3aa, c4gt, c5ct, c5ba, c9ck, chleg, f8bf, i8ct, f8fq, g2kf, g2lz, g2od, g2nm, g5lf, g6rm, iler, m1x, m1b, m9a; mlaf, mlaa, n Nought sv, pi, 1hr.

R. W. Mintrom, 62 Barton St., Woolston, Christchurch, New Zealand.

1aao, 1aci, 1aep, 1ahl, 1anq, 1apc, 1are, 1arh, 1bgc, 1bvl, 1cmf, 1cmp, 1ch, 1pl, 1py, 1qm, 1za, 2adk, 2afn, 2afp, 2agb, 2aiu, 2bbx, 2bur, 2buy. 2cty, 2gv, 2gy, 2ha, 2kr, 2lu, 2mu, 2xaf, 2xk, 2zv, 3bva, 3bz, 3cdk, 3ckg, 3hg, 3il, 3af, 3wo, 4fu, 4ll, 4oa, 4rl, 4rm, 4rr, 4tv, 4io, 5aci, 5agn, 5akn, 5alj, 5atv, 5ew, 5in, 5kc, 5ls, 5nj, 5nq, 5oq, 5ox, 5ph, 5uk, 5wi, 5zai, 6ac, 6aig, 6aff, 6agn, 6agk, 6aij, 6ajm, 6aji, 6alf, 6amm, 6asv, 6awt, 6bhz, 6bih, 6bmw, 6bsh, 6buc, 6bur, 6bve, 6cbb, 6cej, 6cft, 6cgw, 6cgo, 6chs, 6chz, 6che, 6cix, 6cnc, 6css, 6csw, 6ctn, 6cto, 6dah, 6dh, 6dn, 6eb, 6fa, 6jp, 6jq, 6km, 8lj, 6nx, 6rw, 6sb, 6vc, 6vr, 6xad, 6zd, 7adm, 7aek, 7av, 7de, 7gb, 7gj, 7lj, 7ku, 7ly, 7nt, 7uj, 7uz, 7xaf, 8aj, 8apw, 8avl, 8ayy, 8bgn, 8bkq, 8ced, 8chk, 8eq, 8eyi, 8gd, 8gz, 8ks, 8pl, 8ry, 8sf, 8tx, 8xas, 9ado, 9akf, 9apm, 9bcd, 9bek, 9bht, 9bn, 9cnl, 9dac, 9eak, 9eji, 9ek, 9ff, 9mn, 9og, 9uq, 9xn, 9xp, raf3, ra8, bzlab, bz2sp, bz2ui, chleg, ch2ld, c4aa, c4gt, g2dx, g2kf, g2lz, g2nm, g2od, g2sz, g2wj, g5mo, g5nn, g6tm, f8bf, f8ct, f8fq, f8gm, f8qq, f8dri, f8tk, f8tok, f8wag, f8vor, npcuu, noba, hu6cst, hu6dcf, hufxl, ilaf, iler, ilmt, ilno, ilrg, ilwb, mlaa, mlaf, m1b, m1x, m9a. pr4oi, pr4sa, ssmyy, 6zac.

J. Bivort, bW3, 37 rue Elise, Brussels, Belgium

U. S. A.: 1aac, 1aas, 1aay, 1abp, 1aci, 1aep, 1akg, 1ahi, 1ajg, 1alp, 1ams, 1amu, 1ana, 1asf, 1are, 1arf, 1ary, 1ats, 1axa, 1ayg, 1bal, 1bnl, 1bgi, 1btr, 1byx, 1bzp, 1cal, 1caw, 1ck, 1ckp, 1cln, 1cmf, 1cmx, 1ese, 1el, 1ga, 1ka, 1my, 1nt, 1pe, 1pl, 1py, 1rr, 1sf, 1uw, 1zw, 2afn, 2afp, 2agb, 2amy, 2asc, 2asf, 2api, 2auh, 2ax, 2axg, 2bbx, 2bee, 2bkr, 2bbm, 2box, 2bw, 2bxj, 2cgj, 2cig, 2cpa, 2ctf, 2ctk, 2cwj, 2cyw, 2dx, 2gk, 2gy, 2ha, 2hv, 2kr, 2ln, 2nf, 2wc, 2wr, 2xbb, 3afg, 3aho, 3awh, 3bct, 3bmz, 3bta, 3btg, 3bvu, 3bz, 3cel, 3is, 3jw, 3kg, 3ll, 3ot, 3vx, 3wb, 3wn, 4aj, 4ask, 4cu, 4er, 4fl, 4fm, 4it, 4ja, 4js, 4kt, 4oa, 4oi, 4oy, 4rf, 4rl, 4rm, 4sa, 4sh, 4si, 4tn, 4tv, 4ur, 4ux, 4vl, 4xe, 5ac, 5acf, 5afd, 5agn, 5ais, 5akn, 5akz, 5ame, 5amh, 5aph, 5ew, 5id, 5ij, 5nj, 5ng, 5og, 5ox, 5uk, 5zai, 6amm, 6cgw, 6csw, 6sk, 6vc, 8ac, 8adk, 8apw, 8aul, 8avl, 8ayy, 8bec, 8beh, 8ben, 8bf, 8bfe, 8ban, 8bhm, 8bin, 8bnk, 8byn, 8can, 8eaz, 8ecq, 8cer, 8edv, 8cjp, 8exg, 8ckm, 8eyi, 8dem, 8dhu, 8dsh, 8eg, 8eq 8es, 8gi, 8ks, 8rh, 8ry, 8sf, 8sj, 8tx, 9all, 9ast, 9ape, 9bbj, 9bht, 9cap, 9dpx, 9dqu, 9dv, 9ecc, 9ek, 9es, 9ev, 9ff, 9fj, 9mn, 9se, 9xn, nap, nkf, numm, nve, wap, wnp, nrrl. Canada, 1aa, 1ac, 1ar, 1uc, Cuba, 2by. Mexico, 1aa, 1af, 1b, 1x, 9a. Brazil, 1ab, 1af, 1ap, 2sp. Chile, 2ld. Argentine ch8. China, xal. New Zealand, 1ax, 2ac, 2ae, 2ag, 2xa, 4aa, 4ag, 4ak, 4al, 4ar, 4as. Australia, 2cm, 2dy, 2yi, 3bd. 3bg, 3ef. All cards qsl'd.

G5sz, J. W. Riddiough, White Croft, Bare Lane, Morecambe, England.

30 to 48 metres

1ab, 1sac, 1aci, 1aep, 1ahg, 1alr, 1arh, 1bes, 1bqi, 1bzp, 1cmf, 1cmp, 1pl, 1za, 1zs, 2qfn, 2agb, 2bee, 2bbx, 2cr, 2tch, 2ii, 2ud. 2zv, 3ja, 3jw. 3xu, 4du, 8don, 8sf, 9kn nkf, kdka, pr4kt, pr4sa, pr4sr, bzlab, bz2sp, Mosul 1dh, d7ec, ilas, iler, ilgn, ilnd, ilmt, slna, s2nd, s2nm, s3nd, ssmhi, ssmvi, ssmvz, ssmxg, ssmxu, ssmyy, ssmyu, ssmzs, mxmb, mmaruc, Algiers 8alg, f8bf, f8bn, f8bv, f3ca, f8ct, f8dp, f8ee, f8fq, f8gk, f8hu, f8hsf, f8jrk, f8plm, f8rrr, f8rdi, f8vaa, f8wag, nofp, nogn, nohl, noro, b2e, bb7, bb9, bs2, peac 9, h9ad. Unknown bn7rz, 8a, octu, ocdb, ges, m2 4tu, ky5, rwz, ir-yok, yzl, k4ea. Miscellaneous, pof, pow, fnt, pcuu, gfp, z2ac, z2ae, z4ar, 24ag, a3bg.

G2hik, C. L. Champion, Bary Farm, Rickmansworth, Herts, England.

1ap, 1ac, 1aci, 1acx, 1aep, 1afo, 1ag, 1ahi, 1ahl, 1akp, 1akb, 1akc, 1alc, 1ang, 1aoj, 1ar, 1auf, 1ax, 1axa, 1bal, 1bcx, 1bes, 1bke, 1gbt, 1brl, 1bzp, 1caw, 1cil, 1ck, 1ckp, 1emf, 1cmp, 1cmx, 1cmy, 1ga, 1ha, 1hj, 1ka, 1nt, 1sjk, 1ww, 1wwa, 1wa, 1wr. 1zt, 2afn, 2agt, 2agg, 2agw, 2ahm, 2ai, 2aif, 2aou, 2arh, 2atg, 2awo, 2awf, 2ax, 2bec, 2brb, 2bx, 2cm, 2cpa, 2crc, 2ctf, 2crj, 2cwj, 2cx, 2fu, 2ha, 2ikc, 2kr, 2lai, 21u, 2nu, 2ta, 2wc, 2wr, 2ca, 2caf, 2xbb, 2zu, 3bc, 3bhi, 3bva, 4aae, 4ask, 4er, 4js, 4tu, 5acy, 5nj, 5nc, 5wa, 6cgw, 7doj, 7sf, 7bh, 8ace, 8avl, 8bh, 8bhm, 8bt, 8ccq, 8daa, 8djf, 9akf, 9and, 9apu, 9bc, 9buj, 9cgt, 9cht, clar, c2ax, br2sp.

Livio G. Moreira, Rua Paula Gomes 6, Curityba, South Brazil.

1aay, 1aci, 1aha, 1ahg, 1arh, 1aw, 1bqi, 1bqt. 1ckp, 1cre, 1ox, 1pl, 1si, 1vi, 1xg, 2aef, 2afn, 2agb, 2bee, 2bbx, 2cft, 2cth, 2cty, 2fo, 2ha, 2wg, 2wr, 3buy, 3ff, 3jw, 3lu, 3nj, 3ot, 4ask, 4ha, 4tv, 5agn, 5nj, 5va, 5uk, 8aul, 8ben, 8djm, 8eg, 8sf, 9bbj, 9bht, 9xn, rbal, rdb9, rdm9, rfa3, rfg4, bzlab, bzlap, bzlaq, bzmt, ch2ld, clar, npcz, nkf, wir, wiz, wqn, 8ct.

FWX, J. Henerson, San Eugenio 1156, Montevideo, Uruguay, South America.

1ka, 9nx, g5dh. z2ae, z2ac, hu6aff, bzlab, bzlad, bzlaf, bzlak, bzlam, bzlap, bzlaq, bzlas, bzlav, bzlax, bz2sp, bzmt, chleg, ch2ld, ch2re, ch2rm, ssmmy, npcmm. Others: aga, pof, pow, wiz.

ch2LD, L. M. Desmaras, Casilla 50 D, Santiago de Chile

U. S. A.: 1aa, 1aci, 1ad, 1ahg, 1are, 1yb, 2afn, 2afp, 2bee, 2by, 2cv, 2gk, 2ud. 2xaf, 2xi, 2xu, 3awh, 3cdk, 3wb, 3jw, 4af, 4ask, 4cu, 4tv, 4xe, 5acf, 5acl, 5acz, 5adz, 5agl, 5agn, 5ail, 5akn, 5akz, 5amw, 5aum, 5apu, 5atv, 5bg, 5cv, 5ew, 5ha, 5he, 5hi, 5hy, 5in, 5lg, 5mi, 5nj, 5nq, 5oq, 5ox, 5oy, 5ph, 5sd, 5uk, 5va, 5wd, 5wi, 5zai, 6aak, 6afg, 6aiv, 6aji, 6ajm, 6asv, 6awi, 6awt, 6bhz, 6bmw, 6bve, 6cdv, *6cgw*, 6chs, 6cix, 6cnc, 6css, 6csw, 6ct, 6cto, 6cv, 6dah, 6eb, 6fa, 6fz, 6nx, 6qi, 6rw, 6ts, 6vc, 6vr, 8aul, 8er, 8gz, 8pl, 8ry, 8sf, 8ze, 9ado, 9akf, 9aod, 9act, 9apn, 9bbj, 9bbw, 9bht, 9cip, 9cld, 9coc, 9ddk, 9dqu, 9eak, 9ejy, 9ek, 9dkn, 9ff, 9oo, 9uq, 9xh. Brazil: 1ab, 1af, 1ap, 1at, 2sp. Canada: 4gt. England: 2nm, *2sz*, *6tm.* Mexico: 1aa, 1af, 1b, 1k, 1n, 2ha. New Zealand: 2ac, *2ae,* 2xa, 4ag, 4ak. France: 8gb, 8sm. Australia: 2cm. Cuba: 2mk, nrrl, ws, rdw, pcuu, nkf, 2yt.

ch9TC. Major R. Raven-Hart, Los Andes, Chile.

1abi, 1ahg, 1are, 1ka, 1pl, 1vw, 1xf, 2afn, 2afp, 2agb, 2ahd, 2bi, 2cty, 2ha, 2hr, 2pd, 2xaf, 3ckg, 3cm, 3ux, 4ask, 4fl, 4fw, 4jr, 5acl, 5acz, 5adz, 5afb, 5agn, 5ahr, 5akn, 5akz, 5ame, 5amw, 5he, 5is, 5nt, 5nq, 5ox, 5uk, 6abo, 6agk, 6aji, 6az. 6bap, 6bcl, 6bhz, 6bjx, 6bkv, 6bkx, 6btm, 6btu, 6bve, 6cgo, 6cgw, 6cix, 6cmq, 6cmt, 6css, 6csw, 6cto, 6cuk, 6cvk, 6jl. 6lj, 6nx, 6rw 6zd, 8bgn, 8bnh, 8dm, 9akf, 9aki, 9all, 9auw, 9avf, 9bht, 9bpw, 9bvd, 9czz, 9dpz, 9dkv, 9dpx, 9dwk, 9efy, 9ek, 9es.

ch9TC, Major R. Raven-Hart, a/c Trasandino Los Andes, Chile.

1ahg, 2cty, 2cxg, 2gy, 2xaf, 3auv, 3ckg, 3ot, 4ps, 4tv, 5adz, 5afd, 5agk, 5agn, 5akn, 5alj, 5atv, 5co, 5ed, 5jd, 5ld, 5nq, 5oq, 5sd, 5va, 6aff, 6ag, 6agk, 6alo, 6asv, 6aum, 6awt, 6bap, 6bbv, 6bdj, 6bev, 6bil, 6bjj, 6cbb, 6cgd, 6cgw, 6cia, 6cpf, *6csw*, 6ct, 6cuk, 6dab, 6eb, 6go, 6nx, 6ve, 6vr, 6zac, 8oq, 8xk, 9ado, 9aeg, 9amx, 9aot, 9cip, 9cxx, 9czz, 9ded, 9dex, 9dkv, 9dqu, 9dvt, 9ecc, 9eht, 9ek, 9eq, 9fed, 9oo, 9xn, kfuh, npu, nrrl, numm, nve, m1aa, m1hf, m1k, m1x, z1ax, z2ac, z2ae, z2xa, z4ak, a2yj, g2lz, g2nm, c4gt, c5go, pcmm.

Canadian 4AA, H. N. Stovin, Unity, Sask., Can.

1aiu, 1anq, 1axa, 1bes, 2afn, 2bc, 2cgj, 3aha, 3bjp, 3cel, 3jw, 3wb, 4cp, 4cr, 4cu, 4er, 4fl, 4js, 4mm, 4rm, 4tv, 5aav, 5adz, 5afd, 5agn, 5ahr, 5aju, 5akl, 5akz, 5ame, 5aph, 5aqw, 5arh, 5ati, 5atx, 5fl, 5hv, 5hy, 5jf, 5lg, 5oq, 5qs, 5qw, 5uk, 5wa, 5zl, 6aaf, 6aww, 6bav, 6cc, 6cjy, 6csw, 6dab, 6dah, 6hu, 6mw, 6rw, 6ws, 7ae, 7aek, 7df, 7gl, 7gw, 7hx, 7nx, 7to, 7tq, 7uj, 7ya, 8aa, 8ayy, 8bch, 8ben, 8bpl, 8brb, 8brc, 8cau, 8ced, 8cyf, 8cyi, 8djp, 8eg, 8eq, 8es, 8se, 9adr, 9aed, 9alf, 9aog, 9aoy, 9apa, 9apn, 9aqz, 9atq, 9axh, 9aya, 9bau, 9ben, 9bfg, 9bkv, 9bmx, 9bpy, 9bsw, 9caw, 9cdv, 9cea, 9cjw, 9ckd, 9cvn, 9dac, 9dbz, 9ddc, 9ddk, 9dez, 9dfh, 9dfj, 9dgm, 9dkv, 9dpx, 9dqx, 9dto, 9dwn, 9ecc, 9eil, 9eky, 9ff, 9fj, 9gg, 9gt, 9ix, 9ph, 9pn, 9rr, 9se, 9uq, 9vq, 9xh, 9xn, 9zk, 9zt, c4bf, c5bh, c5go, i1no, m1k, z1aa, z2ac, naj, nerk1, wqn, wap, 52-a.

g6QB, 33 Harpenden Road, W. Norwood, S. E. 27, London, England.

1aci, 1ahg, 1aiu, 1alr, 1alu, 1ana, 1anq, 1arh, 1azd, 1ban, 1bhs, 1bqi, 1bs, 1ckp, 1cmx, 1cmf, 1fn, 1ga, 1jt, 1ka, 1kl, 1my, 1pl, 1zl, 1zt, 2aey, 2afn, 2ahm, 2aof, 2apn, 2axq, 2bbx, 2big, 2bnt, 2bqa, 2bui, 2caz, 2crp, 2eth, 2eub, 2eyw, 2gk, 2gy, 2kr, 2lu, 2we, 2xaf, 3bpm, 3ca, 3ce, 3fa, 3jw, 3lz, 3xu, 3zo, 1fl, 4ja, 4ll, 4lv, 4oa, 4rl, 4rm, 4tr, 4tv, 4vl, 5in, 5nj, 5rz, 6bjj, 8avi, 8bf, 8bon, 8bzk, 8bzu, 8dke, 8don, 8eg, 8pk, 8pl, 8ry, 8sf, 9ek, 9xn, clab, cidm, cled, c2fo, bzlab, wap, wnp, nrrl, a2cm, z2aq, z2xa, z1ar, z4as, wvq, nkf.

NUMM, U.S.S. Litchfield (336), Care Postmaster, San Franscisco, Calif.

Worked Between Samoa and Honolulu.

1ka, 1uw, 2ahm, 2lu, 3aa, 4fd, 4sb, 4si, 5acl, 5agn, 5ew, 5hy, 5ls, 5nj, 5oq, 5wi, 5zai, 6agk, 6bhz, 6bkh, 6bmw, 6bur, 6bvy, 6ccy, 6cgw, 6clh, 6cmq, 6cto, 6dah, 6ea, 6ex, 6up, 6uf, 6vr, 6zh, 7aek, 7ay, 7lq, 8bnh, 9bmx, 9cld, 9dac, 9dng, 9dpx, 9ff, 9uq, 9xax (cld us). New Zealand. 1ao, 2xa, 4aa, 4ak. Australians: 2dy, 2gq (input 8 watts), 2jw, 2lo, 2yi, 3ef, 5da. Canadian: 4gt, 5ba, 5go. Hawaii: 6aff, 6aji. Mexico: 1b. Philippines: 1hr, nirx. Samoa: 6zac, npu. Argentina: af1. Miscellaneous: nqg, nqgi, fx1, nedj, nrrl.

Stations Heard Between Somoa and Honolulu, Aug.

1ax, 1azd, 1chk, 1jl, 3bva, 4as, 4fl, 4rm, 4yz, 5ajj, 5akz, 5al, 5amw, 5apm, 5aql, 5asw, 5atv, 5auc, 5ft, 5he, 5jf, 5nq, 5ox, 5rg, 5uk, 5ux, 5va, 6abg, 6aij, 6alt, 6alv, 6aoi, 6asv, 6awt, 6aww, 6bas, 6bde, 6bgv, 8bgo, 6bjv, 6bmz, 6bq, 6bqc, 6bse, 6buc, 6bum, 6bvs, 6cct, 6ccv, 6cdy, 6cej, 6chl, 6crs, 6css, 6csw, 6ct, 6daa, 6dab, 6eb, 6gk, 6hu, 6lj, 6js, 6qi, 6sb, 6ut, 6xad, 6xg, 6zbe, 7bq, 7dab, 7de, 7df, 7ij, 7it, 7nb, 7om, 7oz, 7uj, 8aj, 8aks, 8bpl, 8bt, 8eq, 8io, 8zz, 9bhq, 9ccz, 9edv, 9cov, 9czz, 9dkv, 9efs, 9eht, 9mn, 9rz, 9xn. Australian: 2bb, 2rj, 2sw, 2ws, 2yh, 3bm, 3bq, 3sl, 3xo, 3yx, 4an. New Zealand. 2ae, 2ac, 4ag, 4al, 4as. Canadian: 4bv, 5ct. Mexican: 1aa, 1k, 9a. Chile: 9tc. Argentina: bal. Commercial: ane, kfuh, wap, wvy, xad. Naval: najd, nerk1, nkf, npg, npn, npo, nrrl.

Stations Heard at Christ Church and Wellington, New Zealand, August 11 to 23, inc.

1baj, 1cap, 1cbg, 1cmk, 1kt, 1pl, 1ua, 1zs, 2aiv, 2bee, 2cbg, 2cgw, 2cvj, 2gy, 2lu, 2mu, 3bct, 3biq, 3chg, 3lp, 4ael, 4am, 4jr, 4sa, 4rl 5acl, 5agn, 5adz, 5akz, 5ew, 5hp, 5kc, 5oq, 5ox, 5uk, 5xc, 5zai, 5zl, 6add, 6aij, 6akz, 6aoi, 6aqp, 6awt, 6bgo, 6bgv, 6bhz, 6bil, 6bjj, 6bjx, 6bmw, 6btm, 6bup, 6bvy, 6cah, 6cai, 6cfs, 6cgw, 6chi, 6chs, 6cmq, 6ct, 6etm, 6dah, 6dai, 6dcf, 6fa, 6ih, 6jp, 6km, 6li, 6rw, 6sb, 6tz, 6ve, 6vr, 6zac, 6zbn, 6zd, 6zh, 7ay, 8ay, 8axn, 8bgn, 8pl, 8sf, 9aed, 9akf, 9bht, 9ctu, 9ded, 9dkv, 9dpx, 9eht, 9ek, 9ff, 9hp, 9uq, 9xn. Hawaii: 6aff. English: 2cc, 2kf, 2lz, 2od, 2nm, 2xy, 5lf, 6rm, 6tm. French: 8bf, 8bp, 8fq, *8tok*, 8uiv, 8wag. Brazil: 1ab. Argentina.: a8, ba1. Canada: 4gt. Mexican: 1af, 1b, 1x. Italy: 1rt. Chile: 1eg, 9tc. Philippines: 1hr. Holland: osv. Switzerland: 9ad. Australia: 2bb, 2bg, 2cm, 2nj, 2tm, 2yi, 3bd, 3bm, 3bq, 3ef, 3ju, 3ot, 3tm, 3yx, 4an, 5bg. Naval: naj, nas, nirx, nkf, npg, npm, npn, npo, npu, nrrl, nve. Commercial: kfuh, vis, wap, wiz. Miscellaneous: fx1, ab (qra?).

Wl qsl to ani of abv if they desire. Pse qsl if u hr numm.

James Steffensen, Ehlersvej 8, Hellerup, Denmark.

40 Meters.

1aiu, 1axa, 1caw, 1rr, 2agt, 5zai, 6cgw, 8bqi, 9cea, 9cxx, wnp, bzlab, bz2sp, z1ao, z1ax, z2xa, z4ak, z4as.

s2ND, E. Kairenius, Laivunikatu 21.C.7, Helsinki, Soumi (Finland)

1ckp, 1anq, 1uw, 1arh, 1pl, 1oih, 1bes, 1af, 1mk, 1ana, 1cmx, 1cmf, 1ka, 1cam, 1cmp, 1aep, 1caw, 1ro, 1abp, 1bee, 1bus, 1ij, 1are, 2nf, 2xbb, 2wr, 2bbk, 2bbx, 2lu, 2agb, 2ams, 2gk, 3ah, 3aha, (4sa) 4kt, 4tv, 4er, 4oi, 4rr, 4ask, 4sb, 4rl, 5lb, 6hl, 8sf, 8don, 8dne, 8cle, 9xn. Canada: 1ar. Mexico: 1aa. Brazil: 1ab, 1af, 2sp. Argentine: fa8. Wnp, wap, wiz, wir, nerk1, nve, nkf. One 70 meters: 1sf, 1bhm, 1aww, 1ary, 1bkq, 1aaj, 1bdt, 1ci, 1bkr, 1ckp, 1auc, 1zc, 1cri, 1rk, 1bbe, 1bv, 1aao, 2rk, 2cme, 2brb, 2by, 2cvj, 2ag, 2brc, 2ce, 2dgi, 2gn, 2bqu, 2gk, 2anm, 2bgg, 2axf, 2eq, 2cu, 3hg, 3chg, 3lg, 3bn, 3adq, 3bta, 3qj, 3cdv, 4xe, 8aly, 9eas.

I. A. R. U. NEWS

(Continued from Page 54)

several times during the latter part of August and NRRL has been copied a number of times while he was at Wellington, N. Z.

First communication between Belgium and New Zealand took place on August 29th when b4YZ was QSO z2AC on 45 meters. During the communication 2AC reported having heard b4RS.

u3AJD reports intercepting DC7 giving his QRA as Ashan Dagmar, Pago Lamares, Quetto, British Baluchistan, India. This is the station we have thought was signing DCB, probably. Anyone know anything else about DC7?

And here comes a report from u8CCQ in which he informs us that he *worked* DC7 on September 12th! Fine biz! The best part of it is that 8CCQ uses a lone "5 watt" tube with 500 volts on its plate.

u2ASB heard RDW, September 11, 1925, who was QSTing the following schedule: "We have an experimental transmission from 0100 to 0200, 1220 to 1320 and from 2225 to 2325 GMT. Please QSL to the following address Nijni Novgorod Radio Laboratory, Russia".

ch2LD, Luis M. Desmares, Casilla 50 D, Santiago, De Chile, S. A. is on 37 meters and has been doing some nice work with U. S. stations. He will appreciate as many QSO's as possible.

Communications

D X Rating

214 Union Street,
Schenectady, N. Y.

Editor, *QST*:

"Miles per watt" seems to have been adopted as a basis for determining the relative effectiveness of low-power transmitters. This assumes that the received energy is inversely proportional to the distance. If my ideas of attenuation are correct the energy received varies more nearly with the inverse *square* of the distance if absorption and other effects which can hardly be calculated are neglected. It would seem to me that a more fair basis for rating low-power DX would be in terms of miles² per watt. Ten thousand miles with an input of 100 watts and one mile with .01 watt input are both 100 miles per watt, but figuring miles² per watt gives the former a million miles per watt and the latter only a hundred—all of which seems fair and reasonable. It's altogether too easy to work a couple of miles with a dry-cell tube and hang up a "miles per watt" record. Give the low-power transmitter credit, to be sure, but not undue credit.

—*Robert B. Taylor, 9DQ.A.*

A New Hawaiian

Lihue, Hawaii

Editor, *QST*:

I am very anxious to get lined up with more of the Mainland fellows and feel sure that this letter will bring the desired results. Just recently I have rebuilt my 200-meter set and now have one 50-watt tube "perking" on 38 meters. I have been operating the set only two nights but I have worked several 6's and one 9. I have the only amateur set on Kauai, the island farthest north of the main Hawaiian group, and would be glad to work any of the gang who are interested. The transmitter is patterned after 6TS's per description in March *QST*. Most of the set is homemade. Your magazine has surely been a help to me all the way through.

—*Elliott Wood, 6AJL.*

Re: Jenkins Machine

Washington, D. C.

Editor, *QST*:

It has come to our notice that some of the receiving stylus holders on the Midget radio line-picture machine have been so stiff that it takes an unnecessarily large amount of current to pull it down onto the carbon paper. If you have such trouble will you please remove the cap of the stylus box; unfasten and take out the bronze spring which carries the stylus and bend it down at the elbow (near the point at which it was fastened to the box) until, when this bronze strip is replaced, the armature is scarcely lifted off the magnet pole pieces. It should then require no more current than is required to operate a loudspeaker.

—*Jenkins Laboratories.*

The Shenandoah

Hoogduin, Noordwijk aan Zee,
Holland.

Dear Mr. Maxim:

After the terrible accident to the *Shenandoah* I just want to tell you how we over here deeply feel the loss of this fine airship just as you do. Many amateus in Holland when listening to signals from America have logged the NERK and always when writing down this call we felt as though we were meeting an old friend. We followed the fine service the A.R.R.L. members gave to the Navy by coöperation on short waves and we were proud that the amateur again had shown his ability to do fine work with his apparatus. And now we have lost our friend, the *Shenandoah*, and we can do nothing about it. Please accept this letter as a sincere expression of the feelings of the amateurs in Holland.

—*R. Tappenbeck, President, Dutch Section, I. A. R. U.*

(Letters such as this typify the *true* amateur spirit. It does not matter whether they come from one point of the globe to another, or from one city in the same state with another. They show, in no small way, that the amateurs of the whole world are bound together by a common bond that holds them almost as securely as do the ties within a family.—Ed.)

"N U M M"

At Sea on Board the
U. S. S. Litchfield

Editor, *QST*:

No doubt many amateurs have heard NUMM and are interested in knowing something about the station and the operators thereof. NUMM is the ether buster of the *U. S. S. Litchfield*, and is operated by three ex-amateurs, J. R. Mohler, D. W.

Imel and R. B. Brightman. At the start of the Hawaiian-Australian cruise in April a "1BGF" type tuner was installed on the ship and very good receiving results were obtained on the trip across. At Honolulu the receiver was converted to the now famous Schnell type and immediately better reception was had. At Samoa a 50 watt bottle was installed. Plate supply was obtained from the 500 cycle ship's radio generator stepped up to 2,000 volts through an old spark transformer. Almost everything about the set was constructed from odds and ends found in the radio shack junk box. With set almost every district in the U. S. was worked from Australia and New Zealand. While tied up alongside the dock at Lyttelton, N. Z., we did our best DX, working g2LZ, g2OD, g2XY, f8TOK, i1RT and bz1AB. The European hams on a good evening, could be copied several feet away from the phones. g2NM's music was heard several times with remarkable strength and clearness and g2LZ could be copied without antenna.

As for the U. S. hams the loudest and most consistent were 6AWT and 6CGW with 6BUR and 6CIX almost as good. 1PL, 4RM, 8PL, 9UQ and 7AY were heard more often and better than any other ham outside of the 6th district. During our stay in Lyttelton NRRL was at Wellington about 175 miles away. His signals were heard only once or twice and then very QRZ. Later "FS" said that he heard several amateurs calling us but never did hear us! Our antenna is a single wire about 75 feet long, insulated at the two ends with porcelain, and enters the shack through a large electrose bushing. An antenna current of about 1.5 amps is usually had. No counterpoise is used, a ground being made to the bulkhead of the radio shack.

NUMM will appreciate reports on his signals. He can be addressed care Postmaster, San Francisco.

—*J. R. Mohler.*

Eagle Eyes!

Montreal, Canada

Editor, *QST*:

In your August issue on page 36 you reproduce a cut and caption which appeared on page 52 of "*Radio News*" for July. As the author of the article which the said cut is supposed to illustrate may I point out that the original caption was sa follows: "Hartley Circuit. Circuit of 10 meter generating set. (By courtesy of U. S. Bureau af Standards)." The change to "Short-wave circuit as conceived by Hertz in 1888" was made by "*Radio News*" without my knowledge or authority and it is just one more example of the watchfulness of your journal that this absurd legend did not escape your notice.

—*A. H. Morse, R. M. Radio, Ltd.*

A Statement

(The following self-explanatory letter has been received by the Editor from Central Division Manager R. H. G. Mathews of Chicago, at the time of writing at Phoenix, Arizona)

Editor, *QST*:

It has come to my attention through several channels that certain rumors were propagated at the recent Convention reflecting on my reasons for being absent from Chicago at the time of the convention. There always exist persons who appreciate the opportunity of one's absence to spread scurrilous stories.

As you know I am at present on a tour with the Zenith Portable Broadcasting station. We have just left the West coast and are enroute back to Chicago via New Orleans. On my return I will be glad to take up with those responsible, more details of my trip if they will manifest their interest personally.

In the meantime you can assist me greatly by seeing that a true statement of the foregoing appears in *QST*. I am indeed sorry to bother you with a personal matter of this nature, but only through *QST* can I get a true statement of facts to the fellows.

—*R. H. G. Mathews.*

Amateur Co-operation

Union Trust Company,
Chicago, Illinois

Editor, *QST*:

I should appreciate very much if you would, in the next number of *QST*, express Mrs. Rawson's and my appreciation and gratitude to the amateurs for their fine service and thoughtful attention in transmitting for me the messages to and from our son, Kennett Rawson, a member of the crew of the Bowdoin now returning with Commander MacMillan from the Arctic. I wish especially to thank, for their painstaking efforts, D. C. S. Comstock, East Hartford, Conn., 1MY; Fred Link, York, Pa., 3BVA.; H. E. Keller, Milwaukee, Wis., 9BMV; A. R. Dean, Brockton, N. Y., 8AXN; A. A. Collins, Cedar Rapids, Iowa, 9CXX; B. G. Albert, Fall River, Mass., 1CAW; George Gustafson, Chicago, Illinois, 9XN. These have been untiring in their efforts to send me, by both telegram and letter, messages received, as well as to transmit messages for me. Through this service I have had the opportunity, as never before, of learning the great value the amateur radio operator has rendered and can render again in case of need or war.

With many of these operators I have carried on a very delightful correspondence, and have come to regard them as personal friends, and am looking forward to the opportunity of meeting them in person.

I fully realize what an encroachment on their time and strength it is for these tireless, self-sacrificing men to sit up into the late hours of the night performing this fine, gratuitous service, and I wish they could appreciate how their efforts have alleviated the apprehensions of ourselves and the other relatives and friends of those on the expedition.

—*F. H. Rawson.*

Lighting the House

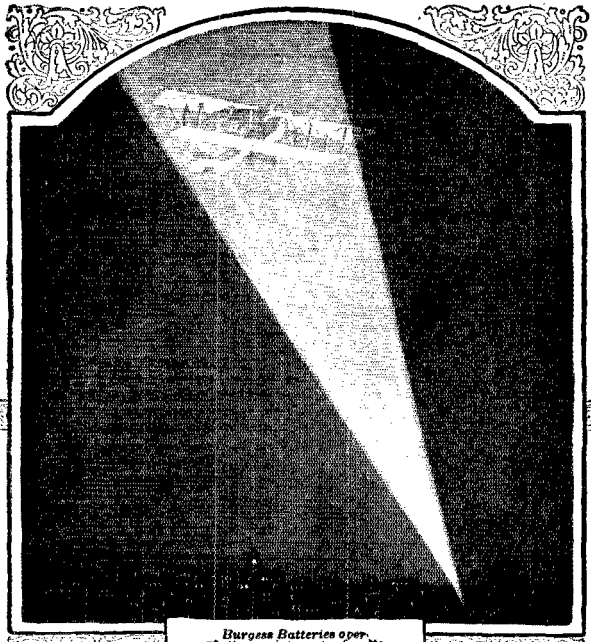
Woodland, Calif.

