

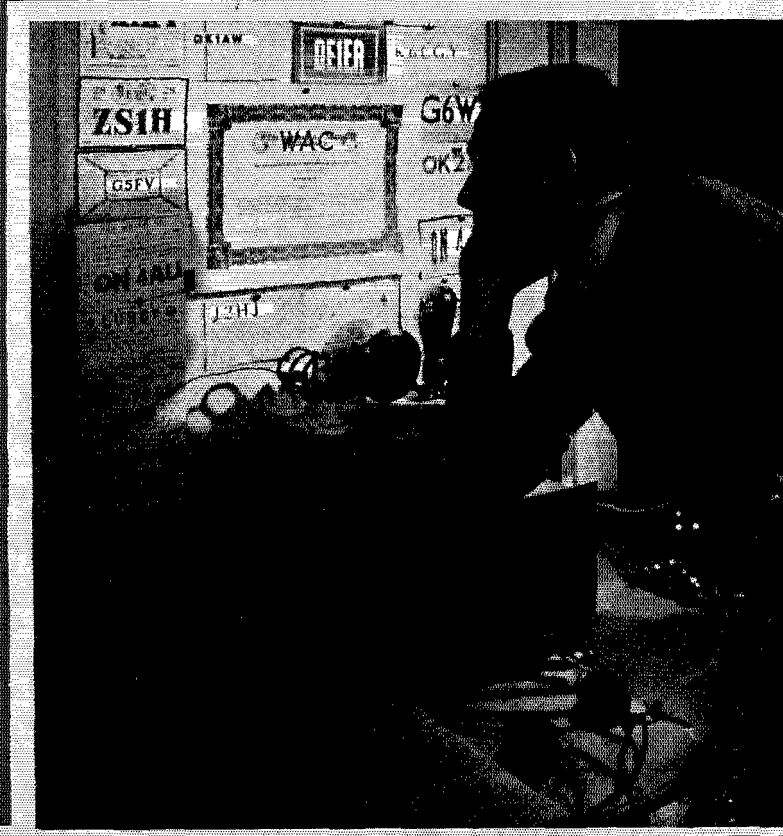
QST

January, 1948
25 cents

devoted entirely to

amateur radio

In this Issue —
New
Equipment
for Ten-Meter
Operation



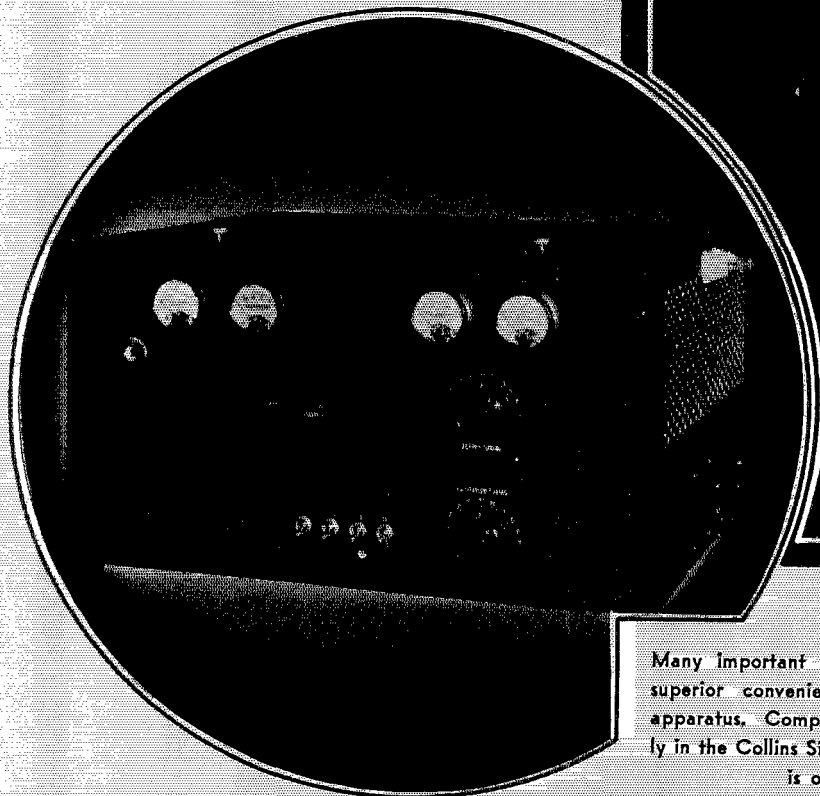
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