Editor, *QST*:

Reading Malcolm H. Romberg's article, "Misplaced Power" in September *QST* reminds me of similiar trouble that I had with a 100-watt set last July. After hooking it up I pressed the key and was immediately aware of shouts from the house. Members of the family wanted to know how and why I was lighting the lights without the usual formality of turning on the switch. The set was feeding enough R. F. back into the line to light two 60 watt bulbs. After trying methods of detuning the light system I decided that "an ounce of prevention is worth a pound of cure" and stopped all R. F. from getting into the system.

With R.F. chokes in all filament and plate leads and by-pass condensers in every conceivable place about the set a sensitive Geisler tube showed that the R.F. was kept out of the transformers and hence it never got to the lighting system. A reference to the articles on five meter sets gave me some ideas on chokes that should be applied to every 40 and 80 meter set. A great amount of local interference is caused by the power that is allowed to wander around in the neighborhood lighting system. A little effort along these lines will give sharper tuning, less QRM for the neighbors and better DX.

—*H. M. Hucke, 6BUD-6CHF.*



Burgess Batteries operate the receiving sets of radio-equipped mail planes

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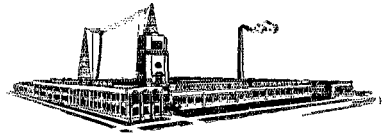
Canadian Factories and Offices: Niagara Falls and Winnipeg

BURGESS RADIO BATTERIES



Built and wired complete in the new ALL-AMERICAN factory, the Model R embodies many notable improvements developed in the ALL-AMERICAN Laboratories. It is offered at a *moderate price*, but with the emphasis upon its superlative *quality*, deliberately inviting your frank investigation of this question—

What Can You Get by Paying More?

ALL-AMERICAN challenges comparison on the basis of the Six Vital Principles of Solid Value in Radio Receivers

1. Quality of tone

In the belief that tonal perfection is all-important, the ALL-AMERICAN Model R is equipped complete at the factory with *Rauland-Lyric* tone amplification. These laboratory-grade transformers, designed especially for lovers of artistic music, are recognized by highest authorities as the very finest on the American market.

2. Ease in Tuning

Two dials (360° type) control the ALL-AMERICAN Straight-Line-Frequency TUNING, reaching easily all wave channels, new and old, and eliminating all crowding of the low-wave stations. Touching the fingers to the dials does *not* affect the tuning.

3. Quietness

Practically all the various noises picked up directly from the air by ordinary coils have been eliminated in the ALL-AMERICAN Toroids. The unequaled quality of the *Rauland-Lyric* tone amplifier results in a remarkable quietness.

4. Selectivity

A test of the ALL-AMERICAN Model R will be a revelation to the experienced listener, in the sharpness of tuning which has been achieved solely through improved condenser and inductance design, without impairing tone quality in the slightest degree.

5. Sensitiveness to distant signals

The ALL-AMERICAN Tuned-Radio-Frequency system embodies the most advanced refinements of the present year. The result is a sensitiveness which challenges comparison with any other set made, irrespective of the number of tubes employed.

6. Appearance and serviceability

The ALL-AMERICAN Model R comes in a beautiful two-tone mahogany cabinet, with inlaid designs, which accords with the decorative scheme of the most fastidious home. Ample space is provided within it for all batteries, or for a "B" socket-power if preferred. The ALL-AMERICAN "steel chassis" construction rounds out a set that will be a source of uninterrupted enjoyment for years to come.

Have your dealer demonstrate the Model R for you

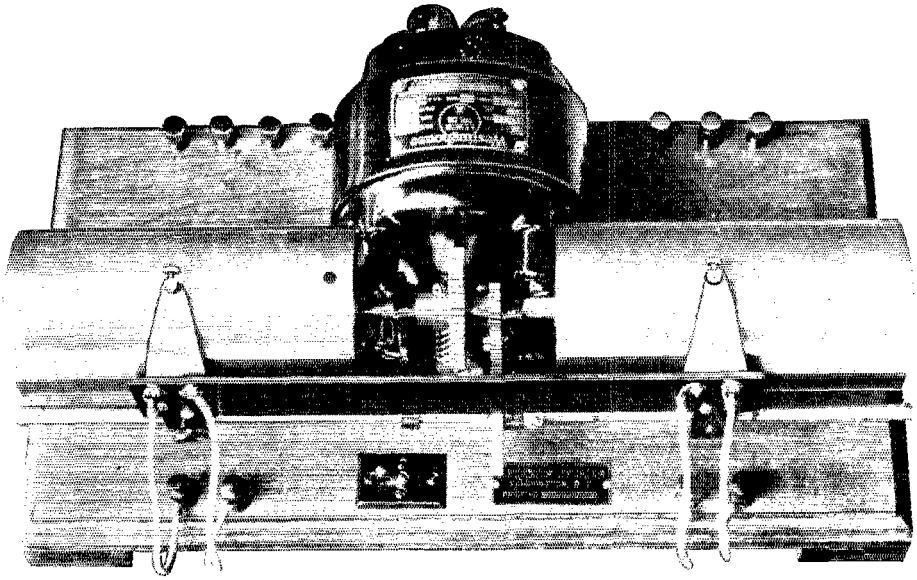
The leading wholesaler of radio apparatus in your community has probably been, for years, an ALL-AMERICAN Authorized Distributor. ALL-AMERICAN Guaranteed Radio Products are sold everywhere by responsible and reliable dealers

ALL-AMERICAN RADIO CORPORATION, 4205 Belmont Avenue, Chicago, Illinois
E. N. Rauland, President

OWNING AND OPERATING STATION WENR—266 METERS

ALL-AMERICAN

Pioneers in the Radio Industry

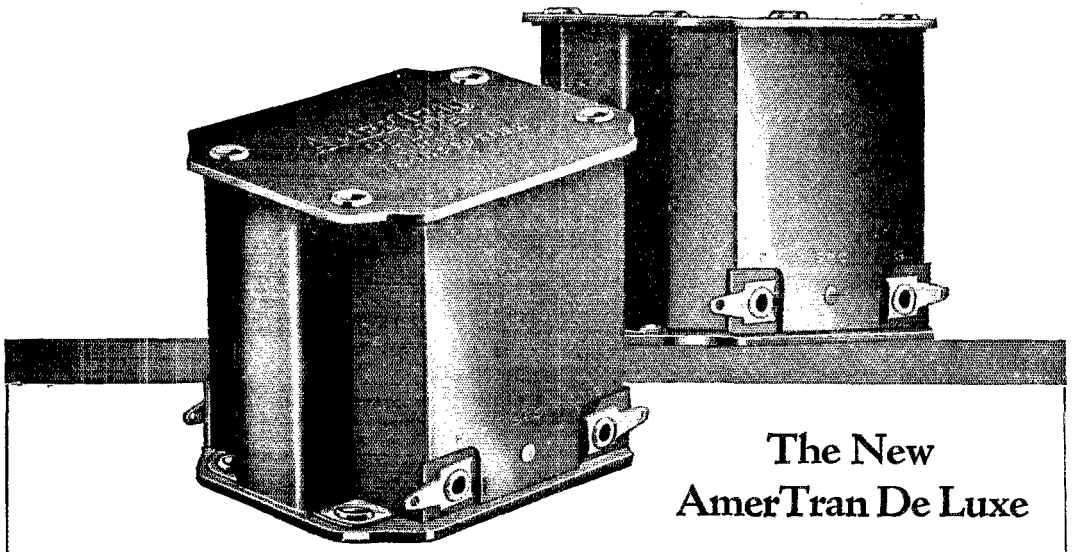


RADIO PICTURES

The Midget is the "Lizzie" of the radio picture system; a very simple and dependable instrument; but, of course dexterity in its use comes only with practice. The function of the sending cylinder is to send electrical impulses, like a telegraph key does, but these represent pictures instead of dots-and-dashes. The signals received at the distant station are then converted back into a picture on ordinary white paper with a stylus and a typewriter carbon sheet, marking the white paper. The picture is finished when taken off the receiving cylinder; no chemicals or developing. The picture to be sent may be made with pen and ink, or may be a zinc etching; a sketch, message, map, or other line work. Machines for finer lines, i. e., finer pictures, can be made for special uses; and these may be photographic pictures where required. Wire or radio or wired wireless may be employed as a carrier. Machines can be furnished for the radio experimenter, newspaper, banker, broker, power superintendent or others who want an autographically authentic copy by quickest means. Tell us your special radio or wire picture problem. We can give you the solution.

JENKINS LABORATORIES

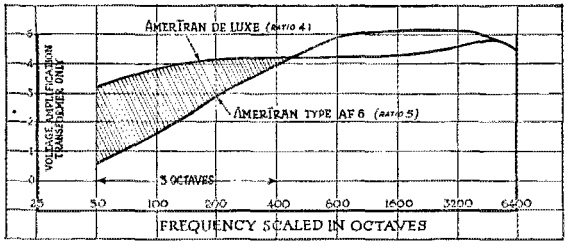
1519 Connecticut Avenue Washington, D. C.



The New AmerTran De Luxe

The new De Luxe model AmerTran audio transformer possesses an unusually straight line frequency characteristic extending the range below the lowest note now being broadcast. While the AmerTran AF-6 and AF-7 have, for years, been considered the leaders in audio frequency amplification, this new De Luxe AmerTran shows a gain of about three octaves below that previously obtained.

The AmerTran De Luxe is a transformer of moderate size and weight, enclosed in a strong metal case with mounting holes at both top and bottom so that it may be inverted, affording simplified connections. While the AmerTran De Luxe will improve any set, appreciation of its uniform amplifying qualities can best be realized when operated in conjunction with straight line frequency loudspeakers, such as the best cone and disc types and with a tube in the last stage capable of handling the output. *It is for those who are satisfied only with the utmost in quality that this transformer has been developed.*



The AmerTran De Luxe is made in two types, one for the first stage and one for the second stage, and plainly marked as such. The chief difference between these two types is that the first stage transformer has approximately 50% greater primary inductance than the second stage transformer, thus more nearly corresponding to the operating impedances of the tubes out of which they work. For this reason it is advisable to purchase and operate these transformers by the pair!

Price, either type, $10.00 at any authorized AmerTran Dealer

AMERICAN TRANSFORMER COMPANY, 178 Emmet Street, Newark, N. J.

"Transformer builders for over twenty-four years"

AmerTran Models AF-6 & AF-7 now reduced to $5.

QS

American Transformer Co., 178 Emmet St., Newark, N. J.

Gentlemen: Enclosed find check (money order) for $..... Please send me ..... First Stage and ..... Second Stage AmerTran De Luxe Audio Transformers at $10.00 each.

Name.....

Address.....

Dealer's Name.....

Address.....

Send for this RADIO BOOK FREE

1926 Catalog of RADIO BARGAINS Save 1/3 to 1/2

The World's Largest Exclusive Radio Mail Order House Will Send You This Wonderful Book FREE

64 illustrated pages containing thousands of bargains in radio sets, semi-finished sets and radio kits of all styles, sizes and approved circuits. **5-tube sets as low as $29.50.** Beautiful models of the very latest designs and types. Elaborate console models with loud speakers built right in cabinets of genuine mahogany and walnut. **All sets guaranteed.** Coast to coast receiving range. Also contains everything in radio supplies, including batteries, chargers, loud speakers, transformers, condensers, rheostats and any other parts you may want for improving your set or building a new one. Guaranteed saving to you of 1/3 to 1/2.

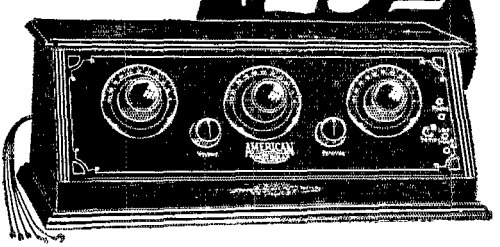
The Biggest 5-Tube Value on the Market

Positively the world's greatest 5-tube radio bargains. **Regular $75.00 value.** Our large quantity production enables us to sell this set for **only $29.50,** fully built and wired in beautiful mahogany cabinet of latest design with sloping Bakelite panel of Satin finish, handsomely etched and engraved as illustrated. Constructed of the finest low-loss condensers, coils and sockets. Bakelite baseboard panel and dials. **Price for set only. $29.50** Transportation charges extra, shipping weight 25 lbs.

This set with all accessories, including the famous **American Bell loud speaker** with adjustable unit, 2-45 volt "B" batteries, one guaranteed 100 Ampere Hour, storage "A" battery, cable for battery connection, 5-201A tubes, Aerial and ground equipment, and everything complete ready to set up and operate. Nothing else to buy. **Price $59.75** Transportation charges extra. Shipping weight 100 lbs.

AMERICAN RADYNOLA 5 TUBE SET

$29.50

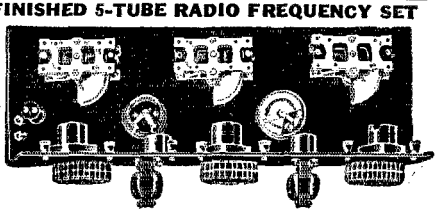


Order Direct from This Page! Save About One-Half!

Order direct from this page. Save 1/3 to 1/2. Our guarantee protects you. Money cheerfully refunded if you are not satisfied. Write your order and prices plainly. Send post office money order or bank draft for full amount to insure safety. Refer to any bank or commercial agency regarding our reliability.

SEMI-FINISHED 5-TUBE RADIO FREQUENCY SET

$18.75



This special offer is astounding the radio world. **Coast to coast reception on loud speaker.** Low loss condensers and sockets. Highest quality transformers. Bakelite rheostats. All wiring concealed under Bakelite baseboard. 7x18 panel—fits into any standard 7 x 18 cabinet. Complete instructions for wiring. **Guaranteed saving to you of $50.00. Price of set all mounted, $18.75.** Cabinet of same model as American Radynola pictured above $5.65 extra.

SEMI-FINISHED 8-TUBE SUPER-HETERODYNE

$43.75

World's Famous 8-tube superheterodyne. Fully mounted on panel and baseboard. Comes **completely assembled** ready to wire and operate. We have testimonials from thousands of builders of this set. Some have received foreign stations on loop aerial. Unsurpassed in volume and tone quality. Low-loss straight line frequency condensers, vernier dials, finest quality rheostats. Matched Columbia long waved transformers. Requires only three screws for attaching panel and baseboard and set is ready to operate. 7x30 panel. **Price of set only $43.75.**

Requires following accessories to complete this set: 7x30 cabinet, 8-201A tubes for storage battery operation or No. 199 tubes for dry cell operation. 100 Ampere hour storage battery, 2-45 V "B" batteries, loud speaker, center tapped loop aerial. All these items are listed in our catalog **at a tremendous saving.**

Complete Parts for Best 45 Kilocycle Super-Heterodyne Genuine Remler Parts $49.50

You must have our catalog no matter what set or kit you want. Our line is complete and includes all popular sets, such as Superheterodyne, Neutrodyne, Ultradyne, Reinartz, Regenerative, Radio Frequency, Browning-Drake, Super-Heterodyne Reflex and all other latest circuits. Kits, sets and parts manufactured by all well known manufacturers such as Frost, Howard, Baldwin, Brandes, Western Electric, Columbia and others.

Our semi-finished sets come with all parts mounted on panel and baseboard ready for wiring. Do not fail to send for our catalog. Remember—we are the largest exclusive radio mail order dealers in the world and carry the best of everything in radio. We save you 1/3 to 1/2 on the following kits. Detailed descriptions appear in our catalog.

Catalog includes list of broadcasting stations, general radio information and facts about our free service division. Write for it today.

NEUTRODYNE
Genuine licensed Neutrodyne kit of parts, come fully assembled on the panel and baseboard with complete instructions, ready to wire. Price, **$29.75**

COCKADAY
3-tube Cockaday kit of parts, fully assembled on panel and baseboard, ready to wire Price **$15.85**

LOW LOSS SHORT WAVE
3-tube set—25 to 100 meters. Fully assembled on panel and baseboard, ready to wire. Price, **$19.80**

Browning-Drake 4-Tube Kit *Complete* **$32.40**

RANDOLPH RADIO CORPORATION

159 N. Union Ave. Dept. 99 Chicago, Illinois

Two More New AMERTRAN Products

The AmerTran Power Transformer Type PF-45, 65 VA-60 cycles 110 volts primary, 450-8/4-8/4 secondary

The New AmerChoke Type 854

TYPE PF-45 is intended for use on the standard 110 volt, 60 cycle house lighting circuit. It has three separate well-insulated secondary windings; one for 450 volts with a current capacity of 60 milliamps. and two 8 volt windings each with a carefully balanced center tap and a current capacity of 2½ amperes. The windings are enclosed in a strong metal case provided with mounting feet. The secondary leads are standard code flexible wires left long enough to reach the terminals in the average set without splicing.

This transformer is well suited for supplying AC power for filter circuits and is designed with the usual margin of safety incorporated in commercial power transformers.

Price: $15.00 each
f.o.b. Newark, N. J.

TYPE 854 is a scientifically designed impedance or choke coil having a no-load inductance of approximately 100 henrys at 60 cycles and a maximum DC capacity of 60 milliamps. The DC resistance is approximately 600 ohms.

The AmerChoke is an impedance of general utility designed primarily for use in filter circuits. As an output impedance for by-passing direct current from the loudspeaker it is just as efficient as an output transformer and somewhat more economical. When used with a 1 mfd. (or greater) fixed condenser, the tone quality equals that of the best output transformer.

DC saturation is prevented by two adjustable butt joints in the core.

Price: $6.00 each
f.o.b. Newark, N. J.

At any authorized AmerTran Dealer

AMERICAN TRANSFORMER COMPANY, 178 Emmet Street, Newark, N. J.

"Transformer builders for over twenty-four years"

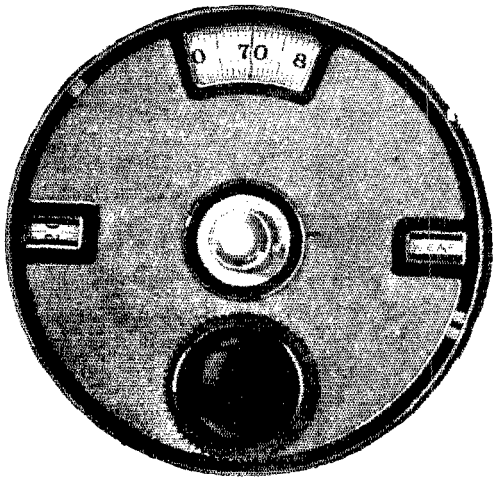
American Transformer Co., 178 Emmet St., Newark, N. J.
Gentlemen: Enclosed find check (money order) for $..... Please send me by Express Collect .....AmerTran Power Transformers at $15.00 each .....AmerChokes, Type 854 at $6.00 each.

Name .....
Address .....
Dealer's Name .....
Address .....

Splits a single degree into hair's breadth divisions!

You'll never know how much difference a dial can make until you get this new MARCO dial on your set. Without the least suggestion of backlash, it responds instantly to your slightest touch. Smooth working, handsome, supremely accurate, it's typical of MARCO. And you keep a record of dial settings in the two slots—right on the dial itself!

Martin-Copeland Company
Providence, Rhode Island



Nickel Plated	*Gold Plated*	*Clockwise, or counter-clockwise action*
$2.50	*$3.00*	

MAR-CO RADIO PRODUCTS Vernier Dial

Now Is the Time to Prepare!

for Your Winter DX. Work

THESE TROY SPECIALTIES WILL HELP YOU

Low Loss Treated Wood Short Wave coupled Inductances for 40 or 80 meters	$8.00
RCA U X 210 R. C. A. 7 1/2 Watt Tubes	$8.00
Double spaced Variable Transmitting Condenser 41 plate .00048 MFD	$9.00
Low Loss Radio Frequency Choke wound on glass forms	$3.00
Bruno Short Wave Tuner 40-150 meters wound on glass forms	$6.50
AMRAD Amrad "S" Tubes 4000-1	$8.00
" " " 5000-1	$6 00
Change Over Switch	$6.00
R.C.A. 40 Henry 150 Mil. Chokes	$13.00

All prices F. O. B. N. Y. *See us for your transmitting accessories or any other needs. Inquiries solicited and promptly answered.

Troy Radio Company

254 St. Johns Place Brooklyn, New York

Specialists in Amateur, Experimental and Commercial Radio Apparatus.

You Fellows *Know* Radio—We Won't Side-step

A well-meaning friend told us that advertising a commercial receiver to the radio intelligentsia was just like inviting a hurricane right into the front parlor. Well, we've always felt that thunderstorms are good for the crops.

So be it. Gentlemen, we continue to present, for your tender consideration, the Thorola Islodyne Receiver. We think it is a mighty good receiver. We have put into it every good thing we know about radio. We have developed a type of toroidal coil you can't laugh off—no matter how funny some manufacturers are trying to make this whole coil business. And we'll venture to state that you'll even learn some new tricks from Thorola.

All right, we've said it. Now it's your turn. Listen in at some Thorola dealer. We've dug in deep and we don't think you can find any weak spots.

REICHMANN COMPANY, 1725-39 West 74th Street, *CHICAGO*

Thorola

ISLODYNE

RAYTHEON

The new rectifier that perfects the B-battery eliminator

PURE, resonant, clear tone—reserve power—freedom from worries of all kinds—aren't these the things you have always looked for in a B-eliminator? The things you have never been able to realize?

Here, then, is a tube that makes all these possible—that has immeasurably long life, uniform quality, ample power to run a ten-tube set. The RAYTHEON Rectifier is the result of prolonged experimentation and scientific research. It is the last word in the perfection of the B-battery eliminator, developed by an organization that is in the forefront of the engineering field, and sponsored by radio editors and leading manufacturers.

Complete B-eliminators or parts, specially designed for use with RAYTHEON tubes, are manufactured and sold by:

Acme Apparatus Co., Cambridge, Mass.
All-American Radio Corp., Chicago, Ill.
Dongan Electric Mfg. Co., Detroit, Mich.
General Radio Co., Cambridge, Mass.
Jefferson Electric Mfg. Co., Chicago, Ill.
Mayolian Radio Mfg. Co., New York, N. Y.
Thordarson Electric Mfg. Co., Chicago, Ill.
Tobe Deutschman Co., Boston, Mass.

You can buy these B-eliminators, parts, and RAYTHEON Rectifying Tubes at your dealer's. Price of tube, $6. Look for the RAYTHEON name. It is the mark of quality and your assurance of satisfaction.

Long Life
No Filament
Replacements
Unnecessary

Reserve Power
No Liquids
Uninterrupted
Service

AMERICAN APPLIANCE CO.

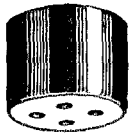
CAMBRIDGE, MASS.

Organization Integrity—Honest Merchandising
Truthful Advertising—Scientific Research
Sound Engineering—Basic Patents—Substantial Backing

Na-Ald Sockets and the new Standard tube bases

Adapters for old sockets—and a brand new socket too

RADIO fans can now use any of the new tubes in the famous Na-Ald De Luxe Socket. This is the socket that has two points of contact with each tube terminal. It is the socket with the ***side-scraping*** contacts that may be easily cleaned by simply rotating tube three or four times without removing it from the socket. It is also the socket proved by laboratory tests to be most efficient in low losses and low capacity

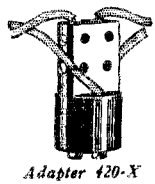


Adapter 419-X

The Na-Ald De Luxe Socket will take the new tubes UX-201A, UX-12 and UX112 without an adapter. By the use of this adapter No. 419-X it will take the new small base tubes, Nos. UX-199 and UX-120. 419-X sells for 35c.

Other Na-Ald adapters and the new socket

The Super-Het No. 420-X adapter, equipped with cables for connections, enables the owners of Radiola Super-Het to get the great increase in volume and clarity the new UX-120 tube develops. Price of 420-X Adapter, $1.25.



Adapter 420-X

Adapter 421-X

There is a new adapter for use in making the shift from WD-11 to UX tubes. It is especially designed to enable the users of Radiolas II, III and III-A to enjoy the improved operation the new tubes provide. Price 421-X, 75c.

The 481-X Na-Ald Socket is a brand new socket that will take any of the UX series of tubes without an adapter. Price 35c. No. 481-XS cushion mount, 50c.

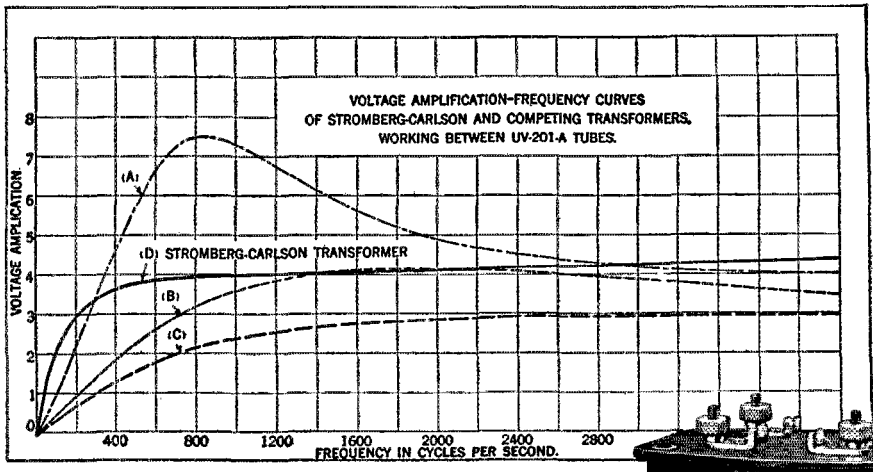
Adapter 481-X

You can obtain Na-Ald adapters, sockets or dials at radio, electrical and hardware stores everywhere.

Write for catalogue and free information, "What to Build," giving tested, selected circuits.

ALDEN MANUFACTURING COMPANY
Also Makers of the Famous Na-Ald Dials
Dept. R1, Springfield, Mass.

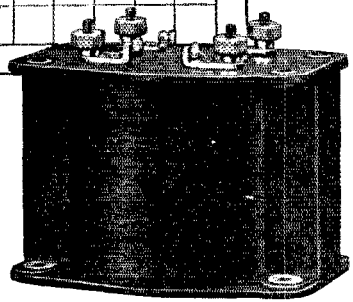
Alden Processed
NA-ALD
Sockets and Dials



Stromberg-Carlson Transformers

Not only does the charted performance of the Stromberg-Carlson transformer show a comparatively high amplification on low frequencies but it also gives uniform amplification on the intermediate and the higher frequencies. This uniform voltage amplification throughout the widest possible range of musical frequencies is in marked contrast to other makes tested which are efficient over only comparatively narrow bands of frequencies or which produce distortion on the high or low frequencies due to weakness in amplification.

The Stromberg-Carlson Audio frequency transformer makes the nearest practical approach to distortionless performance.



No. 3—A Transformer Ratio 4 to 1 Primary reactance, 125,600 ohms at 1000 cycles. Low core losses, thin laminations. Compact dimensions for sub panel or base board mounting. 2¾" long, 1-15/16" wide, 2-3/16" high. Shell type shielding.

PRICE $4.50

Stromberg-Carlson Head Sets

Transformers and loud speakers have Layer Wound and Layer Insulated coils. These coils are wound one layer at a time with a layer of tough insulation between layers and vacuum impregnated. That is why they stand up indefinitely under present day high plate voltages.

No. 3-A Head Set

No. 3-A Head Set Permanently sensitive. Magnets exert 2½ lbs. pull. Hard Rubber Ear Caps. Die Cast Aluminum Case, Nickeled Head Band with Swivel and Slide Adjustment. 11,000 ohms total impedance.

PRICE $5.50

Stromberg-Carlson

TEL. MFG. CO.

1060 University Ave. Rochester, N. Y.

KANSAS CITY CHICAGO TORONTO, CANADA

A REAL LONG RANGE CROSLEY RECEIVING SET, $9.75

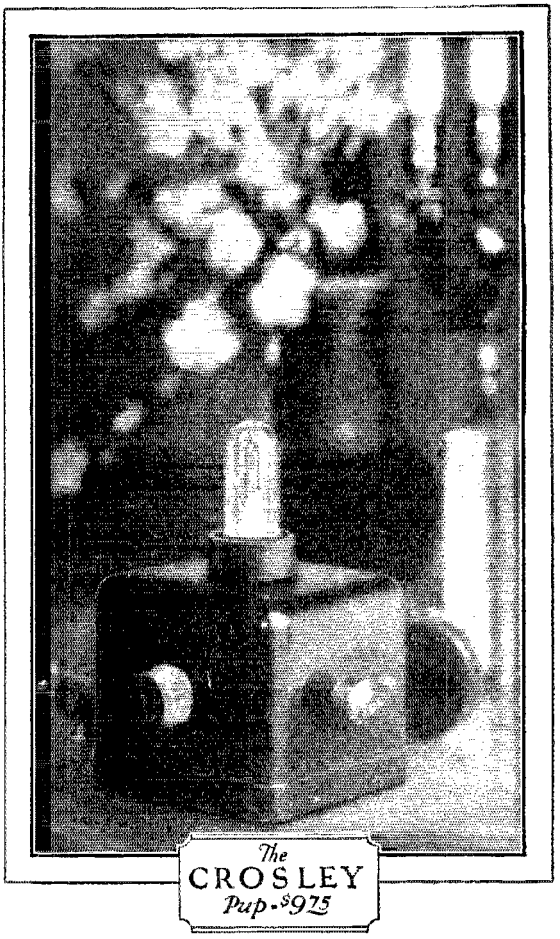
Do not assume from its very interesting price that this very unusual Crosley set is a toy. Its impressive performance alone entitles it to serious consideration. Heretofore, the $10 radio was designed only for local reception. Now the Crosley Pup extends the entertainment radius to 1500 miles under ordinary conditions. Place it beside some costly multiple-tube set and operate the dials. Both tune through local stations sharply. Both get the same programs with equal ease and clarity. Both let you tap the infinite enjoyment coming through the air. There is only one difference—the Pup operates with head phones instead of a loud speaker.

The Pup is the newest Crosley set with a price that reflects the volume-production economies of the world's largest builder of radios. It is substantially constructed and permanent in every regard. Its design is an improvement of the famous Crosley one tube set with which Leonard Weeks of Minot, N. D., heard the MacMillan Polar Expedition while the rest of America listened in vain.

Almost overnight the Pup has become the most popular Crosley set ever offered. It is being bought for youngsters whose curious fingers cannot resist the lure of dials and switches; for the cook, the maid, the old folks back home, and for shut-ins. Traveling men are selecting it because of its easy portability, and radio enthusiasts to have an inexpensive check on their larger sets. Hear it once—and you will own one too!

In addition to the Pup, there is a Crosley for every price and preference. Operating 1, 2 and 3 tubes, these are encased in handsome Crosley-built cabinets and range in price up to the Super-Tridyn Special which retails for $60. Each will deliver the superlative performance that has made the word "Crosley" a hall mark of radio perfection in millions of homes throughout the world.

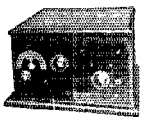
The Crosley Radio Corporation
CINCINNATI, OHIO
Owning and operating W. L. W. first remote control super-power broadcasting station



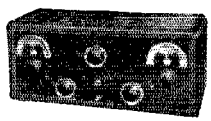
Crosley manufactures receiving sets which are licensed under Armstrong U. S. patent No. 1,113,149 and priced from $9.75 to $60.00 without accessories. None of the prices quoted include batteries, tubes, headphones, etc. Add 10% to all prices west of the Rocky Mountains. See the complete Crosley line at your Crosley dealer's, or write to Department 18 for an illustrated catalogue.

Crosley De Luxe Combination

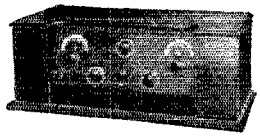
Musicone De Luxe	$27.50
Super-Tridyn Special	60.00
Console Table	25.00
Complete	112.50



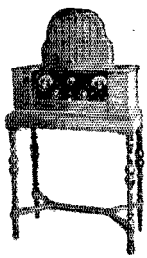
Crosley 3 Tube 52 S.D.
Mahogany finished cabinet, sloping panel. Holds all batteries
$32.50

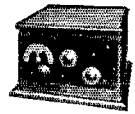


Crosley Super-Tridyn Regular
More compact than the Special Model—but exactly the same superb performance - - - $45.00



Crosley Super-Tridyn Special
Matchless performance and exquisite beauty combined. Solid mahogany cabinet with popular sloping panel - - - - - $60.00





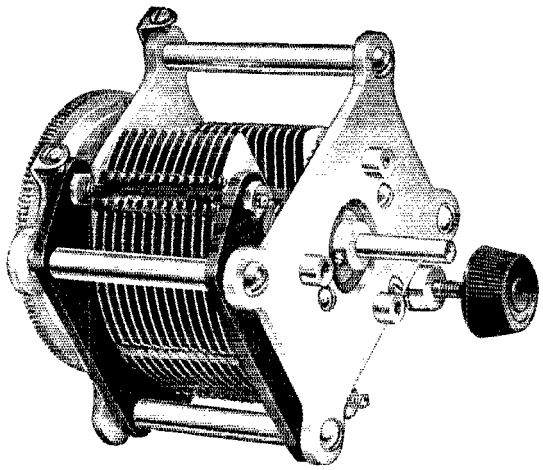
Crosley 2 Tube 51 S.D.
A true long range set, easy to tune and handsome in appearance
$23.50

CROSLEY·RADIO

BETTER · COSTS LESS

ANNOUNCING

the New Type 334



GENERAL RADIO

Straight Line
WAVELENGTH CONDENSER

In certain instances of radio construction the shielding effect of a metal end plate condenser is particularly desirable.

To meet the popular demand for this type of condenser the new type 334 has been developed and is now available at popular prices in all standard capacities both with and without vernier.

In designing these condensers points that have been stressed particularly are ruggedness, permanence of calibration, and uniformity between individual condensers of the same capacity.

These are the factors so essential to the successful operation of modern radio sets.

Rotor and Stator units are similar to those used in the well-known type 247 condensers and good interplate conductivity is assured thru solder-sealed contacts.

All General Radio condensers are rigidly inspected before leaving the factory and are thoroughly guaranteed electrically and mechanically.

Models with Vernier Gear

Type	Capacity	Price
334-H	.0005 MF.	$5.25
334-P	.00035 MF.	5.00
334-M	.00025 MF.	4.75

Models with Counter Weight

Type	Capacity	Price
334-F	.0005 MF	$4.25
334-N	.00035 MF	4.00
334-K	.00025 MF	3.75

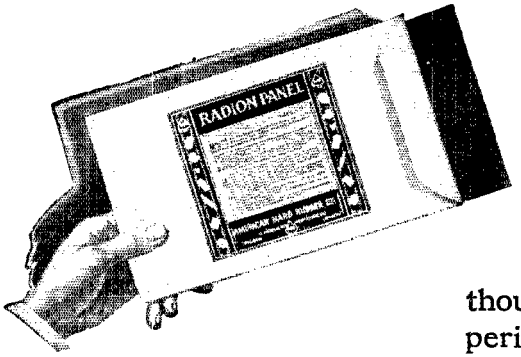
Ask to see them at your local dealers or write for our New Catalog 922-P

GENERAL RADIO CO., *Cambridge, Mass.*

"Behind the Panels of Better-Built Sets"

"As efficient as Radion Panels"

The best recommendation for these Radion low-loss parts



THE very latest developments in radio are embodied in the complete line of Radion low-loss parts—***moulded of Radion, the insulation made to order for radio purposes exclusively***

Leading set manufacturers and thousands of amateurs know by experience that Radion Panels are most effective in reducing surface leakage and leakage noises. This means lowest losses and greater efficiency, especially noticeable in super-sensitive circuits. All the Radion low-loss parts have the same high-resistant characteristics of Radion Panels.

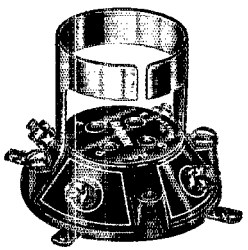
You can now get Radion Sockets, Dials, the new Radion Loud Speaker Horn, Tubing, Binding Post Strips, Insulators, etc. Radion Panels in black and Mahoganite come cut in standard sizes for whatever set you wish to build.

Send for booklet, "Building Your Own Set." Gives Wiring diagrams, front and rear views, shows new set with slanting panel, lists of parts and directions for building popular circuits. Mailed for 10 cents.

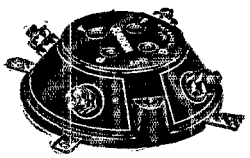
AMERICAN HARD RUBBER COMPANY,
Dept. L8, 11 Mercer Street, New York City

NEW!

Practical types of low-loss Radion sockets for the new tubes and a collar adapter, if you like for the old style bayonet type tube.



No 2 Socket for new UX tubes with collar adapter for old type tubes, No. 3 same as No. 2 without binding posts



No. 4 Socket for new UX tubes. No. 5 same as No. 4 without binding posts.

RADION

The Supreme Insulation

Made to order for radio purposes exclusively.

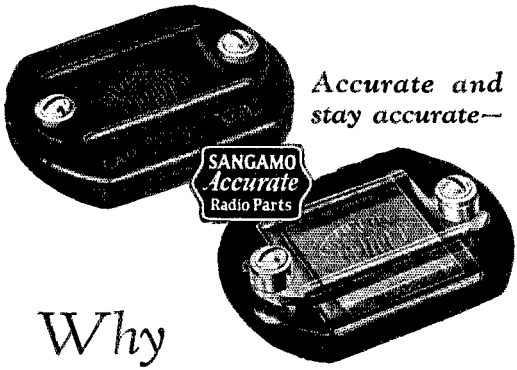
AMERICAN HARD RUBBER COMPANY
Dept. L8, 11 Mercer St., New York City

Please send me your booklet, "Building Your Own Set," for which I enclose 10 cents in stamps.

Name.....

Address.....

.....



Accurate and stay accurate—

Why Sangamo Condensers *have sealed edges*

EVERYBODY who is up to date on radio knows that "Sangamo Mica Condensers are solidly molded in bakelite." Front, back, and sides—all enclosed in one solid jacket of smooth brown bakelite. Why such a radical change from the usual method of manufacturing fixed condensers? Simply this. Exposed edges permit moisture to creep in.

It has been proved in official testing laboratories that a condenser, though accurate when made, may increase its equivalent series resistance twenty times over in a few weeks, because it is injured by moisture, absorbed through the edges, from humidity or salt air. Then it no longer acts as a condenser, but as a resistance unit, causing distortion noises that are often mistaken for static.

The edges of the Sangamo are sealed tight permanently. A doubting Thomas boiled one for 50 hours in water, dried it off and then tested the capacity. There was no change! You do not have to look for water to plunge your condensers into. Moisture is in the air all the time—causing condenser trouble that spoils fine reception.

Now Ready
Sangamo By-Pass Condensers
1 Mfd. . . . $1.25
½ Mfd. 90

Insist upon Sangamo mica condensers and keep the moisture out! Accuracy guaranteed within 10 per cent of marked capacity. They ARE *accurate—and* STAY *accurate.*

Dealers have them or can quicklyprocure them.

Sangamo Electric Company

1421-1 *Springfield, Illinois*

RADIO DIVISION, *50 Church Street, New York*

SALES OFFICES—PRINCIPAL CITIES

For Canada—Sangamo Electric Co. of Canada, Ltd., Toronto.
For Europe—British Sangamo Co., Ponders End, Middlesex, Eng
For Far East—Ashida Engineering Co., Osaka, Japan

At Last--

A 1000 Cycle Tuned Audio Transformer Developed Especially For Amateurs

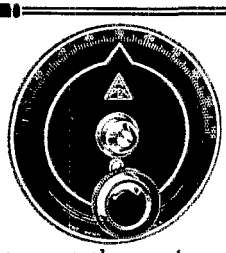
With the new Erla transformer you can heterodyne all signals to one frequency and amplify them to almost any degree. Usually the desired frequency is about 1000 cycles although this can be regulated. Erla offers you 3 important advantages.

1. Only one frequency is amplified appreciably. Any static discharges occurring at other frequencies are not amplified in the same degree as the signal.
2. Harmonics from broadcasting stations picked up by the amateur's short wave set are amplified only at one frequency causing suppression of this interference.
3. Enables differentiation between beat notes of different frequencies by audio tuning effect.

If you want this remarkable new invention send $6.50 apiece and transformers will be shipped at once.

Electrical Research Laboratories, Dept. 2-B
2500 Cottage Grove Avenue, Chicago, Ill

Note: This instrument is unsuited for broadcast reception.



Apex Vernier Dials

are constructed on exhaustively tested and truly scientific principles and are engineered to meet the precise requirements of experts—consequently they *more* than meet the expectations of the average radio user. They bring in distant stations with alacrity and positiveness seldom encountered and provide control and accuracy essential to full radio enjoyment. They impart a degree of elegance that creates a marked improvement in the appearance of any set. Clockwise or counter clockwise.

Royal Brass Finish, 4 in. $2.00; 3¼ in. $1.65
Satin Silver Finish, 4 in. 2.50; 3¼ in. 1.90
DeLuxe Gold (24K) 4 in. 3.00; 3¼ in. 2.50

Apex Rheostat Dials

are little brothers to Apex Vernier Dials. Accurate, handsome—a necessity to satisfactory operation and beauty of appearance.

Royal Brass Finish 75c Satin Silver Finish 85c
DeLuxe Gold (24K) $1.00

If your dealer is unable to supply you, order direct from us.

Apex Electric Mfg. Co.

1410 W. 59th St., Dept. 1109, CHICAGO

Calvert Loop

Bennington
Tube Socket

Mason Z & T Jr.
Detector

Saal
Soft Speaker

Pacent Knob

Pathe Dial

Radio tested all insulations- *and adopted Bakelite*

In the laboratories of radio manufacturers, in actual use in all climates and under adverse conditions, Bakelite has proven its superiority for radio insulation.

The reason for this dominance of Bakelite in radio is easily understood. Its high insulation value, so essential to tonal quality, is unimpaired by time, temperature variations or by service.

Bakelite is generally used for exposed radio parts, dials, knobs, panels and accessories, because its color and high finish are permanent, undimmed by exposure or handling.

The use of Bakelite in the set you buy or build, will insure you against inferior reception through defective insulation. It will pay you to make sure that Bakelite is used in the radio set or parts that you buy.

Write for Booklet 27

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

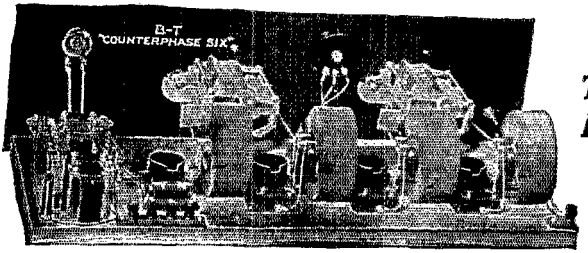
Bakelite is an exclusive trade mark and can be used only on products made from materials manufactured by the Bakelite Corporation. It is the only material which may bear this famous mark of excellence

BAKELITE

REG. U.S. PAT. OFF.

BAKELITE is the registered trade mark for the phenol resin product manufactured under patents owned by the Bakelite Corporation.

THE MATERIAL OF A THOUSAND USES



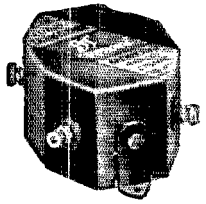
Typical Set Built From B-T Kit

Your Friends Should Know About the B-T "Counterphase"

The B-T "Counterphase" can safely be recommended to the most exacting of your friends. Three stages of R. F. and only two tuning controls make it a distance getter, selective,—yet easy to control. Only a short indoor antenna necessary. B-T Torostyle Inductances eliminate intercoupling and the stray feed backs that impair tone quality.

Up to date amateurs will want information on the Counterphase circuit. Kits for Home Builders—Complete Receivers also. This circuit is patented. **Write for Circulars.**

A New Idea in Audio Transformers

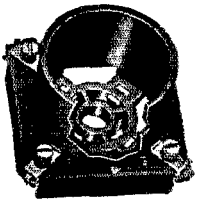


Experienced radio men know that a frequent cause of howling and distortion is due to crossed transformer leads. In addition to being an audio transformer of highest merits, the B-T Euphonic eliminates any necessity for trouble of this kind.

A unique mechanical arrangement permits sub-base, sub-panel or side mounting with the terminals in best position for straight, short leads.

The "Euphonic" is the first mechanical improvement in Transformers for years. You should know about it. *Send for Literature.*

No Loose Contacts with B-T Sockets



No loose contacts with the B-T Universal Socket. Phosphor bronze springs maintain positive side grip on tube prongs. Connections direct to contact springs or to binding posts keyed in position to prevent loose screw head contact.

Extremely low capacity.

Takes all Navy Base and New UX tubes without an adaptor. B-T Circulars describe this socket. Send for your copy.

Keep Informed with "Better Tuning"

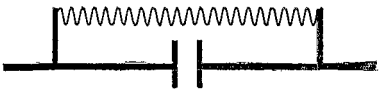
"Better Tuning" Keeps you informed of the latest in Radio. Published bi-monthly. Sent for 10 cents.

BREMER-TULLY MFG. CO.

532 S. Canal St. Chicago, Illinois

THE DAVEN LEAKANDENSER

EQUALS



SOLVES A DUAL PROBLEM

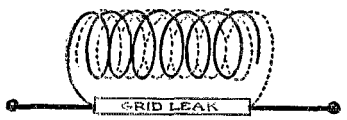
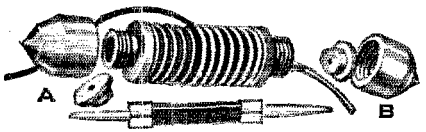


Diagram of the Leakandenser. There are two coils of wire, each forming one of the "plates" of a tiny condenser.



Assembly of the Leakandenser.

The cross section above shows construction and assembly of the Leakandenser.

A pair of wires, coated with a special insulating material are wound in parallel, in a single layer, upon the Bakelite bobbin. To distinguish these in the illustration, one is shown dark, and the other light. The dark wire is connected to cap "A" in the illustration, and the light wire to the cap "B." Each wire therefore has *one open end* and *one end connected to a terminal*, thus forming two plates of a condenser.

The method of winding insures that the spacing between them can vary only the smallest fraction of a percent. This gives extreme uniformity. This is a great stride forward, as grid condensers in the past have been known to vary in capacity as much as 300 percent.

And now, the Grid Leak. One of permanent and constant value is absolutely essential. Daven's reputation for manufacturing precision Grid Leaks needs no comment here.

The Leak is suspended in the centre of the Bakelite cylinder on which the condenser is wound. The ends of the leak are connected to the caps which are also the terminals of the condenser.

Manufacturers are invited to send for a sample.

"The Sine of Merit"

DAVEN RADIO CORPORATION

Resistor Specialists

Newark Reg. U. S. Pat. Off. New Jersey

Daven engineers have produced an innovation so simple and effective that you will wonder it was not thought of before.

Leading engineers and radio manufacturers have asked us repeatedly if we could not improve the old-fashioned combination grid leak and grid condenser which is (1) unattractive and cumbersome, (2) often inaccurate.

The Daven Leakendenser Contains No Mica

Grid condensers (particularly those of the mica type) often lack uniformity in capacity, especially in lower values; are susceptible to injury during soldering operations, and change capacity frequently after installation.

The Daven Leakandenser contains no mica and delivers all the efficiency the name Daven implies. It is a great step forward, both electrically and mechanically.

Manufacturers—you will instantly recognize the convenience and practicability of this new device. *Set Builders* — the Leakandenser will make your set more attractive and save you time and trouble. *Jobbers and Dealers*—here is something new. Show it to those of your customers who know radio. The Leakandenser is precision-built, like all other Daven products, moisture proof and rugged. It takes up less space, is better looking. Made with five different values of grid leaks: 2, 3, 4, 5 and 7 megohms. The condenser is known as type "D" and is correct for all makes of detector tubes. Price $1.00, including clips.

CLIP THIS COUPON

Get the Handbook of Resistance Coupled Amplification. At Dealer's 25c. By mail 30c.

DAVEN RADIO CORPORATION G-11-25
158-160 Summit Street, Newark, New Jersey.

Please send me the following

Check Here:
- ☐ Leakandenser Bulletin
- ☐ Resistor Manual. 30c is enclosed.
- ☐ Complete Catalog (free).

Name .....

Address .....

.....

THE BIG LITTLE THINGS OF RADIO

Distortion

Perfection

Where is the difference in radio transformers?

THE audio frequency transformers in your radio perform a most important duty. They aid in increasing the volume of sound . . . in building it up to the desired strength. BUT—

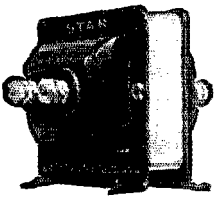
When sound is *increased*, the tendency is toward *distortion*. That's where the difference comes in transformers. Inefficient transformers will give distorted reception, just as a defective mirror will show a distorted image.

Whether you are building a set, or buying one, be *sure* about the transformers. No radio, remember, can be better than its transformers. A safe guide to follow is the Jefferson trade mark. You can depend on quality in performance when the name "Jefferson" is on the product.

Jefferson Transformers are made by transformer *specialists*—the world's largest manufacturers of small transformers. There is a very definite reason why leading radio engineers specify "Jefferson." You'll find it in the clear, sweet, life-like amplification which Jefferson Transformers give. Sold by the better dealers, used by leading set manufacturers.

JEFFERSON ELECTRIC MANUFACTURING CO.
501 South Green Street, Chicago, Ill.

Makers of Jefferson Radio, Bell Ringing and Toy Transformers; Jefferson Spark Coils for Automobile, Stationary and Marine Engines; Jefferson Oil Burner Ignition Transformers.



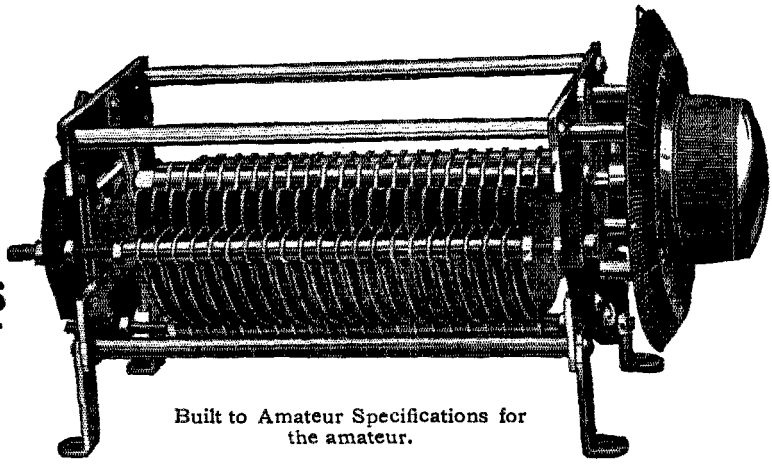
There is a Jefferson Transformer for every radio need.

JEFFERSON
Tube Rejuvenator

Keep your radio tubes like new! Rejuvenate them regularly, AT HOME, just as you recharge your storage battery. Jefferson Home Rejuvenator doubles and trebles tube life, quickly pays for itself. Raises your set's efficiency to 100%, and *keeps* it there! Completely restores paralyzed or exhausted tubes. Takes large or small tubes—types 201-A, 301-A, UV-199, C-299, 5-VA. Don't be without this long-awaited radio necessity. $7.50 at leading dealers.

JEFFERSON
RADIO TRANSFORMERS

Antenna Series Condensers



Built to Amateur Specifications for the amateur.

Type 150 — 3000 150 MMFd. (.00015 MF).
3/16" spacing (ordinarily known as double spacing), 3000 volt flashover. Fine for 5W and normal 50W sets. Proper size for primary circuits. **Price $7.50**

Type 450 — 3000 450 MMF (.00045MF)
3/16" spacing, like those NATIONAL supplied to N.R.R.L. **Price $16.50**

Type 100 — 6000 100 MMF (.0001MF)
3/8" spacing, 6000 volt flashover, for the overloaded "50" and the "250"W. Plenty big enough for the primary, too. All prices include 4" Velvet Vernier Dial. **Price $12.50**

"NATIONAL" can furnish you with 5 or 3 plate Receiving Variables for that short wave receiver.
Send for Bulletin 106 Q S T

NATIONAL COMPANY, INC., ENGINEERS AND MANUFACTURERS
110 Brookline Street, Cambridge, Mass.

UC 1015-$1

REMEMBER THE MAINE!

And our sale of hotwire meters and condensers last season!

Now we have another big sale of

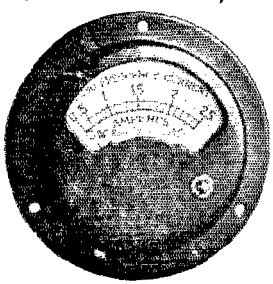
R.C.A. UC 1015 CONDENSERS $1.00

These were offered last spring by RCA at a special sale price of $2.81 and the regular list was $5.75 so we're only giving them away. Hi!

This condenser is a sort of jack of all trades, being a three section, series connected unit which can be hooked up to give capacities from .0002 to .001 mfd. Full directions supplied. It's rated at 7,500 volts, enuf for all tubes from UV 199's to UV 204-A's. It can be used as an antenna series, closed circuit, grid blocking, plate blocking or filament bypass condenser. We believe the .001 mfd. connection is better for the short waves than the old .002 mfd. UC 1806 so universally used for plate and grid condensers.

THE UTILITY RADIO CO., 58 North 6th St., Newark, N. J.

Roller-Smith Co., Hot Wire Ammeters



Flush Panel Model, 3½" Diameter, Zero Adjuster Located in the Front.

0-1 Amp. $4 25 ea.
0-2.5 Amps. $3.25 ea.

AMERICAN SALES CO., 21 Warren St., N. Y. C.

Our Type A Wave Meter Is Ready

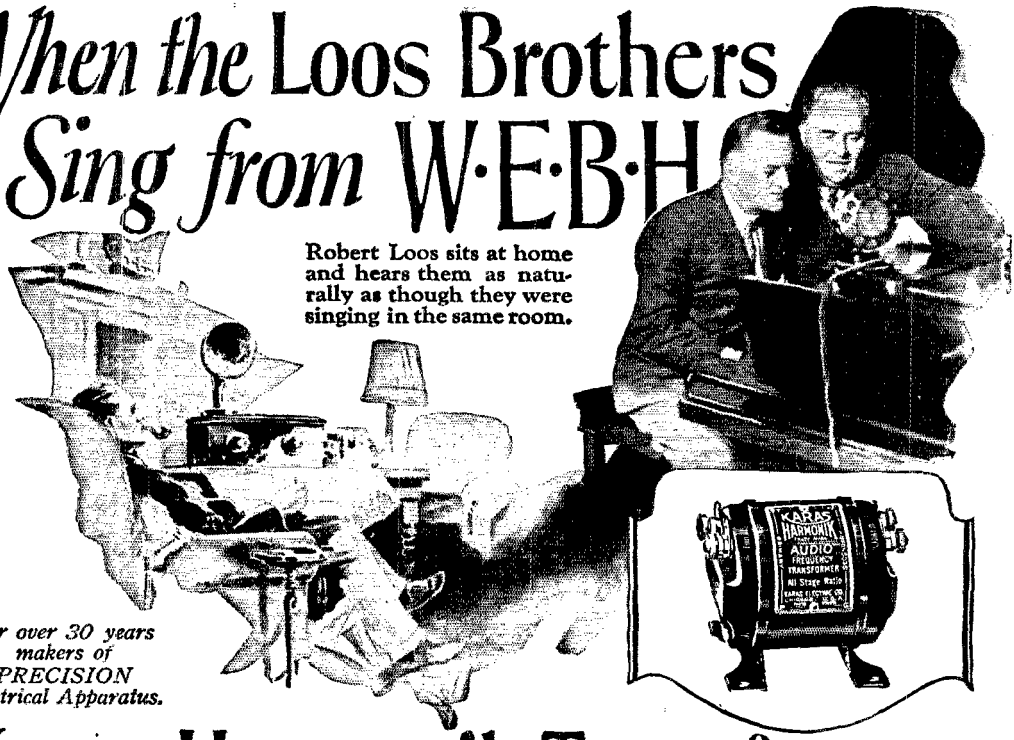
Send for Literature

Other Real Ham Apparatus Under Way

We are specialists in apparatus for the amateur and want every real ham's name on our permanent mailing list.

THE WIRELESS MFG. CO.
Canton - - - Ohio

When the Loos Brothers *Sing from* W·E·B·H



Robert Loos sits at home and hears them as naturally as though they were singing in the same room.

For over 30 years makers of PRECISION Electrical Apparatus.

Karas Harmonik Transformers

Amplify Radiocast Music with Absolute Fidelity!

No sooner had Karas Harmonik Transformers been introduced than letters began to pour in from all over the country. Exacting set builders could not restrain their enthusiasm.

"Now I know radio as I never knew it before." So Mr. E. M. Lubeck of Kokomo, Indiana, expressed himself. "Karas Harmoniks bring in every voice and every instrument as distinctly as one could get them in the room," wrote the Rev. Wm. Stellhorn of Columbus, Ohio. "I consider your transformer a real musical instrument. Like a good violin, it has fine tonal qualities at all pitches covering the musical scale." That was the comment of Mr. Walter Krause of 7807 Burnham Ave., Chicago.

Dear Sirs: I take great pleasure in praising your wonderful Karas Harmonik Transformers. I am using two of them in a three-tube Low-Loss set which I built. I have two brothers singing from Edgewater Beach, WEBH Station. Well, their singing comes in so natural and clear that at times we think they are right in the same room with us. They also tell me mine is the clearest set they have ever heard.

Robert Loos, 1640 N. Leavitt St., Chicago, Illinois

These few reports—picked at random from scores of letters—tell you more convincingly than WE can tell you, the wonderful results YOU can obtain through installing Karas Harmonik Transformers in your set.

Here, for your enjoyment, is an audio transformer, scientifically designed to reproduce through your speaker *all* of the beauty of radiocast music—exactly as it is rendered in the studio.

High, low, and medium audio frequencies are amplified to an equal degree. Sonorous bass notes pour forth from the speaker in full strength and rich tone quality. The vital harmonics and rich overtones are brought out in their true beauty by this marvel of audio transformers.

All last season, home set builders—the most discriminating class of radio enthusiasts — bought Karas Harmoniks and enjoyed a musical quality of radio reception that owners of factory-built sets knew nothing about.

If YOU want the utmost musical enjoyment that radio has to offer, get a pair of Karas Harmonik Transformers at once. It is very simple to install them or, if you don't care to do it for yourself, any radio repair man will do it for you at small expense. Why not make up your mind right now to have the best music your set is capable of giving?

Most good radio dealers carry Karas Harmoniks. If your dealer is out of them, order direct of us. Send no money, just pay the postman $7.00 each on delivery.

Karas Electric Co., 4055 N. Rockwell St., Chicago, Ill.

Please send me.....pairs of Karas Harmonik Audio Frequency Transformers. I will pay the postman $7 apiece, plus postage, on delivery. It is understood that I am privileged to return the transformers any time within 30 days if they do not prove entirely satisfactory to me, and my money will be refunded at once.

Name.....

Address.....

.....

If you send cash with order we'll send Transformers postpaid

The United Achievement of Ten Radio Engineers

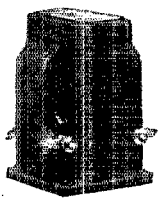
THE Hammarlund-Roberts is a composite of the individual achievements of ten leading radio engineers. The transformers were selected by a transformer engineer familiar with every reliable make. The condensers were similarly determined on by an engineer whose special study has been condenser characteristics. A man whose whole effort has been on resistance research selected the resistance units. Even the smallest units were made the object of scrutinizing study. Never before has so much extraordinary thought been given to every detail of a receiver.

This combination of these harmonizing units in the most desirable circuit is a receiver that is truly the ultimate of five-tube reception.

And now,—you can build this remarkable receiver with the aid of a most comprehensible "How to Build it" book. You can equal the quality of a factory made receiver listing for as much as $170.

Write for descriptive folder.

Hammarlund-Roberts **1182-P Broadway, N. Y.**

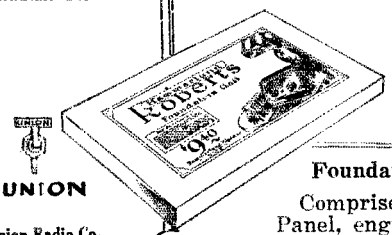


Raulandlyric
ALL-AMERICAN
TRANSFORMER

All-American Radio Corp.

AMPERITE

Radiall Co.



UNION

Union Radio Co.

Hammarlund Roberts

Foundation Unit

Comprises Bakelite Panel, engraved; Bakelite sub-panel, drilled; brackets and wire $9.40

Construction Book

Write for this most complete book giving complete details on assembling, wiring and operating the Hammarlund-Roberts Receiver. 25c

Other Associate Manufacturers: **Hammarlund Mfg Co. Alden Manufacturing Co. Carter Radio Co. International Resistance Co. "Durham Resistors". Westinghouse Micarta.**

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The KODEL MICROPHONE LOUD SPEAKER

You can't tell the KODEL MICROPHONE LOUD SPEAKER from the microphone the broadcasting stations use—they are exactly alike in size and appearance.

The efficient Kodel Sound Unit, with a ingenious new snail-shell horn, mounted inside the microphone case, produces a remarkably clear, full-toned volume. Non-vibrating tone chamber absolutely eliminates distortion.

$15 model incorporates Kodel, Jr. unit; equipped with large Kodel unit $20

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Radio dealers everywhere have them.

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WKRC

Owners of Kodel Broadcasting Station WKRC. Send for program

The Wilson "B" Radiopower Unit

Pats. Pend.

Price $35

In Walnut Case

The ideal plate current supply. Operates from light socket without setting up the slightest hum in the receiver. Furnishes constant voltage. No acid to spill. No moving parts to get out of order. Requires no attention except to switch it on and off. The least expensive type of unit when service is considered. Fits all sets.

Write for details, if your dealer does not have this unit in stock.

Paddlewheel Coil

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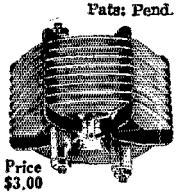

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We also manufacture the famous DUO-SPIRAL Folding Loop. Our Technical Dept. will be pleased to answer any inquiries regarding any of these standard products.

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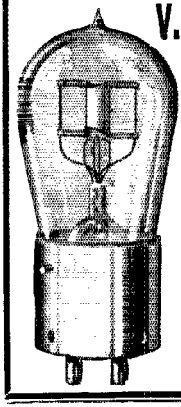
V.T.14 Transmitting Tubes



Rated at 5 Watts

(MF'D BY GENERAL ELECTRIC CO.)
NEW, IN ORIGINAL CARTONS

Filament voltage 7½ Volts.
Filament current 1¾ amps.
Normal Plate voltage 350 Volts.
Plate current 40 milli-amps.

Can also be used as modulator or amplifying tube.

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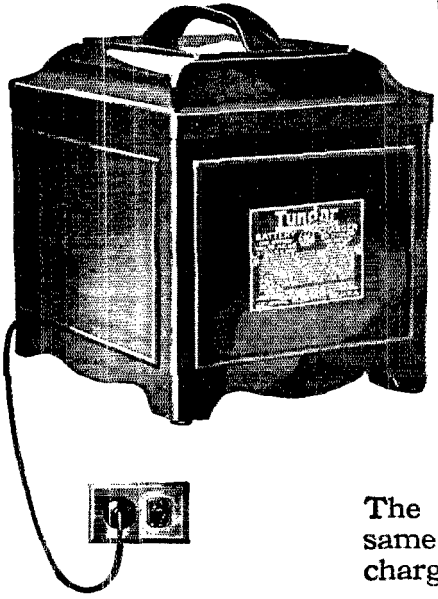

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The new five ampere Tungar—at the same price as the old—means a quick charge of all kinds of storage batteries.

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The Tungar is a G-E product developed in the great Research Laboratories of General Electric.

Five ampere Tungar (East of the Rockies) $28.00

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60 cycles—110 volts

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TUNGAR—a registered trademark—is found only on the genuine. Look for it on the name plate.

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6-VOLT "A" BATTERY

Here is the rugged, good-looking Exide 6-volt "A" Battery. One-piece case.

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Compact Exide for low voltage tubes. Also made in 4-volt size.

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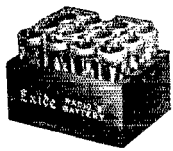
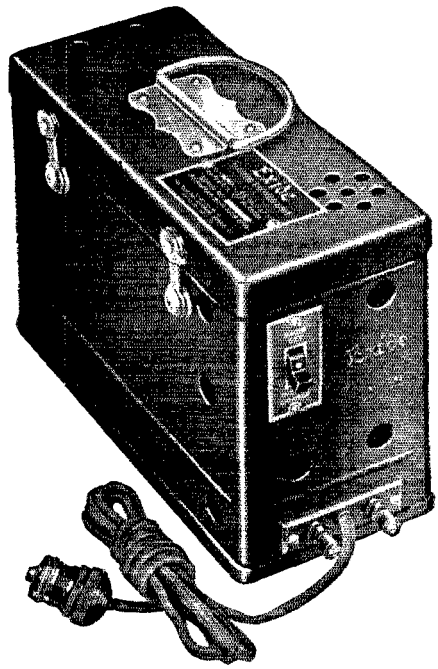
In glass cells, 6000 milliampere hour capacity. Also in 48-volt size.



RECTIFIER

Exide Rectifier for recharging of "B" Battery from your house current.



THE EXIDE RADIO POWER UNIT

(Combination "A" battery and charger)

The unit is kept connected to your electric light socket as well as to the radio set. It is furnished in two sizes—one, for sets using 4-volt tubes; the other, for sets using 6-volt tubes; retailing at $28 and $38 respectively—slightly higher west of the Rockies.

Range far and near with your radio set

BRINGING in the distant stations, selecting the choice numbers from local programs — in short, getting the most enjoyment from your radio set — is largely a matter of proper current supply.

All the distance, volume, and clearness that an ample, uniform supply of current gives to radio reception are yours when current is supplied by Exide Radio Batteries. There are Exide "A" and "B" storage batteries for every requirement, and a rectifier for recharging "B" storage batteries.

See the complete line at any Exide Dealer's or at your favorite radio store.

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Exide Batteries of Canada, Limited, 153 Dufferin Street, Toronto

FOR BETTER RADIO RECEPTION, USE STORAGE BATTERIES

To Our Readers Who Are Not A. R. R. L. Members

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

.....1925

American Radio Relay League,
Hartford, Conn.

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

.....

.....

.....

Station call, if any .....

Grade Operator's license, if any .....

Radio Clubs of which a member .....

Do you know a friend who is also interested in Amateur Radio, whose name you might give us so we may write him about the League? .....

..... Thanks!

HAM-ADS

IMPORTANT NOTICE! NEW RATES ADVANCED CLOSING DATE

Effective with May QST, the HAM-AD Advertising Rates are TEN CENTS A WORD. Name and address to be counted, each initial counting as one word. These rates are shown on QST Rate Card No. 6, in force with the May issue.

The closing date for HAM-ADS is now THE TWENTY-FIFTH OF THE SECOND MONTH PRECEDING DATE OF ISSUE. For example, all HAM-ADS for the June issue must be in this office not later than April 25.

Hereafter no HAM-AD will be accorded any particular or special position.

Rates for the QRA Section remain the same; 50c straight. See heading of that section for details.

MOTORS—New G.E. ¼ HP $12.50, ½ HP $28.50, 1HP $45. GENERATORS—Radio Transmission 500V $28.50. Battery Chargers—Farm Lighting generators all sizes. Lathes, Drill Presses, Air Pumps other Garage and Shop equipment. Wholesale Prices. New Catalog. MOTOR SPECIALTIES CO., Crafton, Penna.

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., 13M Hudson St., New York.

$2.95 ——— OUT AT LAST!

"THE Hawley." An alkali un-acid rechargeable "B" storage Battery of 22½ volts. Not an unassembled battery but ready to use—no extra parts to buy. Uses the largest sized tested Alkaline elements (Edison). Heavy closed top glass cells. Chemical electrolyte included and shipped separate. Any detector or amplifying voltage easily had. Special offer. 4-22½ volts (90 volts) $10.00; 112½ volts $12.50; 135 volts $14.75; 157½ volts $16.80. For those wishing to put their own together buy the knock-down kits. Put up in all voltages at still greater savings in price. The only battery of its kind sold on a 30 days trial with complete guaranteed satisfaction or your money returned in full without any ifs, ands, or buts. Further guaranteed 2 years. Order direct—send no money. Simply pay expressman its cost plus the small carrying charges. Patent pending. Same day shipments. Write for my guarantee testimonials and literature. It's free and it's interesting. Complete sample cell 35c prepaid. B. Q. Smith, 31 Washington Ave., Danbury, Conn.

REBUILD YOUR NEUT—Use same panel, same parts. No neutralization. 22 feet gold wire, only extra part, circuit and complete, simple instructions—$5.00 prepaid. Hundreds of Neut owners use this Kit. Details—10c. 48 page catalog parts—10c. Stamps accepted as cash. KLADAG RADIO LABORATORIES, KENT, OHIO.

G. E. MOTORS, 110v, 60 cyc. 7000 RPM. 1/32 HP, List at $10.50 Special price $3.50 ea. Twin-R Circuit Breaker, Trip and Re-set buttons, adjustable around 10 amps. $2.50 ea. AMRAD No. 2834 Send Receive Switch $5.00 ea. No. 2796 Lightning Switch mounted on porcelain posts, $1.50 ea. No. 3650 Basket-Ball Variometer $1.50 ea. No. 4000-1 "S" Tubes, Lowest Prices. UP-414 Microphone Transformer $3.75 ea. UC-1831 Variable Transmitting Condenser $1.50 ea. Roller-Smith 0-5 amps. Radiation Meter, $3.75 ea. ALL POSTPAID. Write for AMATEUR'S DISCOUNT SHEET and keep in touch with real Bargains. STATE RADIO COMPANY, 286 Columbia Rd., Dorchester, Mass.

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.

EDISON ELEMENTS LARGE SIZE WITH CLAMPED ON CONNECTOR 5c PER PAIR. ALL OTHER PARTS CARRIED IN STOCK. 300 AMPERE EDISON A BATTERIES, PERFECT CONDITION $35.00 GET PRICE LIST. ROMCO STORAGE BATTERY CO., 146 W. 68TH ST., NEW YORK CITY.

PRINT YOUR OWN RADIO CALL cards, stationery, circulars, etc. Press, $8.85. Larger, $12.00—$35.00; Rotary $150.00. Print for others, big profit. Easy rules sent. Write for catalog presses, type, paper, supplies. Press Co., B-95, Meriden, Conn.

SUPERSENSITIVE GALENA CRYSTALS, pound $1.00 prepaid. ALKEMITE, Allsensitive Crystals 50c. Buskett, Chemist, Joplin, Mo.

20-500 M. Complete Tuner in Cabinet. Unlimited Distance $50; New UV203 Tube $25; complete 10 Watt outfit $40. Other Offers. S. Strobel, 3923, N. 6th St. Philadelphia, Pa.

200-20000 METER RECEIVER including Radiotron $25.00. Two step amplifier $15.00. Smith, 4416 Market St., Philadelphia, Penn.

GENERAL Electric 24/1500 volt 350 watt Dynamotors. Unused $45.00, Slightly used $25. General Electric 12/350 volt .143 ampere with filter $18.00 Holtzer-Cabot 12/500 volt .07 ampere $18.00. Any model for belt drive $3.00 additional Crocker-Wheeler 24/1500 volt 450 watt 6500 RPM new $45.00 and $35.00 used. New 10 volt 20 ampere batteries $7.50 in case. Navy Flame Proof Key with "Blinker Light" $2.00 prepaid. 3/16" silver contacts cost $16.50. GE Aircraft transmitters $20.00, 500 cycle motor generators. Henry Kienzle, 501 East 84th Street, New York City.

$5.00 New United States Government Aviators, Automobile, Motorcycle and Racing Leather Helmet with headphones and microphones, cost $25.00. Postage free. Limited supply; other Government Radio Bargains. Send stamp for list. WEIL'S CURIOSITY SHOP, 20 South 2nd St., Philadelphia, Pa.

UR SAVINGS HR OM—All sizes Honeycombs, Century Buzzers, Phones, "A" and "B" Batts; Meters; Audio—Radio—Power Transformers; VT's—$4; Power Amplifiers; Short Wave Tuners; etc. WRITE 3BOV.

FOR THAT WINTER DX: No. 4000-1A "S" TUBES $10.00. THORDARSON POWER TRANSFORMERS 550 volts each side $9.95. JEWELL O-15 AC VOLTMETERS $6.95, O-500 MILLIAMMETERS $6.95. No. 12 ENAMELED WIRE 1000 feet $6.75. Pure ALUMINUM square foot 85c; LEAD square foot 85c. APEX 5-WATTERS $3.00. "HAM-LIST" 3c. CURTIS-GRIFFITH RADIO, 5AQC-5IF-5RV, 1109 EIGHTH AVENUE, FORT WORTH, TEXAS.

AMRAD "S" TUBES, 4000-1; $8.00. Receptacles, $.75. Dealers Communicate. IMMEDIATE SHIPMENT. LOCUST RADIO COMPANY, Dept. Q. 117-19 168th Street, Locust Manor, L. I.

TUBES BRITISH OSRAM TYPE C. MANUFACTURED BY BRITISH GE COMPANY. BRAND NEW IN CARTONS. THESE TUBES ARE THE FINEST FOR RESISTANCE COUPLED. ALSO FOR INTERMEDIATE AND AUDIO FREQUENCY. CONSUMES SIX VOLTS ⅝ AMPERE. VERY GOOD AND CLEAR. 75c each. MODERN RADIO, 1903 NORTH 18TH ST., PHILADELPHIA, PENNSYLVANIA.

RELIABLE WAVEMETERS in cabinets, rugged, accurate and dependable. 20-50 meter $9.00, 75-200 $8.00, 20-200 $14.00, postpaid with curve charts. Accuracy GUARANTEED within 1%. Also Crosley Trirdyn Special demonstrator, can't be told from new, fully guaranteed, $40.00. Edward Bromley, Jr., Whitewater, W.s. 9CSM.

ARRL sweater emblems 5"x8" black and yellow felt, $1.00. Eric Robinson, Jefferson Road, Webster Groves, Missouri.

NOW IN PRESS
HELPFUL HINTS for BETTER KEY WORK
By 8DRI-KUF. How to Cultivate GOOD FIST and Transmit LEGIBLE CODE. Much Needed Advice for Many Hams and All Beginners.
ALSO APPENDIX TO OUR SHORTKUT.
Answering Questions Asked Etc.
Both in One Booklet; Treated as Part of
DODGE RADIO SHORTKUT
and Will Add One Dollar to Present Price
NEW PRICE WILL BE $3.50
in U. S. and Canada: Elsewhere $4.00.
Helpful Hints and Appendix (only) $1.50.
ADVANCE ORDERS ACCEPTED.
DODGE RADIO SHORTKUT, MAMARONECK, N. Y.

TRANSMITTER FOR SALE — Paragon 10 watt CW, ICW and fone. Factory built, a bargain at $20.00. Robt. Starrett, Sheldon, Iowa.

1750v 1 mfd., condensers $2.50. R. Wood, 38 Way Ave., Corona, L. I., N. Y.

40-200 METER receiver with Lopez coil and Cardwell condenser $15.00. Acme 1½ henry double choke $3.00. Thordarson transformer for 5 watter $5.00 RCA 0-2½ antenna ammeter $2.00. Paragon variometer $2.00. Henry Meyer, Jr., Rockdale, Texas.

BARGAIN QUARTER KW TUBES — Limited number, new, in original crates, both types at Jobbers' Discount, Thirty Per cent from list. Type UV 204 $77.00. Type UV 204A $101.50. Cash, plus Express charges and Insurance, Shipping weight Eight pounds, must accompany orders. Wilford Deming, Jr., 1404 Magnolia Ave., Los Angeles, Cal.

TELEFUNKEN 200 WATT POWER TUBES $60.00; Filament 14 volts, 4 amperes; plate 3000 volts. Arthur H. Beyer, 106 Morningside Drive, New York City.

CEDAR RADIO CABINETS — MANUFACTURERS OF Radio Cabinets, built from cedar. Cedar Cabinets finished in Cedar or Walnut. We also make cabinets up from Gum Wood, American Black Walnut, Birch and African Mahogany. We sell direct to the consumer which give you the profit enjoyed by the dealer. These cabinets are remarkably low priced, considering finish, quality, construction, etc. All our cabinets are built to suit your requirements. Send panel sizes for prices, also state kind of cabinet desired. Manheim Wood-Working Co., Manheim, Lancaster Co., Pennsylvania.

R. C. A. TRANSMITTING APPARATUS — U P-1368 Power Transformers, 325 watt, $9.75; U P-1653 Filter Reactors, $4.75; Magnetic Modulators, U P-1643, $3.75; U P-1857, $4.75; U T-1367, $6.00; U Q-809 Keys, $1.50; Hot Wire Ammeters, 0-2.5 amps, $1.50; 0-5 amps, $2.00; U V-216 Kenotrons, $2.00; 750 volt ½ mfd Filter Condensers, .70 BRIGHT & COMPANY, READING, PA.

TRADE — Five tube Neutrodyne sending receiving sets and parts for electric fans 110 A.C. and 32 Volt D.C. Mason Shaw, Marathon, Texas.

TRANSMITTING and RECEIVING accessories. Send for BARGAIN SHEET. A. A. Dombrowski, 4341 S. Campbell Ave., Chicago, Illinois.

WHITTLESEY 75 ft. standard mast $100. Set of Hickok meters, milliammeters 0-750, 0-1000, volt meter 0-3000, fil. volt 0-15, antenna meter 0-7.5 @ $10 each. Acme 300 watt fil. trans. $12. General Radio 174R wavemeter 75-1500 meters $35. Roice 5 watt tubes $2 each. R.C.A. U. P. 414 modulation transformers @ $4 each, U.P. 415 @ $2.50 Faradon's UC1015 antenna series $1.50, two PT 537 Rheostats $5 each. Lopez low loss tuner 50 to 200 meters, $5. Carco Ham special tuner 80-200 meters, $2. 50 watt tube socket $2. Amrad send. receive switch $4, magnetic modulator U.T. 1367, $5. Three Jefferson No. 41 transformers $2 each. V.T. sockets 25c each, four Willard storage Bs 48 v blocks $10 each. W.E. phones $2.50. Broadcast receiver three tubes A and B batteries and fones complete $40. Every article guaranteed or money back. 8BCA.

OMNIGRAPHS, METERS, RADIO SETS, BOUGHT AND SOLD. RYAN RADIO COMPANY, HANNIBAL, MISSOURI.

TRANSMITTER, 30 WATT COMPLETE 6 TUBES 4 METERS MG. 80 BUCKS. 8AOG.

SELL—Westinghouse RC—AR—RT. George Woodbury, Union City, Indiana.

QSTs, March 1921 to December 1924 except June 1923. 30c each. $10 for lot prepaid. T. Zinter, 712 Northampton St., Buffalo, N. Y.

"AMATEUR RADIO EXCLUSIVELY" AND THE COMING SEASON. IS YOUR EQUIPMENT IN FIRST CLASS CONDITION? READY TO COMPETE WITH THE BEST OF THEM? IF NOT GIVE THE TROUBLE TO US. THE SHORT WAVE RECEIVER BUILT HERE IS REALLY GETTING DX. RANGE ? TO 200 METERS. MOST POPULAR DESIGN. EASIEST TO CONTROL. NEW ZEALAND AND ARGENTINE, AUSTRALIA AND HAWAII COPIED REGULARLY WITH THIS RECEIVER. WE ALSO BUILD TRANSMITTERS TO COVER ANY OF THE WAVELENGTH RANGES. IF YOU HAVE THE PARTS SEND THEM IN OR WRITE FOR QUOTATIONS. THEN A WAVEMETER IS A REAL FRIEND. WE BUILD THEM. FOR QUICK CHANGING FROM ONE WAVELENGTH RANGE TO ANOTHER USE E-R-L. NEW TYPE INTERCHANGEABLE TRANSMITTING INDUCTANCES FOR ANY WAVELENGTH. WE SUPPLY SUCH EQUIPMENT AS MADE BY ESCO, WESTERN ELECTRIC, GENERAL RADIO, FARADON, DUBILIER, CARDWELL, THORDARSON, ACME, ETC. WE BUILD ANYTHING SHOWN IN QST. SPECIAL EQUIPMENT FOR EXPERIMENTAL WORK. IF THE SUPERHETERODYNE FAILS TO WORK SEND IT IN. "WE HAVE WORKED THEM AT TWENTY-SIX METERS ON A LOOP." FOR IMMEDIATE SALE. ONE 20 WATT TRANSMITTER COMPLETE WITH WAVEMETER, PANEL MOUNTED, ALL METERS, ALSO 4 50 WATT TUBES. WE BUILD TO ORDER ANYTHING IN THE AMATEUR LINE. FOR THE BEST DROP US A LINE. ESTIMATES GLADLY GIVEN ON AMATEUR EQUIPMENT. GET QSO. THOS. ENSALL (ENSALL RADIO LAB.), 1208 GRANDVIEW AVE., WARREN, OHIO. ("Designers of High Grade Amateur Equipment").

USED POWER TUBES: UV203 50-WATTERS $15.00. GE-VT-10 250-WATTER $65.00. GE-"P" 250-WATTER $65.00. GE-211A 50-WATTER $16.50. CURTIS-GRIFFITH, FORT WORTH.

COMPLETE "HAM" STATION FOR SALE. REASONABLE. LOCUST RADIO COMPANY, 117-19 168TH STREET, LOCUST MANOR, N. Y.

HAMS!—Get our Samples and Prices on Printed Call Cards made to order as YOU want them. 9APY. Hinds & Edgarton, 19 S. Wells St., Chicago, Ill.

"PEPPO" PUTS A LASTING AND TREMENDOUS "KICK" IN YOUR EDISON BATTERIES, AND ASSURES LONGER LIFE OF ELEMENTS. $1.25 (1¼ POUNDS—FIVE POUNDS SOLUTION—100 VOLTS) TEST TUBES, ¾ x 6", 3c. COMMON CHEMICALS FOR EDISON BATTERIES 65c (1¼ POUNDS). PREPAID. ATTACH REMITTANCE. PEPPO COMPANY, 1695 TAYLOR, DETROIT, MICH.

A NEW LOT OF DOLLAR ASSORTMENTS. Biggest value small radio parts anywhere. Add postage two pounds. Write for money-saving price lists. R. P. BARROWS, Columbia Road, Portland, Me.

25c each. Telegraph Loop cord and plug, 4 feet long, two wire. Bought $10,000 worth United States Government Aircraft Department Radio Transmitting, Receiving Sets and Parts. Get our new and latest reduced price list. Send stamp for list. Mail orders answered all over the world. WEIL'S CURIOSITY SHOP, 20 South 2nd St., Philadelphia, Pa.

FOR SALE—De Forest OT-3 Radiophone. Perfect condition. $40.00 gets it. Ellis Huston, Windsor, Missouri.

FOR SALE—Complete transmitter Esco 175 watt 110 D.C. 1000 D.C. Filament tax M.G.; W.E. 50 watter. Panel, meters, chokes, etc., $125. Dr. Cyriax, 219 East 71st St., New York City.

WANTED—Young men learn Radio Operating. Save $1,000 a year at sea. Free catalog. Sample code lessons free. Write Mass. Radio School, 18 Bolyston St., Boston, Mass.

BALLAST TUBES MADE BY W.E. AND G.E. BRAND NEW IN CARTONS. WONDERFUL RESISTANCE TO CONTROL "A" CURRENTS. WILL PASS 1¼ AMPS. ON SIX VOLTS. 50c EACH OR THREE FOR $1.00. MODERN RADIO, 1903 NORTH 18TH ST., PHILADELPHIA, PENNSYLVANIA.

MUST SELL. Complete station and parts. Bargain list. Chester Olson, Story City, Iowa.

Reg. BKUMA YRLSBUG Pat. Of.
DODGE RADIO SHORTKUT.
Kills Hesitation in Reading Code.
Ask For Honor Roll; Read Reports From
TWO HUNDRED LICENSED STUDENTS
Located in All Radio Districts
LOW SPEED HAMS
Jumped to 25-30 Per by Few Hours' Practice.
PREVIOUS FAILURES
Obtained License Quickly and Easily.
BEGINNERS—RADIO FANS
Qualified Few Days by Attention Odd Moments.
$2.50 U. S., Canada. Elsewhere $3.00.
Correction: Our Sept. Ham Ad.
7IE read 7EI. 9BHM read 8BHM.
YRS FR 2WA RADO.
DODGE RADIO SHORTKUT, MAMARONECK, N. Y.

Hi-voltage transformers 1100 volt 250 watt with center tap $11.90. All new other transformers and chokes all sizes lowest prices. 9DAL, Arkansas City, Kansas.

"EVERYTHING FOR THE HAM." 'NUF SED. NO. 12 "DYNEX" SOLID COPPER ENAMELED WIRE, 1c FT., 500', $4.25. NO. 10 (FOR HEAVY DUTY) 1¼c FT. PYREX GLASS INSULATORS. TRANSMITTING SIZE, $1.50, RECEIVING SIZE, 45c. SUPER SIZE 12¼" LONG, $3.50. OHIO BRASS GLAZED PORCELAIN INSULATORS, 5", 75c. 10", $1.50. GARODPYREX SOCKETS, $1.50. RCA "BIRD CAGES," $11. ALLEN BRADLEY RADIOSTATS, $6.50. TYPE E-210, $4.00. RADIOLEAK, $5.00. AMRAD "S" TUBES, $10.00. "DYNEX" KEM RECTIFIER ELEMENTS, 1" x 4", 6c. 1" x 6", 7c. 1½" x 6", 8c. 1/16" LEAD AND ALUMINUM, 90c SQ. FT. FLERON LEAD-IN INSULATOR (PASSED BY UNDERWRITERS) $1.10. CARDWELL TRANSMITTING CONDENSERS, $15.00. ACME TRANSFORMERS AND FILTER CHOKES. JEWELL METERS. WHATEVER U NEED FOR THAT NEW SET YOU WILL FIND AT 8BIN'S. "DYNEX FOR DX." E. J. NICHOLSON, 1407 FIRST NORTH ST., SYRACUSE, N. Y.

EDGEWISE wound copper ribbon, the only really satisfactory antenna inductance .350" wide; 3¼" outside diameter 10c turn; 4¼" 13c turn; 5¼" 15c turn; 6¼" 17c turn; 7¼" 20c turn, prepaid any number turns in one piece; Geo. Schulz, Calumet, Michigan.

$150 WESTERN ELECTRIC 14-A-LOUD SPEAKER. CONTAINS POWER AMPLIFIER. MUST SELL $50. WRITE FOR DESCRIPTION. AUSTIN, 114 SO. THIRD AVENUE, MAYWOOD, ILLINOIS.

WILL sell Acmeflex 5 tube loop receiver in cabinet. Best offer takes it. John Noskey, 8299 Wisner Street, Detroit, Michigan.

WAVEMETERS, 10 to 100 meters, two coils, individually calibrated. Accuracy guaranteed within one percent. Excellent construction and handy size, with flash lamp. $12.50 Postpaid. SHORT WAVE COILS, set of four celluloid supported space-wound plug-in coils with mounting for that new receiver, 18 to 250 meters, $4.00. We build real amateur equipment and carry the supplies you need. Send for list. Seattle Radio Laboratory, 3335 33d Ave., South, Seattle, Washington.

BORAX may be O.K. for washing, but it's messy in a chemical rectifier. Use only the best chemical in yours, OM, and raise the efficiency. Trial package 50c from 1CIC, 123 Blue Hills Parkway, Milton, Massachusetts.

SACRIFICE—900 WATT THORDARSON, meters, 9CTB, 303 Martin, Muncie, Indiana.

DEFOREST D10. Guaranteed like new, and at a bargain price. Kenneth Bricker, Bippus, Indiana.

1 MFD. WESTERN ELECTRIC CONDENSER for B eliminator. 500 volt new $1.00. 3 for $2.50 prepaid. Geo. Schulz, Calumet, Michigan.

BARGAINS—Amrad S tubes type 4000-1 $8.75. Karas straight line frequency condensers .0005 mfd. $6.40. .00025 mfd. $5.90. Cardwell .00025 mfd. $3.50. Write Joseph Nold, 27 Chestnut Street, Schenectady, N. Y., for bargain list.

Be sure and see our Ham-Ad in September issue. Jewell Meters, Fleron Stand-off Insulators and Lead-in Bushings, 2500 volt A.C. test filter condensers, high voltage filament and plate transformers, tubes, No. 12 enameled, Celeron Bakelite tubing, sizes from one to four inch, Bakelite panels in stock. Bulb type Battery chargers, etc. Write us when you need anything in any quantity and don't forget Parcel Post charges. Discounts to Amateurs, A. R. R. L. and dealers only. Roy C. Stage, wholesale Radio, Burt & Montgomery Sts., Syracuse, N. Y.

OLD QST's—Oct. 1916 to Dec. 1923—$10.00. Ed. Searing, 124 Breese Tr., Madison, Wis.

USE G RADIO BONDS to connect your bus bars in that hook-up. No twisting. No soldering. Dozen 50 cents. W. T. Wiederhold, R-3, Geneva, N. Y.

GUARANTEED TUBE REJUVENATORS, 110 VOLTS AC OR DC. $2.85. DEALERS COMMUNICATE. LOCUST RADIO COMPANY, 117-19 168TH STREET. LOCUST MANOR, N. Y.

HR Y'R OMS. 30-220M. Wavemeters $7.50; Generators $10; Filter Cond's & Chokes; Transformers; 5 Watt Transmitters complete $25; 10 Watters $40. 3BOV, S. Strobel, 3923 N. 6th St., Phila, Penna.

PURE ALUMINUM and lead rectifier elements, holes drilled with brass screws and nuts per pair 1/16". 1" x 4", 13c, 1 x 6, 15c, 1¼ x 6, 17c, 1½ x 6, 19c, single elements half price. Sheet aluminum 1/16", $1.00, ⅛", $1.90. Lead $1.00 square foot all prepaid. Geo. Schulz, Calumet, Michigan.

4000v UC1831 variable transmitting condensers $1.50. Generators, new rated at 275v-120 watts, but will give up to 500v $8. Acme modulation transformers $2. Western Electric Microphones 326w $1. Roller-Smith Radio frequency ammeters 0 to 5 New $3. Mounted honeycomb coils 1250 turn $1. 110 volt Ac motors $12. ¼ Hp. keys $2. RCA superheterodyne transformers 1716, $2. Vt 2 and 1, $5 each. Western Electric 2 mfd. condensers $1.25. No. 30 enameled wire 75c per pound per spool. No. 12 enameled, solid 75c per hundred $7 per 1000 ft. No. 14, 50c per 100 ft. Advance resistance wire ½ ohm per ft. .025 diam. 75c per lb. Used generators input 30v dc output 250 to 300 DC $8. 500 cycle 200 watt self-excited alternators $10. Foreign orders shipped promptly, postage extra. R. Wood, 38 Way Ave., Corona, N. Y.

TELESCOPING STEEL MASTS. ALL LENGTHS. 100 FT. MAST TELESCOPES TO 25 FT. EASY TO RAISE OR TAKE DOWN. WRITE FOR PRICES. W. H. HOUSE, DYER, TENNESSEE.

Back Numbers QST., RADIO, etc. List for stamp. Edward Fanley, 235 Butties, Columbus, Ohio.

8CFM — SELLING out 5-10 watt 40-80 meter panel mounted transmitter $32.00. Write for details. John H. Botbyl, 514 Monroe St., Grand Haven, Michigan.

NO BUZZ. NO FUNNY SOUNDS IF YOUR PLATE SUPPLY IS AN EDISON B 8ML KIND. DON'T BUY ON PRICE ALONE AND REGRET IT. PICK ONE OF THESE FOR LIFE TIME SERVICE. NO JOINTS. PURE NICKEL CONNECTORS ELECTRICALLY WELDED FOR ABSOLUTE QUIET. GIVE YOUR SET A CHANCE WITH ONE OF THESE. 54 VOLT $8.25. 100 VOLT $15.00. OTHER SIZES. OAK CABINET. LARGEST ELEMENTS. REAL EDISON SOLUTION. A BIG 2000 MILLIAMP HOUR B FOR THE MULTITUBE SET. 105 VOLTS $24.00. CELL PARTS 17c. DRILLED 19c, ASSEMBLED CELLS 24c. QUANTITY DISCOUNTS. EDISON A ELEMENTS 5c. WELDED PAIRS 7½c. A NEW SUPERCELL 4000 MILLIAMP HOUR, 40c. SAMPLE 50c. ANNEALED TEST TUBES 3"-3c, 1"-4. SHOCKPROOF JARS 1 x 6 4c, 1¼ x 6½-5c. PUREST SOFT .032 NICKEL 1c ft., .034 (HEAVY) 1¼c ft. RUBBER SEPARATORS ½c. REAL EDISON

ELECTROLYTE (THAT'S NO LYE) LITHIUM COMPOUND $1.25 MAKES 5 LBS. WILLARD COLLOID—A REAL B CHARGER. 50 VOLTS $2.00, JUMBO $3.00. 100 VOLT FULLWAVE $4.00, JUMBO FULLWAVE $6.00. BRING YOUR AERIAL UP TO QST SPECIFICATIONS WITH NO. 12 SOLID COPPER ENAMELED AERIAL WIRE, 75c 100 ft. OB PORCELAIN AND PYREX INSULATORS. A NEW QST LEAD-IN, BOWL TYPE PYREX now $1.50. ANYTHING YOU NEED, NOT PRICED TO SELL BUT TO SERVE. FRANK M. J. MURPHY, 4837 ROCKWOOD ROAD, CLEVELAND, OHIO.

FOR SALE—New Robbins Myers 110-500 volt Motor Generator $35.00, one filament transformer and plate transformer, $10 for both. Courtney Evans, 249 N. E. 3rd St., Miami, Florida.

NOTHING CHEAP ABOUT THE NEW TYPE EDISON ELEMENT LIFETIME "B" BATTERIES EXCEPT THE PRICE. NO HUM OR OTHER NOISES. NO MAKESHIFT AFFAIR. OAK RACK WITH EASILY REMOVABLE LID. WELDED ELEMENTS WITH NONE OF THE ACTIVE MATERIAL FUSED, ENGRAVED HARD RUBBER PANEL WITH CHARGE-RECEIVE SWITCH. FULL STRENGTH CHEMICALS AND SEALING OIL INCLUDED. 100 VOLT TYPE "A," $11.00. 100 VOLT TYPE 3-G, $12.50. 140 VOLT, $18.00. SAMPLE CELL 25c. 100 VOLT TYPE 5-G, $19.50. 140 VOLT, $26.00. SAMPLE CELL 30c. YOUR MONEY BACK IF NOT SATISFIED. SEND FOR ILLUSTRATED FOLDER AND OTHER DOPE. IT'S FREE. TYPE "A" ELEMENTS WELDED WITH NICKEL STRIP CONNECTORS. 5c PER PAIR. TYPE 3-G WELDED, 5½c. 78 CELL RACK (100 VOLT), $1.95. NO. 20 PURE NICKEL WIRE, 1c PER FT. NO. 18, 1½c. FULL STRENGTH CHEMICALS FOR MAKING 5 LBS. SOLUTION, 85c. ¾ x 6" HEAVY GLASS FLAT BOTTOM CONTAINERS, 3c EACH. 1 x 6", 4c. SEPARATORS, 1/3c. C. O. D. ORDERS ACCEPTED. PRICES ARE F. O. B. PHILA. J. ZIED, 530 CALLOWHILL ST., PHILA, PA.

THORDARSON 650 VOLT POWER-FILAMENT TRANSFORMERS FOR 5-WATTERS $6.90. CURTIS-GRIFFITH, FORT WORTH.

GENERATORS—1500v Army type $30.00. 20 watt filament $10.00. Francis Rutherford, 160 Chestnut St., Cambridge, Mass.

LIFE-TIME TROUBLE PROOF "B" BATTERY. 48 volts in Mahogany cabinet $7.00. This uses my famous Electrically welded connections to genuine Edison elements; with 2 welds on each negative and one weld on each positive element. Elements sold separate for 7½ cents pair Postpaid. Separators ½ cent. Paul Mills, Woodburn, Oregon.

HAMS! Get the very latest in RADIO CARDS! Embossed Radio Cards! Very low prices. Also many different printed styles. Write for samples. The Arthur Press, 1453 Arthur Ave., Lakewood, Ohio. New equipment—Better service.

Motor Generator Bargains. Western Electric 110-220 V. Alternating Generator 1500 Volts 600 Watts $135.00. Robbins & Myers 220 V. 60 cycle three phase generator 750 V. 400 watts $60.00. Robbins & Myers 220 V. 60 cycle three phase generator 1500 V. 400 watts $90.00. Esco 110-220 V. generator 350 V. 100 watt $30.00. Robbins & Myers 110 V. 60 cycle single phase generator 750 V. 250 w. $55.00. Esco 220 V. 60 cycle 3 phase. 1750 Generator 400 V. 100 w. $25.00. 220 V. Direct Current Generator 1000 V. 500 w. $65.00. 1500 V. 500 w. $75.00. All above machines are ring oiled and include field rheostat. Also many others. Write us for prices on anything in motors, generators and motor generators, stating kind of current, voltage, etc. Queen City Electric Co., 1734 W. Grand Ave., Chicago, Ill.

EDISON ELEMENTS ABSOLUTELY PERFECT LARGE TYPE A 3c PAIR TYPE G 2c PAIR. MODERN RADIO, 1903 NORTH 18TH STREET, PHILADELPHIA.

FOR SALE—150 watt transmitter. Panel mounted. Complete except tube. $150.00. Write for description. Will consider 6v dynamotor in trade. H. F. Kelso, 8OB, Dravosburg, Penn.

TWENTY WATT Westinghouse transmitter, less accessories and motor-generator, used, $20.00; 100 watt 500 volt 110 volt AC drive motor-generator for this transmitter, new, $35.00; 0-500 RCA milliammeter, new, $4.00; R3 Magnavox, $10.00; Pancake OTs with slider, $2.00; ½ KW 500 cycle transformer, $7.50; Corona portable typewriter, $25.00; UT 1643 ½ to 1½ ampere magnetic modulators, 25c; UT 1357 1½ to 3 ampere magnetic modulators, 50c; Metro phono units, new, $1.00; Best featherweight headphones, $1.50. W. M. Derrick, 58 North Sixth Street, Newark, N. J.

SILICON Transformer Steel cut to order, .014". 10 lbs. 25 cents. 5 lbs. 30 cents, less than 5 lbs. 35 cents, 4 cubic inches to the lb. .007" for radio frequency transformers, 50c cubic inch, postage extra. Geo. Schulz, Calumet, Michigan.

GONE away to school. Sell 9BLW's 15 watt long distance transmitter—complete—$35. Write Jack Jones, 520 College Ave., Columbia, Missouri.

Generator, G.E. five hundred volt, one hundred watt, fine condition, fifteen dollars. Barker, 33 Coe Plc, Buffalo, N. Y.

THE BIGGEST SEASON YET FOR AMATEUR RADIO IS AHEAD. ARE YOU READY? GET 9ALD'S NEW BIG HAMALOG. THE ONLY REAL AMATEUR CATALOG. FULL OF GOOD HAM DOPE. DEALERS WRITE FOR SPECIAL PRICES, USING YOUR LETTERHEAD. Who first sold antenna wire at reasonable prices? Yes, we still have it at $6.90 per 1000' or 75c per 100' for No. 12 enameled; No. 14 enameled $5.00 per 1000', 55c per 100'; Insulate it well with Sure Fire 20" porcelains, $1.00 each, $1.15 each for less than four. Pyrex too, ask for all the dope; General Radio No. 260 supporting insulators, you see them everywhere, 25c; New Fall Citizens Call Books, with Amateur Section, 75c; Ballantine's Radio Telephony for Amateurs, $2.00; 15 DIAL OMNIGRAPHS $32.00, 5 DIAL OMNIGRAPHS $25.00. WE RENT THEM TOO—JUST SEND US THE PURCHASE PRICE AS A DEPOSIT, KEEP THE MACHINE A MONTH OR MORE, RETURN IT, AND WE'LL REFUND THE DEPOSIT LESS A SMALL RENTAL FEE; E-2111 Radiostat for filament transformer primary, $6.50, E-210 Bradleystat $4.00; Thordarson 80 watt filament transformer $7.00, 150 watt $10.00, 300 watt $15.00; Thordarson 100 watt plate transformer $13.00, 450 watt $18.00, 900 watt $30.00; Special Thordarson plate and filament transformer for one 5 watt tube $7.50; Acme filter chokes, all popular sizes in stock; NEW GENERAL INDUSTRIES CO. 2 MFD. 3000 VOLT FILTER CONDENSER $5.50; UC-490 1 mfd. 1750 volt filter condenser $2.50; 21-AA 1 mfd. 1000 volt $1.90; UC-1014 $2.50; UC-1015 antenna series, grid, or plate condenser, .003, .0004 and .0005 mfd. 7500 volts, special $2.25; UC-1831 variable transmitting condenser .0012 mfd. maximum, $9.00 list price, at only $1.80; 4000-1 S TUBES IN STOCK, TESTED BEFORE SHIPMENT, $10.00, SOCKETS 90c; BREMER-TULLY SHORT WAVE OUTFIT, WITH FOUR PLUG-IN COILS COVERING 12-200 METERS $8.00; B-T .00015 mfd. CONDENSER FOR USE WITH ABOVE, $4.25; ERLA 1000 CYCLE HAM AUDIO TRANSFORMERS $6.50; General Radio 274-U coil forms 75c, 274-B base $1.00, 274-P contact terminal 15c, 274-J jacks 25c per pair, see page 11 August QST; Edgewise wound copper strip 1/16" x ⅜", 4" inside diameter 10c per turn, 6" diameter 12c. Our own inductance clips 20c; NEW UX-210 7½ WATT POWER TUBE WITH THORIATED FILAMENT $9.00, UX-216-B RECTRON (Kenotron rectifier) $7.50; UV-203-A 50 WATTERS $38.00, UV-203 $30.00; UT-541 50 WATT SOCKETS $2.50; We can't give everything here. Order what you can from this ad and ask for the new HAMALOG—it's free. We ship C. O. D. if you wish, but if you send cash please include postage. BUY FROM A HAM STORE OF REAL SERVICE. E. F. JOHNSON, 9ALD, Waseca, Minn.

RELIABLE WAVEMETERS, in cabinets, rugged, accurate and dependable. 20-50 meters $9.00; 75-200 $8.00; 20-200 $12.50 postpaid with curve charts. ACCURACY GUARANTEED WITHIN 1%. Edward Bromley, Jr., Whitewater, Wis. 9CSM.

ROICE 5-WATT DX BABIES $3.00. CURTIS-GRIFFITH, FORT WORTH.

RADIO SPARK TRANSMITTERS 75 WATT PORTABLE MADE FOR U. S. ARMY AIRPLANES. WAVELENGTH 100-300 METERS. CAN EASILY BE CONVERTED INTO SPARK COIL CW TYPE. PRICE $3.00

EACH. MODERN RADIO, 1903 NORTH 18TH ST., PHILADELPHIA, PENNSYLVANIA.

CHEMICALLY PURE SHEET ALUMINUM, THE BEST GRADE WE CAN OBTAIN, 90c PER SQUARE FOOT. SHEET LEAD 75c. AMRAD S TUBES, PLENTY OF THEM $10.00 EACH, WITH FLASH PROOF PORCELAIN SOCKETS TO MATCH 85c EACH. S TUBES VERY FB ON THE LOW WAVES. UV203-A FIFTY WATTERS ALWAYS IN STOCK $38.00. UC490 ONE MFD FILTER CONDENSERS $2.50. UC1014 PLATE AND GRID CONDENSERS $2.50. OR ANYTHING ELSE USABLE IN A HAM OR BROADCAST SET. WE SHIP VIA PARCEL POST AND EXPRESS ANYWHERE. GET OUR NEW PRICE LIST FOR COMPLETE LIST OF APPARATUS IN STOCK. FORT WORTH RADIO SUPPLY COMPANY, FORT WORTH, TEXAS.

Q R A SECTION

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

1ABE—Ralph T. Kirker, 110 Norfolk St., Auburn, Rhode Island.

1ALR—W. J. Le uyer, 1 Jerry St., Fitchburg, Massachusetts.

2JL—W. A. Cohen, 126 Woolsey St., Astoria, Long Island, N. Y.

2MS—Paul Hoffman, 23 Lindhurst Place, Rockville Center, N. Y.

5AHP—Arthur D. Tennant, Box 6, Lynchburg, Texas.

6DS—R. D. Lemert, P. O. Box 215, Bakersfield, California.

7LK—Leon D. Mills, P. O. Box 55, Lakeview, Washington.

8CCA—W. S. Lloyd, 517 East Street, Parkersburg, West Virginia.

8CWK—F. Kelwin Kearney, 5053 South Martindale Ave., Detroit, Michigan.

8DPH—Merwin O. Kettle, No. 1 Butler St., Oneonta, N. Y.

8SE, H. C. Block, 1 Oak St., Ypsilanti, Mich.

9AII—P. S. Pfeifer, 4857 Fulton Street, Chicago, Illinois.

9AZY—Raymond A. Limberg, 914 Eastern Ave., Plymouth, Wisconsin.

9BSK—James Grindle, 1143 Garfield St., Hammond, Indiana.

9CHM—Theodore Lucke, 700 First Ave., S. W., Le Mars, Iowa.

9EDZ—L. H. Guldman, 799 Milwaukee St., Denver, Colorado.

9EIK—Dean Rein, R. F. D. No. 1, Colby, Wisconsin.

The following stations belong to members of the A.R.R.L. Headquarters gang. Mail for them should be addressed care A.R.R.L., Hartford, Conn.

1BAO	R. S. Kruse	1KP	F. C. Beekley
1BHW	K. B. Warner	10A	R. S. Kruse
1DQ	John M. Clayton	10X	L. W. Hatry
1XAQ	R. S. Kruse	1ES	A. A. Herbert


EVEREADY HOUR
EVERY TUESDAY AT 9 P. M.
Eastern Standard Time
For real radio enjoyment, tune in the "Eveready Group." Broadcast through stations—
WEAF New York
WJAR Providence
WEEI Boston
WFI Philadelphia
WGR Buffalo
WCAE Pittsburgh
KSD St. Louis
WSAI Cincinnati
WWJ Detroit
WCCO Minneapolis, St. Paul
WOC Davenport
WTAG Worcester
ALWAYS RELIABLE
EVEREADY Radio Batteries are always uniform and reliable! Evereadys perform the same, everywhere, for everybody, needing no skill, calling for no experimentation, wasting no time, saving you money. Trouble-proof, wonderful Evereadys. There is an Eveready dealer nearby.
Manufactured and guaranteed by
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Radio Batteries
-they last longer
Eveready Columbia Ignitor "A" Battery, the proven dry cell for all radio dry cell tubes 1½ volts
EVEREADY COLUMBIA IGNITOR DRY CELL
FOR RADIO, IGNITION AND ALL GENERAL PURPOSES
INSPECTED TESTED RELIABLE
No. 766 22½-volt Large Horizontal Price $2.00
EVEREADY RADIO BATTERY
No. 486 45-volt Layerbilt Extra-Large Vertical Price $5.50

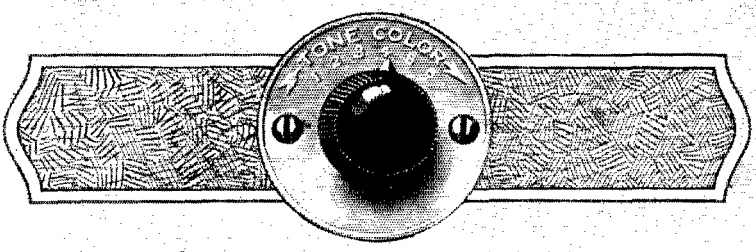
—FOR YOUR CONVENIENCE—

QST'S INDEX OF ADVERTISERS

IN THIS ISSUE

ALWAYS MENTION QST WHEN WRITING TO ADVERTISERS

ONE OF THE GREATEST OF RADIO DEVELOPMENTS



Grebe "Colortone"

THIS tone control is, perhaps, the greatest of recent Grebe inventions.

Grebe "Colortone" enables you to alter to your taste, the quality of speech or music from high, thin pitch to deep, round tones with all the variations between. The Synchrophase is independent of the loud speaker's influence.

With the "Colortone" a complete range of tone characteristics is thus available and the best qualities of any loud speaker are brought out.

The "Colortone" makes it possible to suppress considerably the high pitch frequencies caused by heterodyne interference of one station with another and also to reduce, to a great degree, disturbances due to static.

Ask your dealer to demonstrate this as well as the many other exclusive Grebe features; then compare

A. H. Grebe & Co., Inc., Steinway Hall, 109 West 57th St., N. Y.
Factory: Van Wyck Boulevard, Richmond Hill, N. Y.
Western Branch: 443 So. San Pedro Street, Los Angeles, Cal.

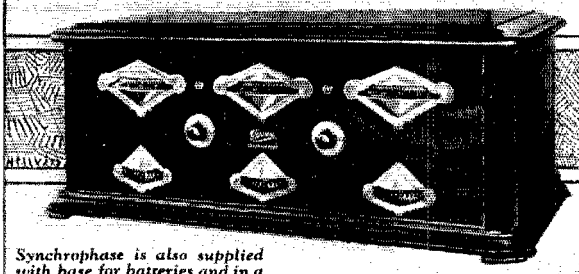
The GREBE SYNCHROPHASE
TRADE MARK REG. U.S. PAT. OFF.

This company owns and operates stations WAHQ and WBOQ; also low-wave rebroadcasting stations, mobile WGMU and marine WRMU.

"It is only he who possesses absolute truth who can create."
— *Confucius*

The constant seeking for truth has created the "Colortone" and other Grebe advances in radio reception.

Doctor Tully

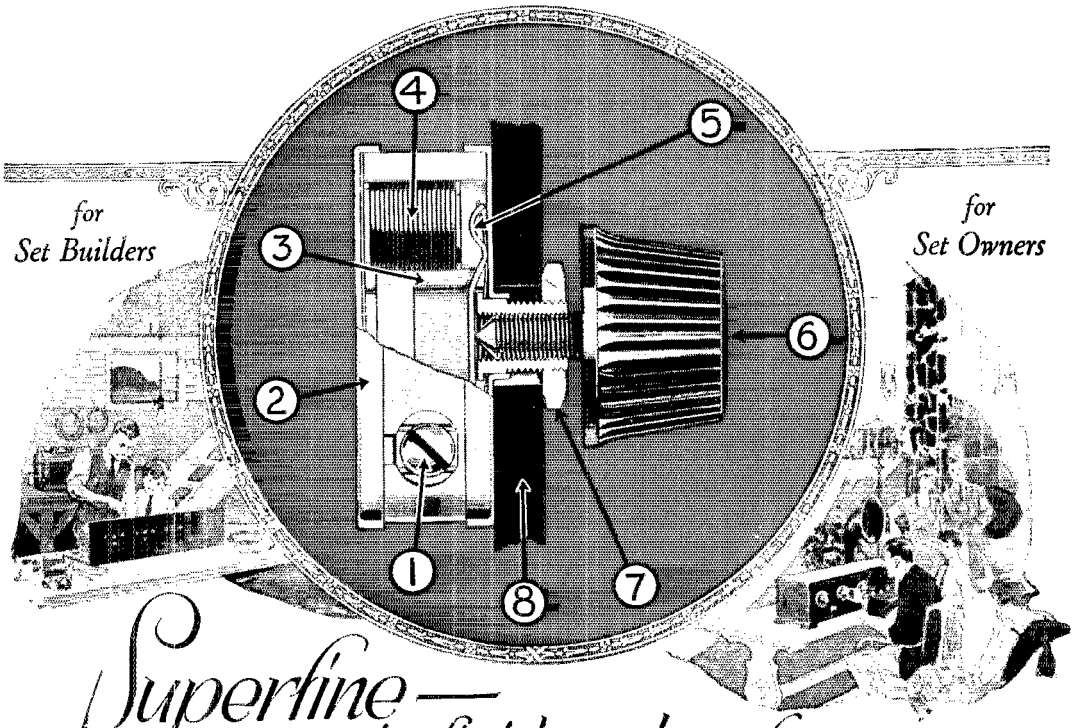


Synchrophase is also supplied with base for batteries and in a de luxe Console model.

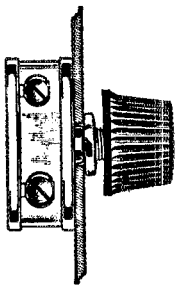
All Grebe apparatus is covered by patents granted and pending.

for Set Builders

for Set Owners



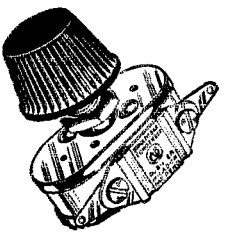
Superfine— *in finish and performance*



Bradleystat—Perfect Filament Control for All Tubes

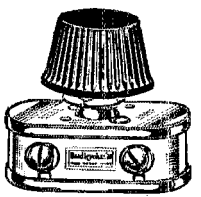
WHETHER you build your own radio receiver or buy a factory-built set, you will improve your set by installing Allen-Bradley Perfect Radio Devices. Not only are Allen-Bradley Radio Devices strikingly beautiful in finish and design, but their marvelously silent, selective control never fails to amaze and delight you. The eight salient, unrivaled Allen-Bradley features are:

1. Terminals are readily accessible. Designed for bus bar wire or terminal lugs.
2. Metal parts are heavily nickeled and buffed to a high polish.
3. Container is made of glazed porcelain that excludes moisture.
4. Specially-treated graphite discs give amazingly wide and noiseless control.
5. Internal switch opens battery circuit, if desired, by turning knob to the left.
6. Highly polished bakelite knob is removable if you prefer to match other dials
7. One-hole mounting makes installation simple and easy on all sets.
8. Can be used with any panel thickness. Back panel extension is extremely small.



Bradleyleak—Perfect Grid Leak ¼ to 10 Megohms

Mail the Coupon for Latest Booklet



Bradleyohm—Perfect Adjustable Resistor

Allen-Bradley Co.

Electric Controlling Apparatus

277 Greenfield Avenue

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Mfrs. of Graphite Disc Rheostats for Over 20 Years.

ALLEN-BRADLEY CO.
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Please send me your latest literature on the complete Allen-Bradley line of Perfect Radio Devices.

Name .....

Address .....

Unchanging "B" power at last

RCA Duo-Rectron, Model AP-937, with Radiotron UX-874 and Rectron UX-213. . . $65

A Power Amplifier for Loudspeakers

May be connected to the first audio stage of any receiver, and to any loudspeaker—to supply a stage of power amplification for tremendous volume increase and marked improvement in tone. Operated from 60 cycle, 110 volt A. C. source. RCA Uni-Rectron. $105

RCA-UNI-RECTRON $105.

RCA has held its new power unit in the laboratories for more than a year after the main principles were developed. There were problems to overcome, and these the RCA Duo-Rectron solves at last.

FIRST—It supplies correct voltage for any size set up to ten tubes. A new vacuum tube—a *voltage regulator* had to be developed to take care of this. With the RCA Duo-Rectron you never get too much current on a small set, or two little current on a five, six or eight-tube receiver. It always supplies exactly the necessary voltage at any needed rate, up to fifty milliamperes.

SECOND—The Duo-Rectron uses a new rectifying tube, specially developed to give *long life* under heavy usage.

THIRD—A newly designed filter system *takes out all the A. C. hum.*

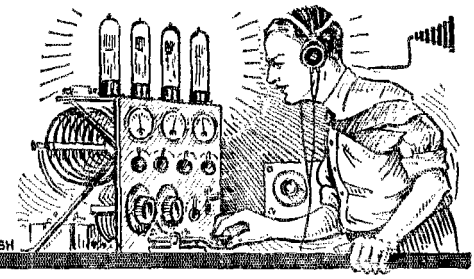
Therefore, the RCA Duo-Rectron supplies the necessary plate voltages of 22½, 45, 90 and 135 volts for any existing type of radio receiver. Supplies it silently—dependably—unchangingly—from any 60 cycle, 110 volt A. C. lighting circuit. A unique feature of this unit is the furnishing of 135 volts on the plate for the operation of the new Radiotron audio-amplifiers UX-120 and UX-112.

RCA-DUO-RECTRON

RADIO CORPORATION OF AMERICA ~ NEW YORK ~ CHICAGO ~ SAN FRANCISCO

The Traffic Department

F. E. Handy, Acting Traffic Manager
1711 Park St., Hartford, Conn.



Traffic Briefs

The Radio Club of Rochester did some of the best work of the month. A low-powered forty meter transmitter with a storage battery plate supply was installed at the Rochester Industrial Exposition which is held annually at Edgerton Park from September 7 to September 12. 8BGN, 8KT, 8KS, 8CYI and 8BRD did the construction work.

Exhibitors experienced no interference whatever from the transmitter. Their troubles began when one of their number connected one of the new Crosley receivers to an antenna.

Messages were accepted for England, Italy, New Zealand, Australia and all parts of the United States. One message reached Washington, D. C., forty minutes ahead of a telegram filed at the same time. A message which was addressed to Australia was sent to that country in twelve hours of filing time by relaying it through other Rochester stations. Usually four or five days are required to get a cablegram through. A message from Governor Al Smith for the Exposition was received via 2ADO and featured in the Rochester papers afterward. A watch was kept at the station from ten in the morning until eleven at night each day. 135 messages were handled and the message service was excellent through 8PZ, the exposition station.

A big spark set and a display of various kinds of receiving and transmitting tubes proved of great educational value to many of the 42,000 people visiting the exposition hall daily. A surprisingly large number of people were found who could copy Continental or were interested in amateur radio work.

A. D. M. Junkins of South Dakota is offering a prize to the station in his state who forms the most schedules with stations in North Dakota, Minnesota or Nebraska. To the station putting through the greatest number of contacts between October first and November first, goes a year's subscription to *QST*. Each time a station is worked on schedule it counts as one point. All stations entering the contest must keep logs of their work and duplicate logs must be sent in at the close of the contest. Everyone was asked to arrange his schedules before the contest opened, to line up some routes, and to notify the A. D. M., giving stations, days and times which may be changed as often as necessary. This idea should help other Traffic Officials with their problems and we expect to have information on a lot of traffic networks before many weeks have gone by.

Mr. Van Dyke of Chattanooga, Tenn., got a telegram from Paris saying that his daughter was ill. Mr. Van Dyke was angry at the Western Union for a delayed delivery on the telegram. He filed a message for Paris at 4MM asking details. The message took the route: 4MM-9AKP-8GZ-z2AC-f8TOK. It was delivered in Paris Tuesday morning by f8TOK and a reply by cable was promptly received. This is REAL RELAYING and it is mighty encouraging to chronicle such neat work in these columns. Every station who took part in the relay did his duty and handled the message both swiftly and accurately.

4MM reports another message that was sent from his station to New York City. The answer was received in one hour and we are sorry that the entire relay routing is not available. Next thing we know the Delta Division will be carrying off the Traffic Trophy.

Speaking of schedules, 8CEO has kept a schedule with 4JR for over a year with absolute reliability.

8CEP sold $800.00 worth of show cases for the Welmarth Show Case Company through a message delivered to them from Bangor, Maine. That Bangor, Maine, gang have written HQ, inviting the rest of the country to watch 'em grow and handle traffic. This word from the Central Division shows that they have begun worthwhile work already. Our Milwaukee traffic handlers will need to work hard to keep their laurels.

1CJR did some worthy traffic-handling work this summer from his station at Medomak Camp. One UV201A with a Ford spark-coil plate supply put .4 amp in an antenna on a 75 meter wavelength. 300 miles were covered in daylight under the very worst conditions. 1CJR kept regular schedules with 1AVB at Washington, Maine and with stations in the vicinity of Boston, Mass. Only two of the many messages originated at 1CJR during the summer were not delivered because Cox took the trouble to place his messages through reliable stations worked on schedule. We wish that there were more 1CJRs.

6ZD gave the Pacific fleet the first news of the recovery of the lost plane, PN9. He copied the first news of the rescue direct from Hawaii, took the air at the request of Naval Headquarters at San Francisco, and gave the message to NRRL.

5QY, W. F. Grogan, D. S. of Florida, Dist. Nos. 4 and 5, is conducting a "most messages" contest each month. The winner receives two 45 volt "B" batteries, donated by the Burgess Battery Company.

9CXX has inaugurated something new. He keeps a weekly schedule with a2DS and a bulletin is handled each way between A. R. R. L. Headquarters and the Wireless Weekly. 9CXX makes up the bulletin from the news we sent him. The news bulletins come in the mail at Headquarters with perfect regularity and we are kept in much better contact with our Australian fellow amateurs. Similar services should be established between the U. S. A. and every foreign country where message-handling is allowed. Australian traffic certainly has a reliable and swift channel through 9CXX.

At the Oakland, California, Radio Show the fellows had two transmitters in operation. 6ZK had charge of the booth and 421 messages were handled for the visitors present. Many local concerns furnished apparatus, but it was the large number of fellows who turned out to help that made the affair a success. Dann says that the A. R. R. L. booth was the place to find the crowd.

A message to Headquarters via BER-8BEN-1SK-1AWW tells us that BER is working g2NB on a reliable and regular schedule, using two of the new "fivers."

Club Activities

CALIFORNIA—The Modesto Radio Club celebrates its *fourth* anniversary and *sixth* year of existence. There has been no reorganization and the same old constitution is working. What other club can boast so many years of continuous life?

The gang are 100% amateurs. Last year they put over a Pacific Division Convention. Later they decided to buy a lot and put up a shack. The club could not borrow money without security. A few words about their success in raising money should prove of interest to other enterprising clubs.

At the time the money question was bothering, the Stanislaus County Fair was held at Modesto. The club members had an inspiration. They donned caps and aprons, borrowed some gasoline stoves, and got two hot-dog stands at the fair. They knew little about the hot-dog business but learned fast. The six day grind was terrible but the results were worth while. Some difficulties were amusing, other tragic. Miscalculations in getting supplies of buns cost dearly. When white bread was sold out, rye bread sold even better. In a week of hard work $1400 were received.

Today the Modesto Radio Club owns a big lot in the best part of the town. A big club house is planned

The gang; left to right: 6CID, 6CJJ, 6CCI, 6CKH, 6FY, 6AME, 6DBU.

with a room for an experimental laboratory, and another for the transmitter (6CB). This winter all can get together at their own club. Are there any other clubs with equal initiative and industry?

CONNECTICUT—Lacking an active radio club in Hartford, the amateurs of the vicinity recently got together and formed the Radio Transmitter's Association of Hartford. Several Headquarter's men are taking an active part in the building of the association. The constitution has been adopted and interesting meetings are held twice each month.

ILLINOIS—The Chicago Radio Traffic Association is conducting the second wavemeter contest. The object of the contests is to increase the number of wavemeters among the members. A fifty watt tube is offered as a prize. The traffic cup, donated by Mr. Marquis, 9IX, for the highest monthly message total, is creating keen competition and is responsible for increasing the traffic reports in the Chicago district.

INDIANA—The Fort Wayne Amateur Radio Club adopted a new constitution and is looking forward to an active winter. Arrangements to become affiliated will soon be made.

The Indianapolis Radio Club has had a busy season. Convention attendance was good. The Club has a transmitter in operation at the Exposition handling traffic. Many messages are being handled. The transmitter is in a booth near many receivers, but though in continuous operation, it causes no interference.

MAINE—The Queen City Radio Club had a peppy meeting September 25. They invite you to watch their growth. Plans have been made to advertise the club and the League and they have some original schemes that will appear in these columns as they are worked out. More power to them!

MANITOBA—Winnipeg amateurs have realized the need of closer contact with each other and at a recent meeting of the ARRL gang they formed a Radio Traffic Association. The constitution is similar to that of the American Radio Relay League. All members of the Association must be members of the League in good standing. Interested amateurs should write the Secretary c4DY, Mr. S. G. Paterson, 612 Beresford Ave., Winnipeg, Canada.

MASSACHUSETTS—1RWW reports, as Secretary of the Springfield Radio Association, that the Association's transmitter is in shape. The several committees report progress. 1APL was admitted recently as a member.

MICHIGAN—The Kazoo Radio Club held its first meeting of the fall at 8OPY's shack on Oct. 21st.

OHIO—The Mahoning Valley Amateur Radio Club of Warren, Niles and Youngstown held a local traffic contest this summer to stimulate activity. 8CLU was the winner and was presented with one of Ballentine's books as recognition of his good work. He has schedules. That's how he does it, boys.

The Alliance Amateur Radio Club started regular meetings October 1st.

The Ashtabula Radio Club reorganized early in September, electing James Cornell Secretary.

The Union Central Radio Association of Cincinnati holds interesting semi-monthly meetings. This is one of the most active clubs in the state.

The Cleveland Amateur Radio Association maintained the club station 8DDQ this summer.

The Toledo Radio Club plans a big "Hamfest" during the Toledo Radio Show. A big attendance of amateurs is expected.

ONTARIO — The Wireless Association at Toronto, Canada's first Radio Club, opened the fall season with a meeting on September 17th. This club is exclusively devoted to Amateur Radio. All members are transmitting amateurs.

PENNSYLVANIA — Friday, Sept. 11, A.D.M. 8ZD laid the foundations for a club for ARRL amateurs. The new organization is The Amateur Transmitters' Association of Western Pennsylvania. Every ARRL man in the western part of the state is behind it. Charter members were admitted up to October 1. Interesting activities are planned and we hope to have a good word monthly, telling us of the work the club is doing.

Official Broadcasting Stations

Changes and Additions Effective Nov.

Call	Wavelength (Local Standard Time) 12.30 p.m.	7.00 p.m.	10.30 p.m.	Days of Transmission Day of Week
1ADP	....	....	28	Mon., Wed., Fri.
2ADM	....	84	....	Wed. and Sat.
2ADM	....	....	41.58	Thurs., Sat., Sun.
2AGQ	....	....	82	Wed. and Sat.
2AGQ	....	40	....	Tues. and Thurs.
2APV	40	40	....	Thurs. and Sun.
2BEE	....	40	....	Monday
2CTH	....	38	....	Tues., Fri., Sun.
2CTH	....	....	38	Fri. and Sat.
2XBF**	80	....	....	Daily except Sunday
5ADA	....	84	....	Wed. and Sat.
5ADA	....	82	....	Saturday
5ADA	....	84	....	Wed. and Sat.
8CEO	....	80	....	Mon., Wed., Fri.
9AIM	....	40	....	Mon., Wed., Sat.
9DZR	....	80	....	Thurs. and Fri.
9DZR*	....	....	206.7	Tuesday
9ZC	....	....	85	Saturday
9HP	....	40	40	Wed., Fri., Sat.
c4EO	80	80	80	Mon. and Wed.

** Noon 11.5, 12.45 180 meters.
* 9 P. M.

NRRL

THE *Seattle* has returned from its long Asiatic trip. On the last leg of the cruise a lot of traffic was handled with the usual reliability. Schedules with the various Navy Radio Stations enabled the routine trafic to be cleared with a minimum of time and effort. The forty meter wavelength was used almost exclusively for this work. Many amateurs were worked and some of the traffic was handled through them. The number of reports to Headquarters dropped off considerably just before she docked, so we are listing the stations logged by NRRL operators during the past month.

Stations worked and heard — NRRL.
August 24 to September 23, 1925

WORKED: 1ana, 1anq, 2brb, 2gy, 2wc, 4tn, 5agn, 5agu, 5ay, 5ux, 5yd, 5zai, 6ac, 6afg, 6agk, 6ahp, 6amm, 6aoi, 6ais, 6bde, 6bgu, 6bkb, 6bjx, 6bmw, 6bq, 6buc, 6bur, 6cah, 6cc, 6cct., 6cgw, 6cmq, 6cto, 6cuk, 6dab, 6dah, 6dai, 6fh, 6gx, 6hc, 6js, 6rw, 6tc, 6uf, 6ve, 6vr, 6zac, 6zd, 7ae, 7aek, 7de, 7iq, 7nd, 8aly, 8er, 8gz, 8pl, 8sf, 9and, 9bpy, 9bwb, 9bwo, 9bwz, 9chy, 9ded, 9dpx, 9ek, 9hp, 9xn, 9yav, 9yu, z2ae, 2xa, 4ac, 4ak, a5ah, rafl, g2nm, 2sz, f8tok, crgt, plhr, 6aws, frl, kfuh, wap, wwdo.

HEARD: 1aep, 1bqt, 1bzp, 1ca, 1cak, 1cmf, 1cmx, 1yb, 1te, 2adm, 2cty, 2cvu, 2cxe, 2in, 2kg, 2mu, 2xaf, 2xb, 3aao, 3ehg, 3ii, 3ckg, 3lt, 3sl, 3xo, 4au, 4dm, 4fr, 4js, 4rm, 4sa, 4sb, 4tv, 5ade, 5acl, 5aid, 5akz, 5aww, 5atv, 5atx, 5bg, 5en, 5ew, 5ft, 5hy, 5lg, 5lz, 5nj, 5oq,

5ox, 5qs, 5uk, 5va, 5wi, 6aaf, 6aak, 6abg, 6aek, 6aij, 6ajr, 6ajl, 6ake, 6alv, 6and, 6apb, 6arw, 6ase, 6aum, 6az, 6bap, 6bbv, 6bdn, 6bdo, 6bgb, 6bhn, 6bip, 6bjd, 6bjv, 6bmw, 6bqu, 6bsx, 6btl, 6bve, 6bwy, 6cco, 6ccv, 6cdy, 6cej, 6cfe, 6che, 6chl, 6cix, 6cls, 6cmh, 6cnc, 6cod, 6cor, 6cse, 6ct, 6dam, 6dao, 6daq, 6dbl, 6dh, 6dn, 6ds, 6ea, 6eb, 6hu, 6li, 6lj, 6ml, 6ts, 6xad, 6xag, 7aq, 7ij, 7it, 7lu, 7ud, 7uj, 8alx, 8aum, 8bce, 8bqi, 8byo, 8cau, 8dgo, 8djp, 8eb, 8eq, 8ge, 8gi, 8sjq, 8lx, 8zg, 9ano, 9bcz, 9bht, 8bwx, 9dmj, 9dng, 9dui, 9eky, 9fg, 9og, 9oo, 9uq.

Z; 1ao, 4aa, 4ag, 4al, 4as, 1ax. A; a3bd, 2lo, 2jw, 2rj, 2yi, 3yx. I; 1er. R; bal, db2. J; jaf, 1aa. G; 2cc, 5lf, 6zk, 2lz. F; 8bf, 8fq. M, 1aa, 1b, 1k, 9a. C; 4gt, 9ck. BZ; 1ac. Ch; 2rm. ANE, WUKX, VMG, HWB, WVY.

WNP

THE *Bowdoin* and *Peary* docked at Wiscasset October 10. Reinartz was greeted by Secretary Warner and "Bill" Murray from A.R.R.L. Headquarters. 1MY, 1CKP and a number of other friends were at Wiscassett when the **Bowdoin** arrived.

1ARE, 9CXX, 8JQ, 1MY, BHL, 1CMX and c1AR handled the bulk of the traffic during the last lap of the trip. Thousands of words of press and many personal messagess were handled for the National Geographic Society, the Navy Department, and the friends of the members of the expedition. Never before has an Arctic expedition been in such reliable contact with civilization Never before has the daylight barrier been so ineffective! Reinartz and the short-wave transmitters that he designed made history for Arctic radio communication.

We are going to let the log of the expedition speak for itself and tell the story of daily and reliable communication. On the days labelled "seasick" everyone certainly had his troubles. John says that the rail was constantly awash on such days and the boat rolled so badly that he was thrown out of his bunk onto the floor several times. If the leadin had not been flooded with water he would have been at the key just the same.

WNP LOG

Received at 9CXX, Cedar Rapids, Iowa, October 5th and 6th, 1925

July 21—40 meters—wkd 1my; hrd g2yt, 1are, 2agb, 2lu, nkf, bhl.

July 22—40 meters—wkd 1ckp, 1my; hrd 8sf, 9bbj, 9ek.

July 23—40 meters—wkd f8qq, 1are, g2sz; hrd g2yt, 1cmp, 2gk, 2ud, 8don, 1aci, bhl, 9ek.

July 24—40 meters—wkd 1my; hrd 1my.

July 25—40 meters—wkd g2cc; hrd 1my, 2agb, 1pl, 2eth, 3afq, 9es, c1ar, 8bq, 1ckp. 20 meters—hrd 2xk. 1xam, 9uq, 9zt, 9cib, 9dej.

July 26—40 meters—wkd 2eth, c1ar; hrd 2gk, 3ot, 2awa, 1aci, 1my. 20 meters—hrd 4sa, 2xaf, 1cak.

July 27—40 meters—wkd 1aao; hrd, 1pz, 1my, 1are, g6kk, 1pl, 9ek. 1aa, 9bbj.

July 28—40 meters—wkd 1are; hrd 1pl, 1cmp, c1ar, 1my, 9xn, 4fu.

July 29—40 meters—kwd 1amw, 1ckp; hrd 9ff, nve, 1cmp, 9xn, 9dok, 8don. 20 meters—hrd 1ii, 1zs, wir.

July 30—40 meters—wkd c2bg, g2sz; hrd c1ar, 9dok, 2ha. 1pl, 1ckp, 4ask, 1akp, 4xe, 1my, 9xn, c2be, 1aci. 20 meters—hrd 1xam.

July 31—40 meters—wkd 1amw, c2be, 1are; hrd 1aep, 2afn.

Aug. 1—40 meters—wkd 1aao.

Aug. 2—20 meters—wkd 9cxx; hrd 8cql, 6agk, 1bzc, 1my. 40 meters—hrd 1are, c1ar, nkf, 1pl.

Aug. 3—40 meters—kwd 1are, 8bf; hrd 9xn, 8avl, 9bha, 1cmp, 8es, 8ckm, 8bn, 3ot, 6cgw. 20 meters—hrd 5za.

Aug. 4 to 17—20 meters—wkd 9cxx and nkf daily; hrd 7lu, 8caz, 1xae, c3bg, 9xu, 2yi, pox, bye, 9zt, 1zi.

Aug. 18—40 meters—hrd 8don, 3auv, 1uw, 2ku, 1sk, 2box, 2bcr, 4ask, 2boa, 9ddp, 9coc, 8dkk. 20 meters—hrd 9cxx.

Aug. 19—40 meters—wkd f8bv; hrd ksmu, oia, g2ac, pcuu, f8al, f8cc, obq, (n-obq), phs, 1ci, octu. 20 meters—hrd g2ac.

Aug. 20—40 meters—wkd 1pl; hrd 2sp, 1xu, 1mw, 1pl, 4ask, nepkl, nve, luw, 1qp, 9ecc, 9ape. 20 meters—wkd 9cxx.

Aug. 21—20 meters—wkd 9cxx. 40 meters—wkd Sept. 22, 23 and 24—Seasick.

1pl, 1mv, 1bvx; hrd 9xn.

Aug. 22—40 meters—hrd 9zx, 9xn, 4jr, 4js, 5ew, 7eh, nve, 5atv, 1af, 4eu, 6akw.

Aug. 23—40 meters—hrd nrrl, nkf, 6cgw, f8oo.

Aug. 24—20 meters—hrd nkf.

Aug. 25—40 meters—wkd 1are, 9dqu; hrd 1cmp, 4sa, 8gz, 9bbj, 1ck, 1pl, 1bom.

Aug. 26—40 meters—wkd 1are, c1ar, 9cdv, 8jq; hrd a2yi, a5bq, a3tm, 4ask.

Sept. 11—40 meters—wkd 1cmx, 1are, 1ckp; hrd 2ahm. 20 meters—wkd c1ar.

Sept. 12—40 meters—wkd 1my, 1are. 20 meters—wkd 9uq, c1ar; hrd 6rm.

Sept. 13—40 meters—wkd 1are, 1my, 1bzp, c1am, c1ar, 9ded, 9cxx; hrd 4ask. 20 meters—hrd 9xh.

Sept. 14—40 meters—wkd 9wo; hrd 9ff, 1are, 9cxx, 8aul, 8hg, wiz, 4rm, 4fl, 4cu, 2xi, 4tv, 5oq, 9hp, 5aj, 9dwh, 9mn, nkf, 9zk, 9dac, 9ado, 4ask. 20 meters—hrd 1my.

Sept. 15—40 meters—wkd 9bht; hrd 1yb, 1are, 1ckp, 9zt, 9za, 9ix, 8aul, nkf, 2xi, 9bnd.

Sept. 16—40 meters—wkd bhl, 1are, 9bht; hrd 5nj, 2cxl, 1aci, 1yb.

Sept. 17—No sigs.

Sept. 18—40 meters—wkd g2sz, 1are; hrd 1pl, 2cxl, nisr.

Sept. 19—40 meters—wkd 1cmx, smzs, c1ar, 1are, 1my, 9zt; hrd 2gk, 8bgn, 2bw, 4ask, 3hg, nkf, wqo, 1ckp, 1wy, bhl.

Sept. 20—40 meters—wkd 1ckp, 1are; hrd 2nd, i1rt, 1ef, c1ar. 20 meters—wkd c1ar.

Sept. 21—40 meters—wkd 1are; hrd 4sa.

Sept. 22—Seasick.

Sept. 23—Seasick.

Sept. 24—Seasick.

Sept. 25—40 meters—wkd c1ar, 1ef, 1amf, 1are, 2ahm, 1my, 1ckp; hrd n-obq.

Sept. 26—40 meters—wkd 1my, 1xg; hrd 1pl, 1ana.

Sept. 27—40 meters—wkd 2ahm, 1ef, 1aao, 8jq, 1xg, 1are; hrd 1pl.

Sept. 28—40 meters—wkd 9cxx, 1ef, 1are, 1xg, 1ckp, 8brc, 8me.

Sept. 29—40 meters—wkd c1ar, 1ef, 1are, 9cxx; hrd 2xi, 1bzp.

Sept. 30—40 meters—wkd bhl, 1er, 1ef, 1are, 1my, 9cxx.

Oct. 1—40 meters—wkd bhl, 1are, 1ef, 8es, 2bkr, 1my, 1ckp, 9cxx; hrd 1pl, 1ana.

Oct. 2—40 meters—wkd 1are, 1my.

Oct. 3—40 meters—wkd 1are, 2zb, 1my, 1ef, 1bay, 8bin, 1qp; hrd 1er.

Oct. 4—40 meters—wkd 1rr, 1qi, 2acs, 1my, 1are, 4eg, 8gz, 8agq, 8jq; hrd 1mp, 2aky, c1ar, 1axn, 3bta, 9dqu, 8oq, wvz, 3aha, 8aul, nkf.

The Traffic Trophy

8BRB did some hard work that deserves credit and he sent in his messages for us to check. 77 messages were complete with the "city and station of origin" and every one was handled promptly and well. Only because the "station of origin" was missing on a number of messages did he fail to "place" in the starred rectangle this month. We understand that 1BUO also started a big bundle of messages to us, but as we go to press they have not arrived. 7OY, who featured last month, kept his schedule. As he took a vacation he was unable to score a repeat. A number of the traffic gang have promised us that they were starting a campaign to carry off the Trophy, and we hope to record the history of their efforts next month.

Back numbers of *QST* contain complete information about the Traffic Department Trophy. When you handle over 100 messages in a month be sure to turn them in to your local Traffic Officials who will forward them along to the Division Manager. Division Managers will send bundles of messages to Headquarters each month and one man at Headquarters will count the messages and make up a Brass Pounders' League each month after which the message file will be returned promptly direct to you. Only messages containing the CITY and STATION of origin, a SUFFICIENT ADDRESS to insure delivery, the TEXT, and the SIGNATURE shall be counted. The date and number are important as the inclusion of a date speeds up the message and the number makes it possible to easily trace the message. The fundamental parts of a message shall determine whether or not it is counted. All messages must be handled in 48 hours or less. If there is any doubt about your messages, send them in and get the credit that is due you.

DIVISIONAL REPORTS

ATLANTIC DIVISION
E. B. Duvall, Mgr.

SEPTEMBER has hit the Division without unusual signs of activity. Due to warm weather, traffic is about as normal as in mid-summer.

One feature September brings us is RADIO GRAPHIC, a new magazine devoted to THIRD DISTRICT HAMS. RADIO GRAPHIC welcomes the support of men in the Third Radio District and those in the entire Division who have felt the need of such a paper. A sample copy may be received by writing to the publishers at 42 Schiller St., Philadelphia.

Red Cross Headquarters has no reports of the receipt of Mid-Western or Pacific Coast Messages. Poor delivery was given the few messages accounted for. The TEST was intended to be a RUSH MESSAGE test, to give the Red Cross an example of our previous records of putting messages through in less than 12 hours. Messages, addressed to Red Cross Chapters were found to have been held in some stations four or five days. The general trend was to hold them 48 hours and then mail them. News and instructions about Red Cross Emergency work should be delivered quickly. Some of our own "gang" were on the job. With the help of the police department, 3BO delivered his messages within 3 hours of receipt. He placed others in neighboring towns via auto. The Red Cross are fully aware of the conditions, the time of the year, and the fact that few stations were in actual operation during the time these messages were ready to go on the air, and it is possible that we shall have more interesting work before winter is over. Let's hope we shall give them better service next time. When this is in print, the DM will be located at Wells Avenue and Edmonston Road, Edmonston, Md., near Hyattsville. Please note the change in address. As moving is a large order for a Radio Man you can appreciate what it means. It will be a few weeks before the DM can get settled, so have a little patience, fellows.

While the Third District Convention has been called off, there is a possibility that we will have a "FIRST ANNUAL ATLANTIC DIVISION CONVENTION" next year. All in favor say "Aye." The DM will be glad to receive comments and all correspondence will be counted as votes — for or against such an event. A time and place will have to be decided and the results will be submitted to the committee handling this matter. The DM feels the need of an informal meeting of traffic officials of the Division shortly and Philadelphia has been suggested as a good meeting place.

All ADM's, DS's, CM's and ORS who can attend such a meeting sometime in November will please write in and make further suggestions. We should have quite a "ham fest." The best time would be a Saturday evening or Sunday afternoon.

DISTRICT OF COLUMBIA, ADM 3AB — There will be many active stations in operation this winter in the District of Columbia. 3BPP has returned and is back on 200 meters with vengeance. 3BL and 3BWT have been off the air, due to the installation of a new mercury arc rectifier and general overhauling of two transmitters. 3JO is back and ready for the winter rush. 3AB is making plans for a large antenna system. The decorating Department is busy at 3ZW and the music department has had to find quarters elsewhere while the work is in progress. 3CEJ has been down the river all summer. Mercury arcs, designed by 3CKG, are much the rage.

Traffic: 3JO, 7; 3BWT, 5; 3AB, 10; 3BSB, 22.

MARYLAND, ADM 3HG—During the summer many stations have been overhauled. 3BUR is on the air. The "ops" just returned from a cruise on NVE. 3LG is back from his vacation. 2WA has built a new 10 watter. 3HP is reaching out fine. 3GT has applied for ORS appointment. 3HU and 3AEA are on 80 meters and do fine work. 3ACW reported late. 3CGC works on 40 and 80 meters.

Traffic: 3AEA, 10; 3CGC, 2; 3LG, 4; 3HU, 3; 3ACW, 6; 3APV, 63; 3HG, 8; 3LL, 1.

DELAWARE, ADM 3AIS—3AIS is still the most active 40 meter station in the State. 3WJ has gone back to sea on a trip to the west coast. 3SL reports a new mast going up. 3AUN has quit the game. 3AEB is a new 50 watt station.

EASTERN PENNA, ADM 3FM—3BNU has a new radio shack and is again rebuilding. 3BNU announces the formation of the Lehigh Valley ORS Club of which he is President, 3LK is Secretary and 3CJN is Treasurer. Meetings are held the second Monday night of each month at the various stations. All ORS in Penna. Dist. No. 2 are eligible for membership. 3UE, 3BAQ and 3CJN are real workers at Allentown. 3BLC is on the job as City Manager for Bethlehem. 3BLP is a very active 80 meter station. 3LK blew up his filter condensers. 3AVM has installed a new motor to drive his generator. 3AVL worked "LN" and WAP and handled 12 messages. 3CTZ is still rebuilding. 3AAO is using a 204A and with 300 watts plate input.

Dist. No. 4: 3ZO has been closed during the last few months. 3QT's ORS was cancelled for not reporting. 3AUV worked a3BQ. 3BVA is on the air daily. He will return to State College this year. 3BGG and 3BKL will be going strong again soon. The York City Manager reported direct to the DM. (Please report to the DS next month, OM).

DIST. No. 6: 8EU worked z4AA and was heard in Scotland, France and England. 8CCQ worked India DC7, NZ, all Canadian Districts and Europe. 8BFE is busy with a case of "YLitis." (Look at 8AFR's case and take heed, OM). 3WH has installed a 40 meter rig. The Club Drive for new members was a big success. 8AFR got married. 8ACU will be back soon. 8BIR is home from California and earning an ORS appointment. 8CTF has a good traffic report. 8BQ worked England and heard Italy, NZ, Australia and Guam. His schedules work well, indeed. The Billtown gang are working up a 5 point system. Watch their smoke!! The ADM's new QRA is 1551 South 58th St., Philadelphia. Phone Woodland 7323 W.

Traffic: 3BVZ, 23; 3HD, 9; 3AHR, 3; 3FS, 4; 3AWA, 5; 3BQP, 3; 3BNU, 14; 8AVL, 14; 3LK, 8; 3BLP, 25; 3BUV, 1; 3BLC, 12; 3MQ, 28; 3CJN, 15; 3UE, 2; 3AAO, 5; 8EU, 61; 8CCQ, 17; 8BFE, 6; 8WH, 7; 8CFT, 11; 8BQ, 38.

Dist. No. 8: The DS reports that some of the gang need a little pepping up in reporting or they will find a whole new set of ORS taking the glory. Reports that 3CE is going to sell his outfit are at hand. We cannot believe this. 3AIH is ready to handle lots of winter traffic on the forty meter band. 3BAY is rebuilding. 3BC did some good delivery work on Red Cross messages. 3WB has been heard in South Africa. 3BWJ has christened a new "fifty." 3BEI phoned a message to its destination but failed to advise the recipient of his address. The call was traced and 3BEI was offered a box of cigars for his trouble. Not knowing his ADM smoked cigars, Walt turned the offer down. He has promised to accept the next box.—ADM.

Dist. No. 9—Stations are few and far between in this District. The ADM wants to hear from stations in Cape May, Cumberland or Salem counties who can maintain efficient traffic stations. Good operating and plenty of traffic is due soon. Let's hold true to the old South Jersey standard.

Traffic. 3BSB, 22; 3AIS, 12; 3OQ, 2; 3BWJ, 5; 3WB 4; 3HW, 3; 3AEA, 10; 3LL, 1; 3BO, 7; 3AIH, 7; 3BEI, 8; 3ZI, 3; 3XAN, 2; 3BTQ, 5; 3CGC, 2; 3LG, 4; 3HG, 8; 3BRM, 8; 3APV, 63; 3ACW, 6; 3AEA, 10.

WESTERN PENNA., ADM 8ZD—Dist. No. 8—8AOX hiked to New York State and through Western Penna. 8DOQ with 10 watts on 80 meters gets out consistently as ever. 8AHK is busy building portable transmitters for embryo hams and super hets for BCLs. 8AWH is putting a 50 watt bottle in the back room with a battery plate supply. 8AWH is the ham transmitter of WFBG. 8AS is the new portable station of 8AKI. A 201A is used as with battery supply and is good for local work. 8AKI attended a hamfest at 8BYI. 8CTT copied a complete conversation between 8CEO and 4TJ. 8DNO has had tube trouble. 8BRL has returned to State College. 8CRK is on regularly with a "fiver."

8JQ, the Alexander brothers, worked Brazil, Chile, France, New Zealand, Argentine. WNP and WAP. WNP and WAP gave them 24 messages, nearly all of which were over 200 words in length, and also 8 press articles of over 500 words each. (FB, OM. TM).

8CUK is on regularly now on 40 and 80 meters looking for traffic and ready to co-operate in any test work that may arise. 8CLV is in touch with England, France, Mexico, Canada and all U. S. A. 8BIT can't raise anyone East of the West Coast. 8AGO is on the air after a two month's absence. 8VE, who several months ago said he was through with radio, is going to be his second operator. 8VE is to be one of the portable calls at 8AGO. With two operators they expect to be able to turn in "ace high" reports each month.

Dist. No. 2: With the advent of the new Amateur

Transmitters Association of Western Pennsylvania *things look very bright* for the winter. A hamfest was held at the City Manager's home Friday, October 2nd. About 40 hams turned out. FB, ADM.

8CTF and 8AEY are on the air on 40 meters. 8BUY gets out well as always. 8AJU is making alterations.

Dist. No. 10: 8CCK is inactive at present. Several new Johnstown stations on the air. 8BYI is going to Washington and Baltimore. 8AUD just returned from Rockland, Maine. 8ADS and 8DSV are too busy to work anyone. 8CMQ has built a new short-wave receiver. 8CPE hopes to be in the traffic swim for the next report.

Dist. No. 11: Swanson will care for the reports from Dist. No. 7 while at college. A new D.S. will be appointed for Dist. No. 11. Stations located here should write the ADM and get in line for fall activity.

Dist. Nos. 12 and 13: Any stations interested in qualifying for ORS appointments should write 8BRC, the DS. 8ABM has been operating a UV204. He handled a small amount of traffic on the short waves. 8BRC can always be counted upon when it comes to moving westbound traffic. 8GU-8XC, the new Erie City Manager, has been on the job with two "fivers," using a storage battery plate supply. A "50" will be added shortly and further experimental work on five and 20 meters will be carried out. Erie has five or six good prospective stations for the winter season.

Dist. No. 14: 8BJV has been in operation throughout the month. 8DKS has been working on 80 meters and reports poor success. 8DCV has been away on his vacation and just returned. These fellows all report "no traffic" but take no steps to originate any. The Army-Amateur work will set them up in business anyway.

Traffic: 8AHK, 8; 8AKI, 4; 8BRB, 115; 8DOQ, 4; 8DGL, 2; 8BW, 1; 8CES, 4; 8CKM, 15; 8SF, 10; 8CEO, 2; 8CUK, 16; 8JQ, 98; 8CLV, 14; 8BIT, 11; 8AGO, 4; 8CCK, 3; 8BJV, 5; 8DKS, 4; 8BRC, 46; 8CMQ, 1; 8ABM, 8.

WESTERN NEW YORK. ADM 8PJ—The state has lost some good stations the past month, due to fellows moving. 8BOE and 8ACM have gone to college. 8NB has moved to California. Rochester will miss him. 8BQA and 8BQB are still traveling around the country in a car. 2ABX is at WJZ and his sister holds down the station. 8CMG is at 8ABX. 8ADM is a proud daddy now. Congratulations Mr. and Mrs. 8ADM. 8CTK lost his new 85 foot mast and suspects his BCL neighbors. Cases like this where evidence can be procured should be prosecuted. 8ADG attended the Foultney, Vermont, convention. He is ready for anything on 40 and 80 meters. 8DSM handled some good traffic on 80 meters. Things around Syracuse are beginning to boom. 8CTL, 8BIN and 8DKE are dusting off their sets for the winter. 8CCR has worked several foreign stations regularly. He handled good traffic, too. 8WU was a commercial operator this summer. 8AWA handled quite a bit of traffic from the Omaha and Milwaukee Radio Show. 8UE expects to surprise the gang with a new 2500 volt generator and a 1 KW tube. 8KU has built his set. 8ADE is active. 8QB, 8BSM, 8OR and 8ANJ handle traffic regularly with c9AL, using a 250 watter on 77 meters. 8PJ is on again after all kinds of trouble with his tubes. 8HR is a new station at WHAM. 8CYI, 8ALY and 8BGN still work foreigners with ease. 8KS works WAP occasionally. 8BRD is a low power expert. DHX's transmitter is out of commission. 8DRJ and 8BQK are the prize traffic handlers!

Traffic: 8CNX, 75; 8CCR, 8; 8BLP, 53; 8KS, 88; 8CYI, 107; 8PZ, 120; 8BRD, 34; 8DRJ, 25; 8BQK, 23; 8CCR, 38; 8BZU, 4; 8DSM, 33; 8DDV, 3; 8AY, 40; 8DME, 10; 8WU, 30; 8UL, 60; 8ADM, 24; 8NT, 23; 8AWA, 20; 8ADE, 36; 8OR, 2; 8PJ, 4; 8BSF, 28; 8BSM, 21; 8BHM, 56; 8DGA, 5; 8QB, 28.

SOUTHERN NEW JERSEY. ADM 3EH—Dist. No. 5: D.S. Wintermuth will appreciate a line from ORS in Morris, Sussex and Warren Counties, so he can rebuild the traffic organization of these counties.

Dist. No. 6. The tendency toward DX rather than traffic prevails. We hope the gang will let this idea wear itself out before the good operating season opens. Station owners show renewed activity. 3CBS uses two 216-A tubes with "B" plate supply. 3RE has done a lot with his Jenkins picture apparatus and he will be pounding real brass on 40 meters soon. 3CBX is a new ORS this month.

Dist. No. 7: Showell reports via Western Union that things are quiet. He is experimenting on 40 meters with little luck.

Traffic: 3AIS, 12.

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

INDIANA—ADM 9CYQ: Dist. No. 1: City Managers, and all stations not under the supervision of a C. M. are requested to mail their reports to Mr. L. B. Wilcox, 1317 N. Harrison St., Fort Wayne, Ind., not later than the 16th of each month.

The new 250 watt panel transmitter at 9II is a knockout and although not on the air much as yet, two "farinas" have been worked. 9BKJ has been working 'em with a 10 watt set and 26 watt date imput. He is now installing a "50." 9CRH is at college. 9EJU is the new C. M. of Muncie. He has a big panel transmitter nearly completed, and one mast is up. 9EJT works on "80" occasionally. He also operates a "Flivver." 9DDA will be on when cold weather arrives. 9BEC and 9DCB are selling BCL sets. 9EJP lost his 90 foot lattice mast. 9EG's 100 watt apparatus has arrived. The D. S. wants a report from every station in the district next month. 9AZC worked a "Frenchy" with one five watter on 40 meters.

Dist. No. 2. 9BK is going again. 9DYT has been visiting hams and he lined up 3 new ARRL members. 9AMI, 9DHJ, and 9DXI are active and working on 40 meters. 9BBJ will be off until Christmas. He will continue to act as City Manager of South Bend. 9OG is using a 250-watter on 20 meters. He has several operators among whom is a Mexican who keeps in daily contact with his home through 9O. 9CCL is putting in a 250 watter now. 9CUB don't seem to get the old punch out of his set. 9ASX has trouble getting out without disturbing the BCLs.

Dist. No. 3. Thru the efforts of D. S. 9BRK, the niterest in general amateur work has increased faster than any other Indiana district. Most activity centers around Evansville at present. That is appreciated by hams in the north end of the state as there never before was a good outlet to the south. 9BRK has two operators and the station works on 40 meters. 9BEP and 9AHM are going good and ready for traffic. 9EBW has a new outfit. 9BSC has some "S" tubes and a new antenna.

Dist. No. 4. 9UT is going to Florida. We will miss his strong arm message extractions but hope the next one is even rougher. He worked the Coast with a "fiver" and 100 watts, but didn't do it long. 9EJI worked g2KF, 9BVZ has completed a new "sync." The output is quite smooth and there is no blaze at the brushes. 9BJL moved to Fort Wayne.. 9BIW sold his old junk and is starting afresh. 9CJW handled some 80 meter traffic with a 203A. 9ADK is the speediest connection with the west coast we have.

Traffic:—9CRH, 54; 9BJL, 46; 9TG, 41; 9BBJ, 27; 9ADK, 24; 9OG, 18; 9BYI, 18; 9CKH, 17; 9AMI, 16; 9ASX, 14; 9NI, 12; 9DXI, 11; 9CYQ, 11; 9CLO, 10; 9NG, 10; 9DPJ, 10; 9DHJ, 9; 9DYT, 8; 9CJW, 8; 9BK, 7; 9II, 7; 9BKJ, 7; 9QR, 7; 9DUC, 5; 9CP, 4; 9EJP, 4 9AQU, 3; 9AAI, 3; 9AEB, 2; 9CUB, 1; 9CCL, 1; 9UT, 1.

OHIO. ADM 8AA: District No. 1. 8LO is now on air with a "50 watter" and sent us a good report. (Toledo Radio Club). 8DCB and 9AOE are under reconstruction. He has been recently married. 8DND is trying to get this transmitter to "perk" on 40 meters. Everyone enjoyed the meeting at Toledo on Saturday, August 22nd. Hebert and Warner were both there with some real stuff. Watch for more ham feasts at Toledo. You really missed something the last time. Dist. No. 2. Most of the gang have been off for various reasons. 8RY received reports from a, g, o, ch, z and e, and worked a, z, ch, g, and f. He is on the USS Wilmington for his U.S.N.R.F. cruise. 8AGS attended the National Convention with 8CTE and 8CTG. He is installing S tubes. 8CTG is waiting for a new tube. 8DDQ has been off. 8RKQ has been sick. 8BCE was QSO Australia and New Zealand 17 times 16 mornings.

8ZE resumes operation under schedule with the assistance of two or three new men from the Oberlin Freshman class. After returning from the Convention 8ZE took the Naval Reserve Cruise of two weeks aboard the USS Wilmington, NWK. He worked a bunch of other hams on the other ships of the training squadron (NOG and NEU). Great life!

Dist. No. 3: Let's go, boys. It's going to be a great winter for DX. Handle some messages! START some! They all start some place. Don't always wait for the other fellow to do it. CLEVELAND—8BVR and 8RJ have returned from summer camp and are "rarin' to go." 8BWB is pushing the key at WMI so doesn't have much time.

running a radio school at home. An old timer, 8AJE is back again, this time on a 40 meter wavelength. 8ADA has been working with 8UK on different antenna problems. He gets out FB. With the aid of 8IG, 8BUK, 8RJ and 8BVR, our friend 8ADA got his mast up. 8BUK put up a temporary aerial and worked two Aussies the first night. 8BF's good work is very consistent. ARKON—8BNH with a "50" and 8BPI with a "5" have been working most everything that could be heard. 8BNH actually worked over twenty Aussies and Zedders.

Dist. No. 5. Vacations made big inroads on traffic figures. Many fellows at National Guard Camp through this period. Several ORS did not report. 8BAU, 8DO, 8EI and 8DEM should remember that two such violations are grounds for cancellation of ORS certificates and govern themselves accordingly. 8CBP burned out his plate transformer. 8TJ is going to Florida. 8GZ has been knocking 'em dead on 40 meters. He says he hopes traffic work improves with the advent of cool weather. 8BYN has not been on much on account of National Guard Camp, and antenna trouble. "DX" at 8BYN and 8GZ has been "FB" all summer. 8PL and 8CBI has a "250." 8DSY has made application for an appointment as ORS. FB OM! The DS hopes the coming of cooler "WX" will wake some of the "sleeping beauties" up and put some ARRL pep into them.

Traffic:—8BYN, 55; 8BKM, 53; 8PL, 27; 8BPL, 26; 8GZ, 25; 8LO, 21; 8BNH, 14; 8BOP, 12; 8DRX, 10; 8BN, 9; 9DHS, 7; 8BSC, 6; 8CTG, 6; 8BWK, 5; 8DNR, 5; 8AA, 4; 8DGP, 4; 8CBP, 3; 8BWB, 3; 8BQI, 3; 8DCF, 2; 8UK, 1.

WISCONSIN, ADM 9VD: Dist. No. 1. 9DTK has resumed his schedule and is going after the traffic trophy in earnest. Our hat is in the ring. 9ATO reports 80 meters a better wave for traffic-handling than 40 meters, and says there are a bunch of fellows on that wave. 9BEK promises to handle a bunch of traffic. He is attending the "U" at Madison, but is week-ends at his station. 8BBY is at school, but worked Australia again. 9BKR is attending Marquette University. 9DWG handled a lot of traffic with a 201A tube. 9CII is back on the air again with lots of pep. 9HW is working on a new amplifier for BCLs. 9BMV is now on regularly. 9AFZ is getting out well on 40 meters. September 15th a meeting of the operating department of the A.R.R.L. was held and about 15 hams appeared. Mr. Snead and Mr. Schunck were put on a committee to arrange a code and technical class, the details to be worked out by them with a report at the next meeting of the MRAC. Mr. Nichel and Mr. Snead were made a committee to obtain publicity for the traffic department.

Dist. No. 2. 9EAR on 40 meters favors breadboard construction. 9BIB has built his set. 9DUJ has a "50" working on 40 and 80 meters. He is arranging some schedules. 9PM also is writing some letters to get schedules. 9EAN worked 32 stations in 12 states in 2 nights, using two UV201A's on an 80 meter wavelength. 9CCF worked France. 9COI can be heard on 20 or 40 meters. 9DVZ started work in October. 9AZA resigned as D. S. but will continue an active station owner though his work with the Electric Company takes most of his time.

Dist. No. 3. 9AEU attended the Convention. He operates on 20, 40 and 80 meters; 9ALA has promised to operate Somerville's emergency set if necessary. 9DKA worked z2XA. 9EMD handed in a good message total. 9BVA has a new antenna. He is looking for traffic. 9DCT says October will be a "Traffic Month" for him. 9BYJ is rebuilding and we expect Amherst will be a live town this year with its competition for traffic.

Dist. No. 4. 9AZN is handling traffic on 75 meters with an old UV203. Schedules with 9DTK will soon start things humming. 9EIL is busy getting a schedule arranged. 9BSO is on the air with a UX210 and using a Hertz antenna. 9DCX is overjoyed at receiving his ORS appointment.

Dist. No. 4. 9DPR is operating on 39 meters day and night both. 9BTH is busy at WEBC. 9ELI will be on the air as soon as he can dig up enough cash for a "hottle." 9BKU has to spend some of his time in working for a living. 9BJD is a new station at Superior.

Traffic. 9TK, 59; 9ATO, 35; 9BEK, 28; 9EAU, 28; 9EK-9XH, 26; 9DUJ, 32; 9AZN, 22; 9DKA, 21; 9BBY, 17; 9BKR, 17; 9DWG, 16; 9CII, 15; 9OM, 13; 9EMD, 12; 9DPR, 11; 9EAR, 10; 9EIL, 8; 9EAN, 7; 9CCF, 6; 9DCX, 6; 9BIB, 5; 9BSO, 4; 9COI, 1.

MICHIGAN, ADM. 8ZZ: Dist. No. 1. 9AMS did good work for the Cincinnati YMCA men. He shot messages through on 40 meters. 8ACU is elated because Michigan was again represented in QST for traffic handle. He says he will shoot in a big report next month to show his appreciation. 8BBQ was heard in Italy. 8ZT has trouble getting UP to 40 meters. 8BBI is on the air again with a "50," on 40 and 80 meters. 8DOO works on a schedule as usual. He will soon have a "quart" bottle in his set and is planning to put a few more pins in his world map.

Dist. No. 2. Stations here are getting ready for a big traffic season. 8BNC is moving to East Lansing where he will be in school using call 8DAG. 8DFB will have a mighty five on the air soon. 8EG will do its bit. 8NX and 8JJ are building fine forty meter sets and sparing no expense in their construction. 8CHK is getting along with his "50." 8DOK is using a "fiver" again. Granger, State Journal Radio Editor and old 8BGN is back on the air as is also 8FI. Granger worked Mexico using a 201. Messages are being handled between Australia and Lansing via 8EG, 8CHK, 8JJ, 8NX, 8AYY, and 8CED. 8DCW and 8MM are on the air on 40 meters. 8DSE has been heard in South Africa with only a "fiver." 8AUB will be run by the second operator this winter as the first "op" is at school. 8JG is rebuilding.

Dist. No. 4. The DS has been away all summer and is now overhauling his transmitter and soon reading to work on 20, 40 and 80 meters.

Traffic: 8JG, 64; 8AUB, 48; 8EG, 20; 8AMS, 16; 8DSE, 12; 8CHK, 12; 8ZH, 10; 8ZZ, 10; 8CAP, 8; 8JJ, 7; 8CED, 6; 8BD, 3; 8CEP, 3; 8ADK, 1; 9EFP, 1.

KENTUCKY, ADM 9EI. Dist. No. 1. 9MN has moved his station to the 11th floor of the Watterson hotel and the location is ideal. 9HP has worked a 3EF and WAP. 9CVR has been rebuilding. We are sorry to lose 9ELL this winter. He has gone away to college. 9DTT is with us after an absence of several months. He expects to put in a good winter's work. 9BPB has found out how to manufacture DC out of 60 cycle AC. 9CMW is constructing a new station for winter work. 9DWZ has worked z4AA, NRRL and g2LZ.

Traffic: 9OX, 44; 9MN, 33; 9HP, 21; 9DWZ, 20; 9WU, 8; 9CMW, 5.

DAKOTA DIVISION

D. C. Wallace, Mgr.

SOUTH DAKOTA, ADM 9CJS—9DZI works out consistently on 80 meters. He handed in a good traffic total. 9BDW has worked all U. S. districts except the sixth at noon on 40 meters. 9DWN takes traffic honors this month but is leaving for college. He and 9BOW will operate at 9XAP this winter. 9AEO will attend the Univ. of Wisconsin. 9TI has a new transmitter. 9DBZ promises to go high in traffic. 9DXR is working on a new station. 9AGL worked a3BX for forty minutes. 9BKB has a new 65 foot pole. 9EH wants to thank the gang for the attention to his QST advertisement. He received 42 inquiries. He is leaving for the coast for a vacation before going out to work. 9NM lost a pole and accidentally shorted a new set of B batteries. 9CJS raised his antenna and got hold of several foreigners. 9CKD has completed his new plug-in coil receiver. 9BRI operates a new 250 watter at the University.

TRAFFIC: 9CJS, 25; 9AGL, 17; 9DZI, 41; 9BRI, 2; 9DBZ, 10; 9DWN, 98; 9BDW, 28.

MINNESOTA, ADM 9EGU—Old Minnesota is picking up the battle-axe in its usual fashion and the fellows are coming through with their old interesting reports. If all the other states in the Union are reporting as much foreign DX as Minnesota is, the shacks of the foreign hams must be more than prepared with "U" cards. One thing certain is that the logs of the As and Zs must be nearly 100% "U".

The Minnesota State Convention held at Mankato on September 19th certainly has done wonders in to use his 204A. 8DGP has the neatest station in Cleveland. 8AVH turned in a good message report. 8DPN operates on 20, 40 and 80 meters. 8KC is

putting a lot of new pep into the gang. Everyone had a wonderful time, and went home satisfied, and with solemn resolution to make Minnesota's past reputation look like a mud fence after a hailstorm, alongside the "rep" she'll have from now on. Ata spirit, gang. Minnesota stations are all super-stations for traffic handling, experimental work, consistent operation and DX. Let's all do our stuff.

Dist. No. 1—9BAV is experimenting with portable installations, and so far has met with wonderful success. While on a duck-hunt in Western Minnesota, using his "5" watt portable set, he was QSO Mexico. 9EGN works out fine with his 201-A. 9EGF still plugs away trying to "get out" but meets with poor success even with "B" batteries on the plate. 9EGU works Australia regularly.

Traffic: 9EGU, 9; 9ADS, 12; 9EEP, 4; 9AOG,32; 9EGN, 10; 9CDV, 158; 9KV, 4.

Dist. No. 2. 9SV has been experimenting on 20 meters with a 250 watter and has done exceptional work. 9EFD found it necessary to go back to 150 meters to get traffic. He'd rather handle traffic than work DX. (FB, OM, this DX stuff is going to spoil radio yet unless we get over the "DX Fever." ADM). 9ANJ is waiting for cooler weather. 9EBC has returned to the key after a summer at camp. 9AIR has an oscillator working at 3 meters. 9JI promises real activity for this winter.

Traffic: 9COF, 1; 9EFD, 5; 9EGG, 3; 9SW, 14; 9BRV, 3.

Dist. No. 3. 9SE works Mexico often with his new "50." 9ELJ has a 90 foot tower and has combined with 9BXV. 9DGE has a new fan antenna 2 transmitters using 250 watters operating on 40 and 80 meters, and two operators. 9CRW-9EF is one of the "ops." 9ZT uses a UV204-A with normal input on EXACTLY 40.0 meters. NO ANTENNA of his is over 35 feet high. 9DEQ has a good layout and is on 40 meters, going strong.

Traffic: 9ELJ, 9; 9CCX, 1; 9DGE, 81; 9SE, 56; 9ZT, 37; 9DEQ, 6; 9ABK, 2; 9DAO, 2; 9BMX, 2; 9CUM, 15; 9CRZ, 14; 9APE, 35; 9BPY, 54; 9PH, 6; 9DYZ, 14; 9DPX, 27; 9DVH, 8; 9BNK, 11.

DELTA DIVISION

B. F. Painter, Mgr.

NOW THE extremely hot weather is over, things are beginning to improve. The only weak spot left in the Division is Arkansas but things are moving in that state and we hope that we will have a good report from there next month.

TENNESSEE, ADM 5CN—Activities in this state are increasing and traffic will soon reach a new high level. ADM.

Memphis—4-CU reports having excellent results on 40 meters. Look for him in calls heard. He is the most consistent station in Memphis and a real credit to the Division. 4IX is doing fine work on 40 meters and will do better.

4EE and 4FP at Chattanooga still working everyone with their "fivers." 4MM handled a few messages for a change. 4AJ has returned to Columbia. 4EY is experimenting with low power using a new UX112 tube. He finds it will oscillate with 3 volts on plate. Listen for him.

1KM has just returned to Bemis from the Convention and points north. He visited many stations and had a general good time.

LOUISANA, ADM 5UK—Weber reports that not a Baton Rouge key has been touched for three months. Everyone seems asleep. 5ABC will be off the air most of the season. 5ASJ will be on regularly. What happened to 5YW? 5AAT is searching for a good rectifier.

At Shreveport, 5ML is on constantly on 20, 40, 80 and 180 meters; 5BB is building a 20 watt set; 5ANC is busy at the office; 5AGJ is getting out nicely on 40 meters; 4AFH is out of town for the winter; and 5WY is trying to hold down two jobs at once.

At New Orleans, 5UK reports working WAP; 5MQ is breaking out with a 7½ watter; 5GI is still trying to get on 40 meters; 5AM has moved and is off the air; 5TQ is trying to find out which is best all around wavelength; 5JW has started up again.

At Plaquemine, 5KC has gone to sea and will listen for hams.

MISSISSIPPI, ADM 5AKP—At Meridian, 5AGM has closed his portable set until next summer. We wish to congratulate the operators for this fine work. With portable "sparkcoil-CW," they worked 8 states. 5AGS is now back on 40 meters; 5AEV reports his usual traffic; 5AQU reports trouble on 40 meters; 5FQ is still waiting for his MG; 5YD is raising much noise on 40 meters with a 250 watt bottle; 5AKP is having battery trouble.

THE ANSWER TO MEMPHIS—The Meridian Gang should worry about the Memphis swiping one of our pretty YL's as we have enough to give all the Memphis gang one each and then have "oodles" left for our gang and the DM too. Come on down and look 'em over. (Therefore, the DM's office will be closed until further notice.)

ARKANSAS, ADM 5XAB—This state is still quiet but 5ANN can always be depended on to get in a report. He advises that static has been very severe around Little Rock lately. In any attempt to get things started, again there was a general meeting called for all the hams. We trust that it will have good results.

Traffic: 4AJ, 28; 4EE, 4; 4EO, 4; 4CU, 21; 4FP, 3; 4IV, 8; 4KM, 5; 4MM, 5; 5AEV, 15; 5AGM, 1; 5AKP, 16; 5ANN, 14; 5AQU, 2; 5KC, 8; 5UK, 8.

HUDSON DIVISION

E. M. Glaser, Mgr.

THE D. M. wishes to apologize for the Eastern N. Y. and N. J. reports being absent from last QST. The N. Y. report never came in, and is again missing from these columns. A new ADM has been appointed and he is a real old timer in the game. Mr. H. H. Ammenheuser, 2PV, 178 Quail Street, Albany, is that ADM. (Watch his smoke-DM). Dist. No. 1 has R. W. Hendrickson, Jr, 2KX, of Sea Cliff, L. I., as DS. He takes the place of Mr. Fincher. A circular letter to all officials of the Division was sent out by the DM which contained the new rules and practises. These cannot be outlined here because of lack of space. In the future, all stations will report to their City Manager on the 12th of the month. The ADM must have his reports by the 19th and must get them to the DM before the 25th. If this procedure is followed by everybody the reports will ALWAYS get in QST. If not, they simply WILL BE LEFT OUT. It is not the fault of the D. M. that reports are missing.

Several cancellations of ORS have been made, and more are being made for those who fail to report. ALL ORS MUST REPORT EVERY MONTH OR LOSE THEIR APPOINTMENTS—AND ONCE THEY LOSE THEM, LET THEM TRY AND GET THEM BACK.

ADMs are to condense their reports, leaving out any "negative" information. Send a double-spaced, typewritten report to the DM. Always note the highest traffic stations, and the ones doing the most experimenting and other useful work. They are the ones that deserve credit.

Dr. Dunn, our director, is planning monthly meetings of the members of the A.R.R.L. in this division to be in New York City. One will have been held before this gets off the press, and you will hear about it in the next report. All members should try to attend. There will be traffic meetings, talks, lectures, and everything else of interest to true amateurs. Let's Go!

Mr. Peacox, Supt. Dist. No. 2, N. Y. has all his ORS keep a log of transmission, and originate a few messages every month. We wish there were more officials like him.

Let's have EVERY report in next month, and every month thereafter. If everyone pulls together, we can do it.

NEW YORK CITY—2BBX handled most traffic, and in addition, has been QSO many parts of Europe very often using an indoor counterpoise. 2CYX handled a good bit and worked Europe on 20 meters. FB. 2BEE worked Turkey, Bulgaria, and Roumania, and G2NM, when the latter was using fone. 2AMJ has been recommended for an ORS. 2APJ is using a "fiver" with raw A. C. plate supply.

2WC has one of the best notes in this section. 2CTY is still working plenty. 2ABR was away at camp. 2CHY has been ill for a month. He kept the amateur column in the Telegram going just the same. 2PF has been heard in several European countries on low power. FB, DAVE! 2UD, is going again with his "250." 2CLA is too busy with Division affairs to be on the air. Where are all the Brooklyn stations?

2CHK, City Manager, Manhatten, moved and is not yet settled. 2TT just got back from vacation.

2HJ is the new call of City College Radio Club, ex-2XNA. He will be on the air on 40 meters with a "fifty" and a Hertz antenna before this gets off the press. 2AUY is having his troubles with his "fifty" on 40 meters. Hope to see some traffic, OMs. Go to it.

2BSL just got home from a vacation. He expects to be on 20 meters soon. 2AEP, a new ORS, is handling the most traffic in Queens. He is rebuilding his 100 watter. 2AVE operates on schedule on 80 meters, week days, 7-8 am and 6-7 pm. 2AQS of Rockaway Park, is stepping into traffic handling.

Radio Club, is doing good work with a ten watter.

Traffic: 2AMJ, 15; 2APJ, 5; 2BBX, 92; 2BEE, 58; 2CYX, 82; 2WC, 25; 2CTY, 19; 2ADC, 12; 2BRB, 8; 2AQD, 7; 2PF, 5; 2AEP, 7; 2AVE, 2; 2AQS, 6; 2AHZ, 4; 2ACZ, 1; 2AFV, 32; 2AKK, 3; 2APT, 110; 2CEP, 7; 2CIS, 2.

NEW JERSEY-ADM-2WR-2WR, besides being on the air, is building new transmitters for 50 and 250 watts adaptable to all waves. 2CMK is keeping 2WR on the air with a clean fist. 2ARB is active on forty meters, trying all sorts of aerials. 2BLM has returned from a vacation. 2ADF and 2CGS are not very active. 2FC is contemplating S tubes for his new rectifier. 2BUY worked a good variety of stations. 2AFQ can now be heard nightly handling traffic. 2AHK attended the Citizen's Military Camp at Camp Vail, N. J. 2LZ forwarded a complete report of all active Newark hams. 2JC, the station of the Bloomfield Radio Club, is now fully in operation. 2BAW, is changing his QRA to West Englewood where he will operate on 80 meters. 2CRP is still using 5 watts power. 2CDR is gradually commercializing the ham transmitter. 2QS is experimenting with the new UX210 transmitting tubes. 2CQZ and 2ACV maintained a schedule with a Boy Scout Camp which resulted in a very large traffic total for those stations. 2ADU has erected an 80 foot mast. 2CXE is leaving for Lehigh University and will have to forfeit his ORS appointment.

Traffic: 2WR, 12; 2AUH, 9; 2CPD, 25; 2BZJ, 12; 2BGI, 12; 2BUY, 14; 2AQC, 12; 2JC, 4; 2BAW, 20; 2KA, 2; 2KS, 19; 2LZ, 6; 2ALI, 30; 2AOC, 12; 2BNT, 8; 2AHK, 42; 2AFG, 9; 2ZB, 54; 2CDR, 12; 2QS, 9; 2ACO, 10; 2CRW, 7; 2ACV, 164; 2CQZ, 116; 2AT, 30; 2ADU, 4.

MIDWEST DIVISION

P. H. Quinby, Mgr.

TO save time and increase the efficiency of the Division, we request stations desiring ORS appointment to ask their City Manager or Dist. Supt., for application blanks. Before making application ask yourself these questions. Do you keep your station on the air regularly enough to make such an appointment worth while? Do you follow ARRL operating rules regarding CQing, calling, and signing? Have you been reporting regularly so that your DS and ADM are informed of your activity? If you answer these questions in the affirmative then fill out your application and forward it to your CM or DS. DO NOT FORWARD IT DIRECTLY TO HARTFORD, as this will lose a lot of time, since it must then be mailed back to your Division Manager, who will not approve your appointment until he has had a favorable report from the DS and ADM. If you want speed, mail it directly to your CM or DS.

Applicants for OBS appointments should follow the same procedure. In addition they should include the following information with their application: — 1. What wave bands can you use? 2. On what particular waves in these bands do you prefer to operate? 3. What days in the week can you operate at the following hours: 12:30 PM, 7:00 PM, 10:30 PM? Do not ask for hours other than these three. (See Oct. *QST* p. III of TD.

Now that traffic is picking up again, why not get those schedules arranged on the "five point" system, and join the Brasspounders' League. When your message total is high enough be sure to send your message file direct to your Division Manager for checking. This puts you in the running for the trophy. Let's give that traffic trophy a berth in the Ole Midwest where it belongs.—D.M.

MISSOURI — The axe is sharpened for those ORS who have persistently neglected reporting. It will be necessary for them to report two months in succession before a new application can be entertained.

Dist. No. 1: The D.S. just returned from his western trip and found no reports from ORS. Some may have reported to 9ZK before he arrived, but nothing has yet come through from 9ZK. The following ORS have been cancelled for failure to report. 9ASX, 9DOE, 9DXN reports being on but no traffic. 9BEQ is also back again. He went west with 9DXN. 9BMM reports good work on 80 meters. 9BEQ has transmitters on 40, 80 and 150 meters.

Dist. No. 2: 9RT reports that he and 9DKG are the only active stations in Columbia. 9CUA sent his report to the RFD address of the DS and it is stuck there, as the roads are too muddy to get through to Warrensburg. 9DIX has moved to Kirksville and is working a 40 meter set. Some traffic has been handled already. 9AYK and 9BUE are still active.

9CYK gets out well on 40 meters. 9BVK reports that 9DAD returned from St. Louis. 9BVK returned from Colorado with a flat one. (Pocketbook — not tire). 9ARA is at school in Warrensburg. 9DVF is batting out traffic with "A" tubes. 9DNJ is a phone station. 9DAE has a noon schedule with 9DNJ. 9CHE reports that the convention was responsible for his low traffic total. 9AOB is a persistent pounder of brass. He keeps schedules with 9BFG. 9OUU sold out to 9AJW. Has moved from Joplin to Carthage. 9CRM is still chasing the almightly dollar. 9CVN of Kansas City and Arlin of KDKA were visitors at 9AOB recently.

Dist. No. 3: 9DWK is now an OBS with 100 watts on 200 meters flat.

Dist. No. 4: 9TJ got his ORS at last. He has been in contact with two Alaska stations. FB.

9AXD and 9CS claim to have fully recovered from the convention at Chicago. 9CS opened for the fall at 1 AM September 20th. 9AXD has been having trouble getting his set to perk below 80 meters. 9BCD reports business slack on the camp grounds. 9CWG and 9DJA are busy with school. 9DAU operates at KTNT and expects to be on with 50 watts soon. 9AXQ desires schedules.

Dist. No. 1: 9DEX is the high traffic man. He should have forwarded his 113 messages to "HQ" for the Brass Pounders' League. 9BKV has several schedules arranged for fall traffic. He is working on 78, 42 and 165 meters.

9DZC has been trying to improve his note. He has several schedules with northern stations. 9AED promises to be on more this fall. 9EKX is a new ORS. 9BEW's operators have been away on a vacation. He has arranged schedules with Iowa stns. 9DMS is back on the air on 50 meters, with an entire new set. 9ADMS will be chief operator at KOIL beginning next week. 9UQ is open and handled 80 messages last month. Interesting test work is planned.

Traffic: 9DEX, 113; 9CZC, 12; 9BKV, 23; 9AED, 5; 9BCX, 53; 9HK, 22; 9DOA, 10; 9DAU, 1; 9AXD, 11; 9UQ, 5.

9AZL and 9DAD are combining stations and arranging schedules. 9ELT got his 40 meter stuff working at the last minute before report time and worked Australia with one "fiver." 9DRD also worked across, getting QSO a2BB and z1AO, using a "fiver" with only 600 volts on the plate. 9ADR applied for an OBS appointment. 9AHZ, 9ST, 9AYL, 9BDZ and several other ORS are going away to college. 9ACX, 9FM, 9RR, 9BKO and 9DOJ failed to originate any traffic as they were too busy to get on the air much.

KANSAS ADM 9CCS. The season is opening with most of the stations on 40 meters. 9AEY is working Mexico and New Zealand, using all the wave bands from 20 to 200 meters. 9CCV is on 80 meters with a 50 watt tube. 9ACQ has moved again, but has the new antenna system working. 9DNG is getting out well to several foreign countries. 9CPY painted his station blue and white with lace curtains to match. It's some classy layout. 9BRD returned from Colorado too late to do much this month. 9CCS continues to receive lots of "Aussie" cards.

Traffic: 9BXG, 43; 9CVL, 20; 9CFI, 5; 9AOD, 5; 9EHT, 8; 9DNG, 15; 9AEY, 9; 9CPY, 2; 9CCS, 8.

NEBRASKA, ADM 9CJT. Dist. No. 1: 9BFG is the most active station in this district. He is trying to arrange schedules on the five point system so traffic moving will be more certain. 9DUO is rebuilding his the convention. 9BYG is busy working on his new transmitter, using the power transformer he won at station. He and old 9HT are putting in a real "superpower" station.

Dist. No. 2: The traffic total at 9DI was cut down some due to blowing the power transformer. 9CGQ is at Lincoln, but expects to get home week-ends to do some operating. 9BXT is also at school. 9EAK has been on 40 and 80 meters this month. He has very good results on 40 meters in daylight and dark. Cards were received from France, Chile and Mexico

this month. 9DJP is on again with a "fiver." 9BDU has turned his filter and power supply over to 9DAC. 9DAC handled most of the east messages for the fair station. He worked z1AX, 4AG and a Samoa station.

Traffic: 9AWS, 5; 9DUO, 3; 9BFG, 4; 9DI, 7; 9BOQ, 1; 9PN, 6; 9CGQ, 3; 9EAK, 21; 9DJP, 5; 9DAC, 74; 9AKS, 88.

NEW ENGLAND DIVISION

I. Vermilya, Mgr.

SIX "Prize test messages" were started by ADM Cushing from c1BO. Four tracers were returned. Things are improving by leaps and bounds. The four messages traced all made good time. Message Nr. 61 was the prize winner. It was started August 20 and traveled c1BO-1AKZ-1AAE-1ARE. The names of each of these four traffic- handlers was placed in the hat and 1AKZ came out the winner of the prize. A UV201A and socket have been sent him. The American Radio Relay League wants to thank the people who have donated prizes. The Springfield Radio Company are giving a prize each month for six months; the J. M. Bess Co., the Alden Manufacturing Co., the F. W. Sickles Co., and the Wetmore Savage Electrical Co., all of Springfield, have contributed.

WESTERN MASSACHUSETTS, ADM 1AWW—Dist. No. 3. 1BFE will be away at school this fall. 1AMZ worked the fourth and ninth district, using one UV-201A. From now on 1AMZ may be the only "regular" in North Adams. 1AMS, who first discovered that Kenetrons were "minus" grids, returned from the service to find that his faithful 50 watter was minus a filament. He is back on the air with another, which cost him $30.00. Kletchka, 1XU, is on frequently and if any station desires a schedule just look for him on 20 meters, or even five meters. He "raises" any country on request. 1AZD is in line now to give our best men a run. 1ANE sat in at a ham key the other day for the first time in eight years. His recollection of DX was the momentous occasion when Massachusetts worked Minnesota "A la spark."

1ARH has slipped back to an A. C. supply. He won ADM Cushing's first monthly prize. Congratulations. 1CEE is revamping his entire transmitter. Rumor has it that Et. Atkinson will be a guiding factor among the Reservist radio men here this winter. 1OM has twin 50's in the sockets. He has two first-class transmitters. 1GT came back from Devens this year highly enthusiastic over camp benefits. He already has his application in for further military training next year.

PITTSFIELD—1AAE, like other Pittsfield ORS, has in operation a transmitter and receiver patterned after the style of our "Star" station 1ARE. Minor differences in the mechanical arrangement exist. 1VC is handling the early fall rush for BCL service which he hands out ably in the capacity of expert for a local firm. He finds some time to be on the air, though. 1CLN is building a wavemeter that will split waves up into matchwood before taking their height and waist measure. During the last month Everest took most all of WNP's traffic and he handled his share of the return messages. More than 5,000 words of press were handled through this station during the month. He has worked the expedition 80 times since they got inside the Arctic Circle. How he finds time for work and sleep, too, we cannot guess.

Dist. No. 4: 1AEP worked WNP and WAP several times and on one occasion took more than 600 words of press. Great work, OM. (Please report to the CM each month). 1AAC worked a3EF, s2BB, s2DS, s2YI, s2AC, bz2SP and bz1AB this month. 1BVR reports that messages are beginning to roll in. He has a new receiver which is working prettily. 1BIZ-1SZ heard t-1RT twice recently. 1AWW has no trouble in working across. He handled a message for Handy from Reinartz that came by way of London (g2SZ) all in about an hour. 1BX enjoyed a vacation at Weekapaug Inn, Weekapaug, R. I. He has visited 1AAP and obtained some ideas to try out at his own station. 1CTT took an operating job. 1PY keeps a schedule with c1BO as well as French and British hams. 1ABF is silent. What's the matter, OM? Traffic is picking up and seems to be moving faster.

Dist. No. 6: ADM Cushing visited this district, stopping with 1BOM, who exhibited some UV 204's very proudly. After working with the set for hours and hours trying to get it to perk, a little old 50-watter was resurrected and she went. 1AOF has been called to Florida, due to illness in the family, but has a nice chance to do some good DX this fall with his 204-A.

Dist. No. 7: 1AKZ holds up his end as usual in the traffic game. D.S. Green visited his station. 1AJK and 1AJM are doing a lot of traffic work and deserve much credit. 1DB was heard in Italy. To celebrate, he bought a new home. 1ASU is rebuilding the station destroyed by lightning. 1JE has a new 50-watter. 1ASU enjoyed a nice vacation with a new automobile, and reports that he hates to go back to work. Lots of us feel that way on getting back, OM.

Traffic: 1AAC, 4; 1BVR, 12; 1AAE.29; 1BIZ, 9; 1SZ, 9; 1ARE, 41; 1CLN, 2; 1PY, 23; 1CRZ, 2; 1AWW, 13; 1VU, 28; 1APL, 99; 1BLU, 14; 1AAL, 2; 1AKZ, 15; 1ASU, 3.

CONNECTICUT, ADM 1BM — With coming cool weather and perfect radio conditions, your ADM sincerely hopes for greater activity and a more active organization of traffic men. In one of our districts the local radio club is offering a prize for the highest message total covering a period of three months to encourage relay work. Let's get busy and put the old Nutmeg State in the front ranks. We are losing a few good men who are going away to college. We wish them the best of success.

1MY has been in touch with WNP again. During the summer had a fifty watter going at his shore cottage. 1BHM, 1CTI and 1APC, our vacation men, sent their reports in and hope to get back on the job soon.

1IV, 1ZL, 1AH and 1AOS, all first rate relay men, are leaving for various colleges. We have a notion certain college radio sets are going to be overworked once in a while.

1CKP handled 19 messages last month. This month four times as many. FB! 1AOX, our latest ORS, is handling traffic on schedule and is right on the job. 1ANE, 1BFI and 1BGC are anxious for more relay work and are on the lookout for it. 1AYT, the Waterbury City Manager, reports hearing WAP and NRRL. He worked NVE and Mexico. 1AVX says the Jr. Op. causes him so much concern he is unable to carry on reliable communication. 1QV has been visiting in Montreal. The Canadian boys gave him the time of his life. He says they have the real ARRL spirit of friendship. FB! 1AXN, the Stamford CM, reports some special activities. He has been sweating over a 250 watter that doesn't seem to want to behave.

Traffic: 1MY, 62; 1GC, 7; 1AH, 9; 1BFI, 1; 1AYT, 4; 1ADW, 77; 1ACX, 21; 1ANE, 27; 1AOS, 6; 1XG, 96; 1AVX, 8; 1IV, 35; 1ZI, 2; 1HJ, 28; 1AJO, 7; 1BLF, 16; 1AXN, 19; 1QV, 9; 1CKP, 69.

RHODE ISLAND, ADM 1BVB—1DP and 1AHE in Pawtucket are rebuilding and will be on the air soon. 1AID is getting all set for the winter traffic. 1II is rebuilding. 1WE is a new ORS and a live wire. 1BCC recently got burned by some hot oil but can handle a key nicely now. We expect a lot of action from him this season. 1BES and 1GV are out of the game for a short while.

Traffic: 1AID, 20; 1II, 4; 1WE, 3.

NEWPORT—1AOA will be on the air soon and 1BQD is re-opening his station. He is awaiting the arrival of some "fivers" and then we will hear 1BQD as of old. Welcome back Old Timer.

WESTERLY—1AAP lost his "fivers" and was off for quite a spell. He is back again with his station entirely rebuilt. He should kick up quite a fuss this winter. 1BVB spent his vacation with 2OM and had a great time. 2UD, 2PF, 2SQ, 2OM and 1BVB stood on the corner of Broadway and 51st Street one morning at 12.45, blocked traffic, and kicked up quite a little noise for an hour hashing over "radio things." When visiting New York look up 2SQ at Grebe's plant and get him to take you to the National Winter Garden as did 2OM, 2CNT and 1BVB.

Traffic: 1AAP, 2; 1BVB, 21.

MAINE, ADM 1EF—This month has witnessed an increase in activities. With the opening of schools many of the hams are dusting off their sets and checking their wavemeters before starting work.

About the best piece of work this month was done by 1ATV's transmitter in the Radio Shop's booth at the Somerset Central Agricultural Society's Fair at Skowhegan, Maine. Schedules were arranged with several stations to handle the traffic. 1ATV's transmitter is a replica of the one used by 1AWW at the Springfield Show. Unfortunately the battery supply gave out, so a M. G. set was used with a result that

can well be imagined. Then a UV201A with "B" plate supply was used on forty meters. This set worked fine with no QRM and traffic was handled with ease. 1500 miles at 2.20 pm. on 40 meters was the best DX worked. 1APM requests cancellation of his ORS certificate. 1ACO is adjusting his new transmitter, so hold down your cans. 1AUC is installing a fifty watter and with 1BDB manages to keep Bar Harbor on the active list. 1PD has returned from Conn. and has his transmitter ready for business. 1VF sends in a report after a summer of farming. 1EF has been appointed City Correspondent for Ellsworth and has clicked again with WN-AP. 1HB is attending the U. of M. and hopes to be able to move his apparatus there. The Queen City Radio Club sent a delegation to the Convention at Poultney and a GOOD TIME WAS HAD BY ALL.

Traffic: 1ACO, 1; 1AUC 3; 1BDB, 6; 1EF, 16; 1KL, 3; 1PD, 2; 1VF, 9; 1ATV, 14.

NEW HAMPSHIRE. ADM 1GL—1BFT has returned to Concord and has two transmitters in operation on 40, 75 and 150 meters.

1AVL is now using 100 watts on 40 meters.

The ADM wishes to call the attention of all ORS to the fact their report must reach him not later than the 15th of each month and that from now on there will be a gradual weeding out of those stations that do not come up to the mark. The Fall season is on and he expects each station to be on the job. He also wants a few more good reliable ORS. Let's all pull together for the biggest and best season this state has ever seen.

Traffic: 1AVL, 10; 1BFT, 25.

VERMONT, ADM 1AJG—It is with regret that we note of the passing of our ADM, Bill Hall, 1ARY, 1BHC. Under his administration things in Vermont surely thrived. The new ADM, 1AJG, Charles T. Kerr, Poultney, Vt., earnestly asks the co-operation accorded Bill and promises to do his best for the old State. The main doings in the State last month included the State Convention, sponsored by the Poultney Executive Radio Council.

Dist. No. 1. George Cruickshank, 1BDX, is D.S. Will the stations active but not ORS's please report to 1BDX, as more ORS's needed. George is back on the air after an absence due to outside power work. 1YD and 1ARY will please send news to 1BDX, as their reports are due to him. Montpelier hams 1BEB and 1BBJ very active and at the next report will be ORS's. FB, OM!

Dist. No. 2: Ralph Colvin, 1AC, Poultney, is the new DS. All ORS and active non-ORS are asked to send reports to him. 1CQM is at school. He had a spree on 40 meters before he left. 1LA leaves for Florida soon. Listen for him at 4UP. 1APU has dropped to 40 meters. 1FN is off on account of business. 1AC, also on 40 meters, has increased his power to a "fifty." 1AJG worked WNP. He says the old set is "itching to go" this winter. 1HA will be an ORS soon. The ORS's in this district that don't report will be losing their certificates soon. Come on, OMs, stand back of your state.

Traffic: 1BEB, 4; 1CQM, 1; 1AC, 8; 1AJG, 24.

EASTERN MASSACHUSETTS — 1LM has been changing his transmitter. 1NV hasn't been on at all this month. 1CTO has been working on a boat all summer. He is now studying and hopes to have a commercial license before long and go to sea this winter as an operator. 1BZQ is very busy day and night and has little time for radio. 1ZW managed to work across five times in one month. 1CJR is home from camp. He is working on the City of Bangor until school opens. 1CIT has been abroad all summer. He will be on the air soon and ready for traffic. 1AFS will be off until next summer, but his other station, 1OV, will be on at Christmas time.

Dist. No. 2. 1BUO has the largest traffic total this month. He handled 156 messages but will not be on the air much now, as he is going to college. He hopes to push the key at 1XAW. 1BVL is planning to use the five point system. He works his antenna on third harmonic and uses a 40 meter wavelength. 1GQ has changed his location. He has worked New Zealand and Australia in one night. He is using 20, 40 and 80 meters and would like to have schedules with stations on 20 meters. Drop him a line, OM! 1AXA has a new 203A bottle. He worked a2IW the first thing. During his vacation he went to the second district to visit some of the Hams. He says the second District treat visitors royally. 1SE and 1CC are off the air rebuilding. 1AHL worked d7EC, SMZS, and others galore. 1ADM is going back to college and doesn't expect to be on much. 1ACI thru his plate transformer and if off the air for a few weeks.

1AHL, 1CC and 1SE presented 1UW with an ornate brass medal for the best "DX" in the city. It is inscribed on front "Trans-Pacific Ether Buster" and on the back, "A Brass Medal for a Brass Pounder." 1UW goes on the road soon. He works them all but China.

Traffic: 1AEO, 11; 1BZQ, 19; 1CEA, 1; 1ABM, 3; 1AHL, 10; 1AIR, 4; 1AXA, 22.

NORTHWESTERN DIVISION

Everett Kick, Mgr.

MANY stations are pushing their signals to places just dreamed of before. Message totals are on the rise and to boost them more everyone is asked to originate some good messaged from his friends. The 10th of each month is at present the closing report day for your monthly reports.

WASHINGTON: Winter work is again with us. Many sets have been rebuilt during the summer and 40 meters is proving most popular. The Seattle gang are completely sold on 50 watters, and most every station in the city boasts of owning one. Seattle promises to be very much alive this winter. FB! The Seattle CM (recently married is moving but we will hear him as soon as he gets reorganized at the new QRA. John Huntley of Spokene, 7AF, is the new D. S. appointed for Dist. No. 1 of the counties mentioned in last month's report. In Dist. No. 3 7WQ handled the bulk of the traffic. 7AIF is planning to go to sea as soon as he can get a billet. 7DC is moving to 630 Concord St., Bremerton. 7AFO has finished a new rectifier. 7IJ copied M2LB and several "r" stations on 38 meters. Clause Butler of 7GB has gone to WSC at Pullman. We shall miss his fist this winter but 7GB will be on the air as usual in charge of Francis Todd. 7AFN has just returned from Alaska and is pounding brass at home under call 7ZM. 7DF has a "50" working on 38 and 75 meters. 7AO and 7RL are going to WSC this winter. 7GE-ZX at Pasco is back with a 39 meter Hertz antenna and great expectations. Our DM is back for the winter with his initials for a new call. He signs 7EK hereafter instead of 7ABB.

OREGON: There was no report from ADM this month. A new ADM will be appointed soon. 7EO was appointed D. S. for Dist. No. 3 and will be on the air thruout the winter. 7PP handled an extra dose of messages during the Convention in BC. He made a trip there recently. 7ALD is on 40 meters. 7AJB will be home from San Francisco pounding his key when this is in print. 7EC is reconstructing his set for 40 meters operation. 7AIX is busy with school.

IDAHO: Activity is picking up a little here but not enough yet. If you don't report by the tenth of the month don't kick if you fail to see your call in print. 7ZN and 7UI have a set going at the U. of I. 7OL is now in Arizona. 7SI has gone to school at Salt Lake. Her call there is 6BNV so watch out fellows. 7OB will be going before Xmas. He is now operating 7YA who is doing good daylight work and working N. Z. and Australia when on nights. 7JF is the star station. He is a new ORS and will be quite active this winter. He has 7CC-ZM of old spark fame as second "op." 7CJ in Summit has started up. He uses a 50 watter on the 40 and 80 meter band. 7IU was also active this month. He and 7JF clear traffic between the U. of I. and Idaho Tech. on schedule. FB OMS!

MONTANA: Summer is gone and real Ham spirit and activity holds forth. 7DD's two fifties went west. Of course he likes the west but doesn't want his tubes to go there. He is using a "fiver" now. 7NT is at Ransey, Mont., about seven miles west of Butte. 7ACI says he will not be on much this winter. Frankly, we don't believe it. 7MX is building an 80 meter outfit to go with his 40 meter rig. He and 7GS helped move 7NT to his new QRA. 7GS is enthusiastic about Fall DZ. 7TD is back in town and getting his 80 meter transmitter going. 7ZJ and 7MG are reconstructing their sets. Welcome back OM's. 7KZ is attending the University at Missoula and installing a transmitter at South Hall.

ALASKA: The new Ass't Div. Mgr. is all enthused in making that territory alive. He plans on making it so hot that the ice can't free this winter. He is

none other than Leo H. Machin, 7DE, Cordova. Give him your help OMS! Mail moves slowly so use radio whenever possible. 7KM and 7KX have returned to the states. 7KM is also 8XB. 7KX is a portable station from Eugene Ore. 7KN's mast blew down but he is rebuilding and will be back soon with a 50 watter. His "fiver" was heard in Australia. 7LT was inactive this summer. 7MN now operates on WWDO. He has a "fiver" on 40 meters while in Alaskan waters. NPA will be on soon with a 250 watter and wants to test with amateurs using a 35 meter wavelength. 7DE is doing good work with a "50" on 30 meters. He works "Aussies" and "Zedders" every night. 7DE will be glad to listen and make reports to any stations that wish to test on 20, 40, or 80 meter bands.

Traffic:—7OY, 53; 7AO, 37; 7UQ, 14; 7WQ, 13; 7DM, 12; 7GB, 8; 7BF, 7; 7ABF, 5; 7RL, 5; 7IJ, 5; 7DC, 4; 7OT, 2; 7AHA, 1; 7PP, 10; 7EO, 3; 7JF, 75; 7SI, 30; 7GW, 13; 7IU, 2; 7DD, 8; 7NT, 5; 7EV-PU, 3.

PACIFIC DIVISION

M. E. McCreery, Mgr. Southern Association

SOUTHERN CALIFORNIA ADM 6 CTO: The Southern Section of the Pacific Division is adjusting itself rapidly to the changes authorized by the League's Executive Committee, for the Pacific Division. Interest is gradually increasing and a great deal of time is being spent getting ready for the Pacific Division Convention which occurs at Santa Ana, October 2, 3, and 4th. A large turnout to the Convention is expected and a wonderful time is planned for all those present.

Regarding the Vigilance committees there seems to be little or no need for them in Southern California, perhaps due to the fact that for many years Southern California has governed itself with regard to the radio laws of the country and the feelings of the public.

Next month we expect that Arizona will be on deck again. The Section Manager expects great things from this territory during the next year. Next month, the Section Manager is going to alter the writeup that appears in this section of *QST*. It will have a distinctive form and give the facts of what has happened as far as results are concerned in the Southern Section of the Pacific Division at a glance. This little space in *QST* belongs to you, fellows, and it is up to you to make it what you want it to be so for the "Love of Mike" be sure and get all the information possible in to your CM, DS, or ASM. Let's go, gang! Make this year the biggest year that Southern California has ever had.

Vacations are over, bringing increased activity in traffic and DX work, both traffic totals and miles-per-watt show a great improvement. Interest in the Division Convention promises a good time for all; The Orange County Convention committees are working overtime to plan as much pep as possible for three short days. English hams are beginning to be heard in Southern California; get ready for an all-round-the-world relay this winter, gang!

Dist. No. 1. 6ALK managed to handle some traffic with ch1EG and pi1HR. He blew his "50" and is using a UV203A while waiting for a "250" 6HU has been doing good work with Argentina and New Zealand as well as handling messages. 6CNK has a new 50 watt set for the winter. 6OP is the chief technician of the family and built it.

Dist. No. 2. Everyone is waiting for snappy winter weather. 6GV reported static bad in Arizona. In Los Angeles, 6VC took the traffic lead again. What do you think of that, 6AFG? 6BBV missed his power leak for a few days and worked out wonderfully well. 6OF is leaving for Riverside soon. 6CAH broke in his new 50 watt set by working WAP. 6BGV works plenty of "Aussies" using a 7½ watter. 6CSW elevated his aerial above the level of the house. 6BJX has gone to the mountains taking with him his portable set. 6CVE, which is a reliable means of communication although the power is only 90 volts of "B" battery. 6CTO has a new "50" and a "sync." 6RN will be back at Pasadena soon; welcome old timer. 6BBQ and 6CMQ hold the lead for being consistent stations. Whittier "ops" spent most of the month out of town. 6CHZ and 6BUR attended the national convention. 6BUR got back in time to work WAP. 6BUW has left for a long fishing and hunting trip. 6CIX spent the summer landscape gardening (pulling weeds. Hi!) 6CQA has a 50 watt transmitter for the winter. 6CDY installed 6CPX at the County Fair in Oxnard. 6CGW rebuilt for the fifteenth time. 6AJI received verification from f8TOK and g5XY of his communication with f8TOK using 18 watts on a "fiver."—FB.

Dist. No. 3. Reorganization is in progress here and activity slight. 6AKZ worked NERK-1, the Shenandoah, shortly before the disaster. Mr. and Mrs. 6JJ are the proud parents of two future "YL" ops! Congrats! The County Fair at Tulare will find 6ASV and his bunch ready to QSR messages on 80 meters—. In Reedly, 6CDG and 6CWF have been quasiactive; Burk is in San Francisco while Mr. Hall is getting the transmitter ready for the winter. 6CWF is now News Manager for Southern California.

Traffic: 6CHS, 55; 6HU, 22; 6ZH, 20; 6BAS, 6; 6SB, 4; 6AKZ, 2; 6ASV, 6; 6VC, 109; 6AE, 14; 6BQR, 2; 6BGC, 3; 6CSW, 55; 6BGV, 20; 6CAH, 14; 6IH, 63; 6CTO, 41; 6BBV, 25; 6BJX, 42; 6CGW, 44; 6CGK, 2; 6CAE, 2; 6CIX, 7; 6BUR, 53; 6CSS, 13; 6AGK, 20; 6BJD, 5; 6BBQ, 88; 6BLS, 47; 6CMQ, 42; 6DAH, 78.

P. W. Dann, Mgr., Northern Section

It is gratifying to note that all districts have turned in a report. I want to compliment the gang and I hope that next month's report will be still larger, especially relative to Traffic work. Your SM is now spending a week or so among the fellows in Nevada. Next month the Nevada bunch will have had something started in the way of A.R.R.L. activities, as Newcomb of Yerrington, Nevada, is a pinch hitter, and has had experience in Telegraph work. The new D.S., Tom Boland, is also a "go getter," and things will get under way rapidly under their supervision. For the benefit of all stations who may wish to report their work I am listing the Section personnel. Please report to your local officer every month.

Manager, Northern Section—Pacific Division—P. W. Dann, 562 35th St., Oakland. A.S.M (4) F. J. Quement, 51 Pleasant St., San Jose. A.S.M. (5) W. S. Upson, 9220 E. St., Oakland, Calif. A.S.M. (6) St. Clair Adams, Eureka, Calif. A.S.M. (7) Nevada—C. B. Newcomb, Yerrington, Nev. D.S. No. 7, Nevada—T. J. Boland, 721 Lander St., Reno, Nev. D.S. No. Sect. 4, W. J. Wymar, Turlock, Calif. D.S. Dist. No. 2, Sect. 4, J. J. Coats, Santa Cruz, Calif. Club secretaries are requested to send in the news for *QST*. Dist. No. 4 was heard consistently in Chile with an audibility of R-6. 6ALW and 6BON are rebuilding their set for winter. 6UW is at school but operates Friday and Saturday nights. 6AMM was logged by BW3 and secured eight Rag Chewers' Club Members. 6BMW worked "a," "z" and "j," as well as NUMM. 6BCL keeps a schedule with c9CK. pi1HR has been worked. 6AME and 6ZAU are at school. 6CFI worked a2TM and KFUH during the month. 6BLT is working in the Power House. 6CLP's MIGHTY "FIVER" is still working the "Aussies." 6CJD will operate portable station 6CVR for the winter. 6AOI is getting out as usual. 6CCY took some traffic from Australia and Samoa this month. 6ADB handled split honors with 6CLP for having a high message total this month. Dist. No. 5. 6KV is back using two "fivers." He is doing fine work and operating at KPO. He is building a 50 watt League Station. 6WP dismantled his station to use at the Radio Show. He will be on again soon. 6BIP worked NZ,, using seventh Harmonic antenna excitation. 6DG is ready for traffic again. 6JP is using a 50 watter. 6CQV is a new one. 6BQL has a set working but no time to spare. 6LX has a new Nash car. 6AWW is on Saturdays only. 6AC-6CW has been combined and lots of tubes and wavelengths are available. 6AVH is busy at KGO. 6BNU is at College. 6AJF married a girl by the name of Jones. Jones versus Jones. Congratulations from the gang, Jones. 6ANW is on 80 meters. The Richmond bunch handled their share of the Exposition Traffic. 6EW-6BCU have combined stations. 6AOA borrowed a tube and expects to have a big total next month. 6CTX is rebuilding everything.

Dist. No. 6. The SM has been very ill this month. 6SA is on the air again with ten watts on 180 meters. We have a Station at Smith River, Calif., operated by 6AUM and our old friend 6ACT. Give these boys north-bound traffic. They sure get out. Adams has written several fellows but don't get many answers.

NEVADA: 6UO is remodelling his Service Station. He had to rip out the transmitting equipment, but is now back on the air again. He and 6AJR in Reno

keep schedules. We have a Station in Elko operated by another Old Timer with twenty-five years' experience as an operator. Nevada is picking all the thoroughbreds. FB fellows. There was a meeting of the Manager, the A.S.M. the D.S., and the gang in Reno Sept. 21, 1925. More dope on Nevada will be given next month.

Quement, by the way, says that if a few of his gang don't "come to" there will be cancellations. The Manager doesn't like to forward cancellations and neither does your A.S.M., so help us both to bring the Northern Section up to 100%. Thanks for the reports fellows.

Traffic: 6DQ, 3; 6AWW, 10; 6VK, 23; 6JP, 11; 6AC, 8; 6CVO, 82; 6CW, 18; 6BQL, 6; 6ALV, 16; 6LX, 2; 6WP, 20; 6CJD, 3; 6AOI, 7; 6CCY, 4; 6VLT, 8; 6ADB, 21; 6CLP, 21; 6NX, 2; 6BON, 4; 6AMM, 9; 6BMW, 17; 6ALW, 3; 6BCL, 19; 6CFI, 6; 6UO, 5.

K. A. Catin, Mgr., Hawaiian Section

A reliable relay route has been established to the mainland and considerable traffic was handled during the past month.

The Radio Club of Hawaii (6BUC) created considerable interest at the Territorial Fair. A number of messages were accepted from the visitors from different parts of the globe. 8EG of Michigan accepted a number of messages from 6BUC direct and it was FB the way he asked for more. 6BUC is anxious to accept traffic for Hawaii.

6AFF works the Pacific Coast and is always ready for traffic. He worked NRRL, c5HP, urBA1, pi1HR, z1AX, z2XA and a2BC.

6AJL of Lihue, Kauai, is back on the air with a 50 watter. He wants a schedule with stations in Portland, Ore. He worked j1AA and mainland stations and is ready for traffic.

6CST did not spend much time on the air during the past month, but he sent in his report saying that he would make up for lost time.

Business continues to keep 6ASR and 6OA off the air.

6TQ is in contact with mainland stations and getting out in fair shape.

FX1, Fort Shafter, Honolulu, worked MacMillan on 40 meters. A message from the Governor of Hawaii was sent and an answer received from MacMillan. FXI uses a 250 watter and 6DCF usually pounds the key.

KFUH on 40 meters continues to pound in from the South Sea.

NRRL was heard on the return trip to Honolulu but seldom worked by local stations.

A reunion was held when mainland 6OK, 6OI and 6TS met at the Radio Club of Hawaii.

Traffic: 6AFF, 24; 6AJL, 11; 6BUC, 58; 6CST, 1; 6TQ, 7.

ROANOKE DIVISION
W. T. Gravely, Mgr.

NORTH CAROLINA, ADM 4JR—There are still a number of ORS owners who have failed to report. The warning that certificates will be cancelled for failure to report two months in succession is repeated, for those concerned. All indications are that this will be the biggest winter yet.

Dist No. 1: The D.S. is very busy and requests that everyone report voluntarily, as he will not have time to force you to report. (Take notice of the warning, fellows—ADM).

4LO is slightly active. 4AF has been doing some fine DX but is now back at State College.

Dist. No. 2: A MO-PA circuit is working well at 4NJ. 4GW is still off the air. 4TS is doing some good DX on forty meters. Forty meters is the mainstay at 4MI now, but 80 meters is used for schedules.

Dist. No. 3: 4JS does fine work with a new fifty watter. He left for school Sept. 16th. 4BX has gone to work but still finds time to pound brass a little. 4JR is on most any time of day and ready for traffic-handling.

Dist. No. 4: B. L. Hinnant, 4NT, Box 101, Wilson, N. C., has been appointed DS and wishes to hear from any active stations. 4MA-4NT has two sets going and expects to do good work this fall. 4RW is back on the air handling traffic.

Traffic: 4LO, 2; 4NJ, 6; 4TS, 11; 4MI, 21; 4JS, 22; 4BX, 38; 4JR, 39; 4MA-4NT, 15; 4RW, 10.

WEST VIRGINIA—J. L. Bock has resigned as ADM on account of business pressure. C. S. Hoffman, Jr., (8BSU-8AKZ) of Wheeling, has been appointed to succeed him. We appreciate the efforts of 8AUE and thank him for the work he did. 8BSU-8AKZ should receive the support of the hams in his state and we are sure that you will lend your assistance. Send your reports to him promptly to insure a full report.

8AMD sends in a lively report from Huntington, W. Va. 8ATC has been operating on 80 meters regularly, but has kept no record of messages handled. (Please keep a record OM and send in DM). 8CQH broke his third 250 watt tube in shipment. He has a fine station, though. (Most of us would have worse if we broke so many 250s., DM). 8CBR has a new lattice tower and aerial. 8DNJ is still at it but not getting anywhere. Maybe he has a "spark" set. 8DOJ has been away in August but knocks 'em all dead with one "fiver." 8AYP has quite a number of messages to report, but is unable to speak or even think about radio as he has typhoid fever.

VIRGINIA, ADM 3CA—Wohlford will appreciate a line from every active station in Virginia. (Please help him out. TM). 3AFX has just returned from a six weeks stay at Camp Trinkle. 3OL is not in operation. 3IN just returned from New York. 3RT has sold his apparatus. 3BNE has a "fifty" perking on 80 meters now. Due to business pressure his station is only in operation two or three nights a week from 8 pm to 5 am. He wants schedules with stations to handle traffic for the south. 3MK on 80 meters finds working conditions as good as could be expected. 3TI is still experimenting with very short waves. 3CKA bought a 50 watter but can't get it to perk. 3CJU sends in his report from Miami, Fla. He does not want his ORS busted. 3CKK is still tied up with business and not on much. 3AHL hasn't used his transmitter for some time. 3CEL worked 61 stations this month. FB, OM!

Dist. No. 2: 3BMN is busy rebuilding his station. Ex-3CKN is now 9BKH, using a "fiver."

Dist. No. 3: 3RGS has some trouble getting his power line going. He will get back with some kind of set shortly even if the power line does not develop. 3IW handled one message. One of the operators at this station got married and that ruined the whole works this month. 3BFE has been sick in bed, but we are glad to report that he is getting better now, and we hope to hear from him on the air before long.

Dist. No. 4: 3BZ is still hamming around and has been reported in New Zealand but unable to work them so far. He has hooked up with some of the European stations. 3CKL has logged NRRL but not yet worked him. 3CA is rebuilding and moving his station to new quarters. 3PDZ is rebuilding and will be on the air soon.

Traffic: 3MK, 6; 3TI, 4; 3CEL, 18; 3BZ, 2; 3CKL, 15; 3CA, 1; 9ABC, 4.

ROCKY MOUNTAIN DIVISION
N. R. Hood, Mgr.

COLORADO-ADM-9CAA: The Denver gang are preparing for the Radio Show to be held in October. They have a booth donated them by the show, and plenty of publicity can be expected. Next month we hope to have a good report from this source.

9CAA comes to the front with a good traffic total. He reports that he is seriously considering applying to the Post Office for appointment as a sub-station. All new Denver hams whose QRAs are not in the call book are having their mail sent him. 9WO has been experimenting with aerials. 9OO shot up his last "50" and dug out the old "250." 9BXQ stayed at Chicago after the convention, and didn't return in time to get any traffic thru. 9QL expects to be on 20 and 40 meters soon. 9EAM is building a new transmitter. 9DED reports as usual. 9DQG is now getting set for the winter season. The YL and her brother at 9BDF are on the air again on 40.

Traffic: 9CAW, 18; 9CAA, 88; 9OO, 22; 9QL, 6; 9WO, 29; 9EAM, 22; 9CDW, 7; 9ABC, 6; 9DED, 61; 9CJY, 5; 9DKM, 18; 9DQG, 1.

Dist. No. 1. 9DVL is doing good work on 80 and 40 meters, and has been heard on 20. 9AOI has been able to be on only at noon.

Traffic: 9DVL, 64; 9AOI, 5.

Dist. No. 2. The D. S. has resigned and a new D. S. will be appointed in the immediate future. 9CDE is on 40 and 80 meters now. 9EAE turned in an excellent report. 9CLD is back on the air again. He is getting out very well.

Traffic: 9CLD, 85; 9EAE, 62; 9CDE.22.

WYOMING—7HX is on the air and has noon schedules with many stations. A noon schedule is kept with 9CAA at Denver. 7LU at Greybull is back with a fifty watter and doing fine 40 meter work. 7ZO is on the air with raw AC on the plate but promises a better QSB as soon as the necessary parts can be built. 7AGL has left Casper and gone to School at Laramie where he hopes to operate a set soon.

Traffic: 7HX, 13; 7LU, 86.

UTAH, ADM 6ZT—Mr. Rulon Biddulph has resigned as Superintendent of Dist. No. 2. He has left the State and is working in Mexico.

Salt Lake City—6BTX is building a new receiver and overhauling his set preparatory to a busy season's work. He handled some traffic. 6BUH has completed a new antenna system and is doing excellent work in long distant reception. 6CRR has installed a motor generator set now and increased his power to ten watts. 6ZT recently visited San Francisco and Los Angeles, attending the radio show at the former city.

Some of the ORSs in this State are not reporting regularly. It is desired to bring to their attention the rules and regulations relative to forwarding traffic reports promptly for in case these reports are not received, the ADM will be forced to recommend cancellation of certificates. A circular letter is being written all stations about this.

Two or three new stations in northern Utah have been located.

The ADM reports the arrival of a son on August 5th. He is already taking code practice and we expect to have him standing a regular watch soon.

Traffic: 6BTX, 14; 6BUH, 5; 6CRR, 8.

SOUTHEASTERN DIVISION
H. L. Reid, Mgr.

FLORIDA—ADM 4EZ. Although there has been good summer activity in Florida, the ending of vacations marks the return of a number of good stations. The rapidly growing and well-deserved popularity of Florida is bringing hams from all over the country into the state, and the A.D.M. anticipates a record-breaking winter. If you think Florida has been full of life, you don't know what life is—YET!

The comparatively strict regulations recently adopted in Florida have proven healthy food for the development of worthwhile stations. The O.R.S. appointment is now something well worth working for; furnishing a motive for those who had previously had no particular object in view. But still we are just starting.

Although messages are not our big boast this month, there has been a good measure of activity along other lines. Our high powered stations are going higher and the low powered stations are going lower; each have their own pet goal in view, but both are doing noteworthy work.

4XE has returned from Maine and has a quarter KW crystal controlled set, in addition to his myriad of other transmitters. 4FM is working out a new system of schedules for use this winter. 4ASK is covering the globe with regularity. 4VS of Miami is back on the job after an extended absence. 4CH has had to resign as Miami City Mgr., because of removal of residence, but he expects to have a better station in the suburbs. 4TR had hard luck with lightning.

St. Augustine is back in its old stride. 4PI worked a8EF with his "fiver," but isn't satisfied, so is rebuilding. 4SB has a hundred watter going steadily and worked NUMM. 4KK is Jacksonville's most active O.R.S. at present. 4FS has returned from the beach and will be on this winter. Good work is being done by a number of other stations which are not yet O.R.S.

Traffic. rPI, 27; 4VS, 27; 4KK, 16; 4SB, 4; 4CH, 4; 4IR-4XE, 4; 4TR, 8; 4ASK, 103; 4TV, 31.

SOUTH CAROLINA, A.D.M. 4RR—4PV found it necessary to resign as D.S. and as O.R.S. in order to give full attention to other work. We shall miss him. Two of our amateurs, 4SH and 4SL, are taking transmitters to college with them. 4HW swapped calls with 24AA. A new "50" made its appearance at 4IT's and promises more DX and traffic than the "10 watter." We've been trying the O.R.S. operating rules here in South Carolina. Here's a tip for "the gang:" they just can't be beat!

Traffic: 4HW, 50; 4IT, 10; 4SL, 23.

ALABAMA, A.D.M. 5AJP—5VV and 5AWF are the active stations in Birmingham. 5VV has been vacationing at National Guard Camp. 5AWF apologized for the "poor" showing of only 29 messages. 5AMH has been working hard and hasn't been on the air actively. 5ZAS and 5MI promise to be on soon with a good traffic total. 5AKJ hopes to start traffic rolling these fall days.

Dist. No. 2: Newman is the new DS. He is starting fine with a good report for his district. 5AOM blew his fifty and has been off the air. 5DL and 5AC who work together are working everything that comes their way. 5QK paid a visit to the old town (he is working in New Orleans) and put his set on 40 meters. The 2nd "op" there is keeping the set "perking." 5LC is a new station in Mobile. 5AR expects to be on this fall with a brand new "fifty." 5AAD is on 200 meters and holding his own. 5QF is now located in Auburn for this year going to college. 5AC was heard by African 4 V. He heard XA2 YI, pil HR N2-2AE, KFUH, WAP, NPG, NPM, 3CM. dB qra? The Mobile gang is wide awake and a fine lot of fellows. (They sure do make a fellow feel at home while in Mobile.—ADM, Hi).

Dist. No. 3: 5AJP is now in his new quarters, on most every night looking for traffic and his old hobby of rag chewing. Any RAG chewer will find delight if he hooks up with 5AJP. 5ADA is getting a large flood of messages from the neighborhood as a result of his large sign placed in front of his house. 5DI and 5WI will both be on the staff of 5YB, the Auburn station (old 5XA). 5ANE while at home this summer built a new set. He leaves for Georgia Tech. and will be on at 4AV this winter. 5ASR is on the air now and promises a big future.

Dist. No. 4: Old Auburn has started a new year and the mighty "sigs" from 5YB start rolling around the earth again. 5XA was called in and the new call of 5YB is with them to stay. "Ops" there this fall will be 5WI, 5DI, 5OM, 5QF, 4GN, 5JR, 5GP and ex 5ON. There is no doubt that 5YB will bring Alabama to the front during the coming season. Go to it fellows and make Alabama proud of its amateurs!—A. D. M.

Traffic: 5AC, 19 5ADA, 53; 5AJP, 23; 5ANE, 18; 5ASU, 4; 5ATP, 14; 5AWF, 29; 5DI, 43; 5YB, 13.

PORTO RICO, ADM 4OI—4SA has worked over 15 foreign countries and keeps a nightly schedule with d7ED. He also worked NRRL when in Australia, and 6ZK (Palestine). 4JE is back from the United States and will be on the air this month. 4UR at Cayey is back again handling traffic with the U. S. 4OI works regularly every night.

Traffic: 4RX, 5; 4JA, 12; 4SA, 35; 4OI, 22.

GEORGIA, ADM 4IO-4RH—Dist. No. 1: 4SI is on consistently and doing good work.

4IO is back on the air.

Dist. No. 2: 4FZ is going away to school and a new DS will be appointed immediately. Many new ORS are wanted in Atlanta. Every station in Georgia is being written and the reorganization in Georgia will be well under way by next month. 4AAH is still on the job, having moved to a new QRA.

Traffic. 4EQ, 12; 4AAH, 4; 4WJ, 11.

WEST GULF DIVISION
Frank M. Corlett, Mgr.

CONSIDERING the extreme heat, the call of the great out of doors, the price of gasoline, 'n everything, the fact that 42 stations reported promptly and that 30 of them had something besides "Nil Hr OM" to report, is considered very good. It appears that no single operator sat in very long at a time. The highest message total was captured by 5AKZ, and the average for the division was 11 messages per station. While the foregoing figures are by no means what they should be with eight odd ORS in the division, everyone knows that it is not high message totals that we are at this time striving for but ACCURACY, SPEED and RELIABILITY.

OKLAHOMA, ADM 5PAG—September seems to have been the worst month of the summer for the Oklahoma "Gang." High temperatures and great gobs of static conspired to lower our traffic totals. The number of stations reporting exceeded that of any previous month.

5AQW reported lots of trouble on 40 meters. 5CE is installing a 50 watter. 5APY gave up his ORS because he is engaged in the intensive training of a

Junior "Op" 5ABE threw up the sponge, leaving 5APZ to carry the load. 5ASK is building a 20-watt phone set for 170 meters. 5ADO worked Hawaii and KFUH with 20 watts. 5GJ is arranging a schedule with Oklahoma City. 5GA has a new type transmitting tube. Ex- 5XBF left for College. 5ED handled some Red Cross Rush messages with great facility. He will be off until Thanksgiving, as he is joining the "Gang" at Oklahoma "U." 5AGK uses spark coil plate supply.

Traffic: 5APG, 4; 5ANL, 15; 5ADO, 21; 5ADE, 5; 5APQ, 15; 5AGN, 5; 5AAV, 2; 5ASK, 5; 5ATV, 26; 5ATK, 2; 5ED, 16; 5AGK, 2; 5TW, 21; 5AQW, 6; 5PU, 2; 5ARO, 6; 5GJ, 9.

NORTHERN TEXAS-ADM-5AJT—Vacation time is over but the roll call for fall school terms is taking many active stations from the air temporarily. No special activities deserve mention this month. 5ACL, 5AKZ, 5HY, 5OQ, and some others deserve credit for consistent operation during the summer months. Their DX records are also very creditable.

5AKX, 5LI, 5AQL, 5ATH, 5AMZ, 5AMB, 5OT, 5AFU, 5VF, all reported but failed to originate their share of traffic.

Traffic: 5OQ, 13; 5AKN, 4; 5RG, 14; 5HY, 22; 5ACL, 6; 5AJJ, 2; 5JF, 16; 5AKZ, 41; 5ATZ, 9.

SOUTHERN TEXAS: ADM-5YK-There are still too many stations that do not report regularly. Who knows a hookup that will make every ORS report every time?

Dist. No. 8-5EW, 5WP, 5HS, and 5ACZ sent in good reports. 5EW handled traffic with WAP, Hawaii, N. Z. and the Marquesas Islands. FB, OM! 5DW is back on the air on 40 and 80 meter wavelengths.

Dist. No. 7-5ALR has been on little, due to delay in getting his transmitter in shape.

Dist. No. 6-5ZG says he is busy with the YL's. His "A" battery is sulphated, antenna shortened, and the generator shot, but otherwise OK. (That sounds encouraging, ADM). 5ZF is dismantling and moving to Houston where he will rebuild. Glad to have you back, OM.

Traffic: 5ACZ, 2; 5EW, 31; 5WP, 4; 5HS, 4.

NEW MEXICO-5LG-5SC of Alamogordo has another "fifty" going. He is leaving for California October 1st and expects to set up a station there.

Traffic: 5LG-5SC-14.

CANADA

WE ARE recovering from the worst slump in the history of amateur radio. Everything seemed to go dead during the summer but we hope to pick up with speed from the depression of the last few months.

This fall there is an election for the new Canadian General Manager followed by a readjustment in several of the Canadian divisions owing to elections and resignations. More will be said concerning this next month.

Let us pull together this fall to make the new year the best that amateur radio has ever had in Canada; with greater DX, better inter-communication between our stations, and less trouble with the broadcast listener.

With the return of good weather this month there is no reason why 120 meters should not be again established as a favorite working wave for Canadians among themselves. If you do not care to readjust your 40 meter transmitter for 120 meters, build a little 5 watt set which you can use on Wednesday nights to talk to your fellow countrymen.

Several Canadians have written us asking why use 120 meters for the Wednesday night "prayer meeting" instead of forty meters, which is so good for long distance work. They have asked us if we will change the wave to forty meters. The writer thinks the reasons for operating on 120 meters are very clear but to explain to the membership at large, the following notes are in order.

The "prayer meeting" is not meant to be a long distance competition. Its primary idea was to enable Canadian amateurs to operate at the same time and on the same wave without interference from outside sources. We have only one wave on which this is possible, 120 meters, a wave which was set aside for us by the Dominion Government and which we should use.

It is admitted that 40 meters is to be preferred to 120 meters for long distance work, but it is not satisfactory for night work under two or three hundred miles. 120 meters is useful for this and to keep in touch with the stations in one's immediate neighborhood. 120 meters can knock the spots off 40.

MARITIME DIVISION
W. C. Borrett, Mgr.

THE outstanding work this month was performed by Joe Fassett, 1AR, and is worth particular mention. 1AR worked WNP nine times during the month on the 20 meter band and took nine msgs. from him and one thousand and fifty-five words of press. He worked WAP twice, too. Ole Joe also worked BZ 1AB for an hour September 24th and got a card from O-DX of Cape Town, South Africa reporting his signals. If this is not enough to make all the gang get on forty meters as soon as possible, nothing will bring them down.

Through an error c1AN was not included in the list of ORS last month. 1AN is still an ORS and should have been included.

All Maritime members have received a letter from C. G. M. Russell, regarding the Canadian Convention which will be held in Montreal November 26th, 27th and 28th. It is the DM's wish that the Maritime be represented by as many of the gang as possible and so everyone may attend he suggests that we let the Maritime Convention go by for one year and all try to get to Montreal instead of Halifax this year. Drop Russell or Jack Argyle a post card at once and let him know of your intentions. Once you have met those fellows the DM feels sure the meeting will bring greater efforts on the part of all Maritime hams to keep in toch with them by radio.

1BZ of PEI reports little doing in that part of the division, but with the help of 1CO he hopes to get going soon.

1BY of Halifax is located in New Glasgow. We expect at least five new A.R.R.L. members Gordon. 1EI complains that outside NB stations do not report on time. (Give this matter your attention gang-DM.) 1EI is building a fifty watt station. 1AK has ordered a Mullard 250 watter. Fenderson of 1AF lost his only brother during the month. 1BO is back strong, and one of our useful ORS. 1AM worked WNP at Godthaab, Greenland BZ 2SP on 40 meters using a 201A transmitting tube. 8AW is building a transmitter and asks the gang to look for him. 8AR is in Labrador. Fred Rossiter is operating an amateur broadcast station. Fred is a good A.R.R.L. man and never misses a chance to say a good word for A. R. R. L. to the BCL's.

1DJ is rebuilding. 1DD has been on Customs work, hence the silence. He was on 40 meters a few evenings and worked several USA stations, and copied many English stations on 45 meters. 1DD regrets that he was not home for any Wednesday evening prayer meetings, during the month.

Regarding these Wednesday evening meetings, the DM would like the Maritime gang to get on the air at 11:30 PM Atlantic Standard Time on 120 meters so that we can get in touch before the other divisions start up and if any of the gang cannot stay on until 1:30 they can notify one of the other stations to report the CGM by radio. Please try this next week.

Traffic: 1AR, 10; 1AN, 7; 1AM, 5; 1DD, 2; 1EI, 1.

ONTARIO DIVISION
W. M. Sutton, Mgr.

TORONTO DELEGATES RAISE THE ROOF AT CHICAGO. ONTARIO AMATEURS PICNIC AT HANLAN'S POINT. THE C. G. S. "ARCTIC" AT LAST IS IN TOUCH WITH HOME. THE AIR IS NOW FULL OF THINGS YOU SHOULD NOT MISS. EXTRA! AT LAST A STATION IN HAMILTON ON THE AIR. CENTRAL ONTARIO, ADM-9BJ. THE SUMMARY OF THE MONTH'S EVENTS IN TORONTO AND CENTRAL ONTARIO APPEARS ABOVE. WHAT A MONTH IT HAS BEEN COMPARED WITH MONTHS OF PREVIOUS SUMMERS! MANY STATIONS ARE consistently operating. DX is becoming better day by day, and OM Traffic has not suffered as bad a slump as was expected. Could anything be rosier?

3VH-9CS and 3IN returned from the National Convention as full of enthusiasm as any two live hams could be. They were bubbling over with tales

of 5KW B-C stations, wild-west rodeos, banquets in popular cabarets.....and a world of good fellowship. None who was at the Convention can say that Canada was not well represented. 3VH gained prominence by being elected president of the R. O. S. S. Ask any of the gang that went to Deerfield for railroad certificates.

The Annual Summer Hamfest at Hanlan's Point, Toronto Island, was staged by ADM Sloan, 9BJ, and took place August 30. It did one good to see such a turnout of Ontario Amateurs, over 40 in number, good fellows all. The gang met at the Pavillion where eats were served. After the banquet at which much 4.4% beer was consumed, a photo was taken, and an open meeting held in the dance hall. 3IN and 3VH gave highly-coloured accounts of the Big Convention at Chicago, while the question of a Canadian convention was discussed. We have just learned that one will be held at Hotel Windsor, Montreal, Que. Nov. 26, 27, and 28. 3CO gave an interesting talk on the incidents of his cruise on VDM, told the gang about his transmitter with which he has been able to do such wonderful DX. The only thing lacking was the presence of CGM Russell, who was away on his vacation. 9BJ says that the ferry company are putting extra boats in commission to accomodate the crowd of hams expected next year! Hi!

3WG is working in Hamilton, and only home weekends. 3GL is making changes in his station, but still handling traffic. That's the spirit; don't let rebuilding be an excuse for no traffic, fellows.

Special EXTRA! 3HT in Hamilton is on the air!! He says that 3RY will be on soon, too. He reports traffic and this is the best news we have had for a "dawgsage."

3CK and 9APY handled National Convention news for the papers. This is the kind of thing that counts—make your set of use to someone besides yourself. 3FC has had rotten luck; first he moved, deserting a nice pair of poles; now he blows a 250 watter. 9AL, 3CO, 3BP and 3AO keep everybody else's diaphragms well corrugated. Three Kay Kew's message total is worthy of mention. This boy is one of the Old Reliables. He hands in a *good* report *every* month. At last we got 3OH down from 150 meters; now he won't move to 40 as his work on 80 is excellent. 3PH has resisted all attempts to get him down to a decent wave, too. 3QS has as neat transmitter as we have seen for some time. He says his "VH" receiver works so well that he feels disgusted with the transmitter when he fails to work all the foreigners he hears.

9AL, the indefatigable, is credited with the accomplishment of the month; he worked VDM and took a sixty word CODE message from him under the worst of conditions. FB, and then some! VDM has been out of touch with the world until the last week of this traffic month.

The city manager requests that the amateurs who so willingly subscribed to the fund that sent Borrett to Paris now support the organization he helped form here. A Dollar to Headquarters will make you a member of the I. A. R. U.

Traffic: 3OH, 28; 9AL, 22; 3KQ, 21; 3PH, 20; 3AZ, 16; 3QS, 10; 3VH, 7; 3GL, 7; 3CK, 4; 3HT, 2; 3FC, 2.

Northern Ontario: 3NI and 3WS have dissolved partnership. 3NI has moved back to Fort William, and is located in the Victoria Hotel. This is the station of your D. M., and all O. R. S. kindly note the change of location. 3HP had his power cut off because the installation did not pass inspection. He has had a special service put into his shack however.

QUEBEC DIVISION
J. V. Argyle, Mgr.

AT AN enthusiastic meeting of the Quebec members it was decided to accept the suggestion of the Canadian General Manager that we stage the first All Canada Convention. It will be held at Montreal November 26th, 27th and 28th at the Windsor Hotel. Arrangements are being made for first class internationally known speakers to attend and the entertainment will be of the best class. It is requested that all those in this or other Divisions, who will attend, be good enough to drop a card to the Committee care of the Division Manager so that some idea of Hotel requirements can be made.

The local gang are preparing an exhibit for the Radio Show which promises to surpass that of last year.

2BE has worked VDN and WNP. 2AZ is alive again on 40 meters. 2CB is back from sea. 2BG is getting out well when he does punch his key. 2CG continues as ever. 2CI and 2BT are rebuilding. 2BV has descended to the lower regions and gets out quite well. 2AX is doing well on 40 meters. 2BN is unheard.

Traffic: 2BE, 8; 2CG, 4; 2BG, 2; 2BV, 10.

VANCOUVER DIVISION
W. J. Rowan, Mgr.

GRADUALLY the sounds of tinkling glass in the kitchen of various hams are dying out. Once in a while one hears one of the summer hibernators giving a few preliminary chirps on the air, but on a whole gang seems to be unsettled on account of business and other ties. This is the commencement of the season, so for the Love of Mike fellows, please get your sets on the air and arrange schedules. The Division Convention was held August 29-30 and the crowd that attended far exceeded the expectations of the committee handling arrangements. There was a good showing from the 7th District. Everybody said hello and had a good time.

GREATER VANCOUVER—5AN is out of hospital and "rarin" to go. He heard WAP and is experimenting with a Hertz antenna. 5AS is going to try 40 meters for a change. 5BJ hasn't yet got around to fix the shack yet. 5CR is nursing a "fiver" for his very life. 5GO is on occasionally with his big bottle on 40 meters. 5GF has been busy working overtime at the shop and has had little time to spend on radio lately. 5HS has been going strong since October 1. 5BH owns and operates a Radio Store. He has worked his first "nine" and earned his spurs. 5AE is making inquiries about an ORS appointment. FB. OM! 5AC is beginning to make himself felt now around the country. 9BD's shack has been sold and is now a broadcasting station using "B" plate supply.

CALGARY—4GT works South America with ease and gets R7 reports from the Zedders and Aussies.

Members of the British Columbia Amateur Radio Association waiting for the arrival of delegates to the Vancouver Division Convention, August 29th.

The Calgary gang are doing their darndest to hook up with Europe and they have arranged a schedule with g5QV who transmits from 9 to 19 MST on using 45 meters Saturday nights.

4AL was out to the coast on his vacation. He is on the air now on 80 meters. 4AX has been rebuilding for 40 meters work using two VT2's in a coupled Hartley circuit. 4IO is plugging away on 80 meters. 4CC is a newcomer and is starting out with low power on the 40 meter band.

VANCOUVER ISLAND—5CT continues to hold down the job of Official Broadcasting Station with the utmost regularity and is to be complimented on that score by the whole division. He has been QSO with NZ and Australia, and works good with Alaskan "FC."

PRINCE RUPERT—5GT has extremely reliable daylight communication with Vancouver on 40 meters. WAP, WNP, and NRRL are heard regularly.

EDMONTON—The DM had a talk with an ex-resident of that locality and he said the deciding factor on radio operation on short waves was a string of dandy arc lights owned by the city and hated by the populace. It must be pretty bad when a ham gives up.

Traffic: 4AL, 1; 4GT, 21; etc.

WINNIPEG DIVISION
W. R. Pottle, Manager.

WINNIPEG Amateurs have realized the need of closer unity and their banding together is recorded in Club Activities this month. A Vigilance Committee was also formed. Traffic handling is on the increase. 4DW is doing some mighty fine receiving. His transmitter is about completed. 4AS and 4BP are radio "ops" on the Transcontinental Trains. 4CJ has ordered some S tubes. 4CR works on 40 meters. 4DE has his 250 watter "perking." He is busy building a new cage. 4DF has a "heaut" of a 20 watter ready to go. 4DY is rebuilding and has a new 50 watts bottle. 4BH is experimenting with 5 meter transmission. 4CN is at Calgary. He will be operating with a 50 watter when he returns. 4CO is with a survey gang but will be back soon. 4DB is right on the job. The new station at 4EA-4FZ promises to be a consistent relay station. Several new stations are awaiting licenses before opening.

4AJ has returned to Toronto. "U" 4ER will operate this station this fall. 4FV softened his tube but has it almost back to normal. Hooper, the popular "Op" at CKCK, is going to put in a Five Watt Squeeker (gud stuff bert D. M.)

4AO has been busy building a Schnell receiver. 4HH is moving his set to his residence. 4EO says he is going to quit radio but we have heard that yarn before. Hi! 4BF has been doing good work. 4IW is cutting down his aerial for 40 and 80 meter operation.

4GH has rebuilt his station and is ready for heavy traffic. 4AA is going strong on 40 meters. 4DR is trying to sell out. 4IQ is building a new station. 4IX, using a small portable set, worked Indiana with 2 watts plate input. 4EM is busy and has no time to pound brass just now. 4EZ just returned from a holiday in California. 4CB has a new mast with a copper tubing antenna. Our new D. S. is right on the job and handing in all the news there is.

Traffic: 4AW, 10; 4DY, 3; 4EA, 4FZ, 15; 4DE, 2; 4AA, 2; 4AO, 10.

TRAFFIC SUMMARY BY STATES

"TRAFFIC BRIEFS" has mentioned some of the high points of the month's traffic handling. We are mightly encouraged by the facts shown by this months figures. More messages were originated this month than last month when Red Cross messages swelled the totals. The "apparent" delivery has improved .too. Of course some messages are still being relayed from month to month, but we can place some dependence on the available figures. Instead of 44% of our messages being delivered as last month, 70% were delivered this time. Let's hope we can improve still more next month. If every station owner who reads these words will see that every one of his messages are delivered and handled promptly we will be 100%.

ATLANTIC DIVISION

State or Division	A.D.M.	Originated	Delivered	Relayed	Total
Md.	G. L. Delchmann, Jr.	—	—	—	—
Del.	H. Layton	—	—	—	—
D. of C.	A. B. Goodall	—	—	—	14
So. N. J.	W. W. Densham	—	—	—	12
W. N. Y.	C. S. Taylor	—	—	—	375
E. Pa.	J. F. Rau	131	48	225	468
W. Pa.	P. E. Wiggin	47	42	140	375
		178	90	375	1274

CENTRAL DIVISION

Ohio	C. E. Nichols	66	35	200	301
Ind.	D. J. Argus	14	24	50	415
Mich.	E. E. Darr	25	8	64	221
Ill.	G. W. Bergman	—	—	—	—
Ky.	J. C. Anderson	47	10	74	131
Wis.	C. N. Crapo	—	—	—	399
		152	77	388	1467

DELTA DIVISION

Delta	B. F. Painter, Mgr.	—	—	—	145

HUDSON DIVISION

N. Y. City	F. H. Marden	—	—	—	—
E. N. Y.	G. Kastenmeyer	—	—	—	499
No. N. J.	A. G. Wester, Jr.	121	105	428	654
		121	105	428	1153

DAKOTA DIVISION

So. Dak.	N. J. Junkins	25	14	192	221
No. Dak.	No report	—	—	—	—
Minn.	C. L. Barker	36	17	172	229
		61	31	364	450

MIDWEST DIVISION

Kans.	C. M. Lewis	30	23	63	139
Iowa	O. E. Watts	—	—	—	—
Mo.	L. B. Laizure	15	4	84	103
Nebr.	H. A. Nelson	—	—	—	—
		45	27	147	242

NEW ENGLAND DIVISION

Conn.	C. E. Nichols	—	—	—	503
Maine	A. F. Wheelden	6	11	11	54
W. Mass.	T. F. Cushing	40	39	200	278
E. Mass.	Gladys Hannah	58	57	181	296
Vermont	G. Z. Kerr	4	1	32	37
N. H.	C. P. Sawyer	20	5	—	25
R. I.	D. B. Fancher	—	—	—	29
		182	104	514	1308

NORTHWESTERN DIVISION

Wash.	L. C. Maybe	34	44	50	166
Oregon	P. E. Hoppe	8	7	28	43
Idaho	K. S. Norquest	8	10	27	120
Montana	A. R. Willson	—	—	—	16
Alaska	—	—	—	—	—
		50	61	105	345

PACIFIC DIVISION

So. Section	M. E. McCreery	—	—	—	—
No. Section	P. W. Dann	22	20	82	328
Nevada	M. E. Smart	—	—	—	—
Hawaiian	E. A. Cantin	—	—	—	—
		22	20	82	328

ROANOKE DIVISION

W. Va.	No report	—	—	—	—
Va.	J. F. Wohlford	—	—	—	50
No. Car.	R. S. Morris	—	—	—	164
					214

ROCKY MOUNTAIN DIVISION

Utah	A. Johnson	4	2	48	54
Colorado	C. R. Stedman	37	94	341	505
Wyoming		3	1	95	99
		44	97	484	658

SOUTHEASTERN DIVISION

Fla.	C. F. Clark	98	67	59	224
So. Car.	A. Dupre	27	11	45	83
Alabama	T. F. Trum	52	47	117	216
Porto Rico	No report	—	—	—	—
Georgia	No report	—	—	—	—
		177	125	221	523

WEST GULF DIVISION

No. Texas	W. B. Forrest, Jr.	43	13	71	127
So. Texas	E. A. Sahm	11	3	25	37
Oklahoma	F. W. Ehret	32	27	81	140
N. Mexico	—	—	2	12	14
		86	43	189	318

MARITIME DIVISION

Maritime	W. C. Borrett	3	16	6	25

ONTARIO DIVISION

E. Ont.	No report	—	—	—	—
Cent. Ont.	W. Y. Sloan	—	—	—	139
W. Ont.	No report	—	—	—	—
N. Ont.	No report	—	—	—	—

QUEBEC DIVISION

Quebec	J. V. Argyle	—	—	—	19

WINNIPEG DIVISION

Winnipeg	W. R. Pottle	—	—	—	42

VANCOUVER DIVISION

Vancouver	W. J. Rowan	12	2	18	32
Vancouver Is.		1	—	12	13
Calgary		16	2	18	36
		29	10	48	87

TOTAL FOR COUNTRY

Originated	Delivered	Relayed	Total
1150	806	3331	8737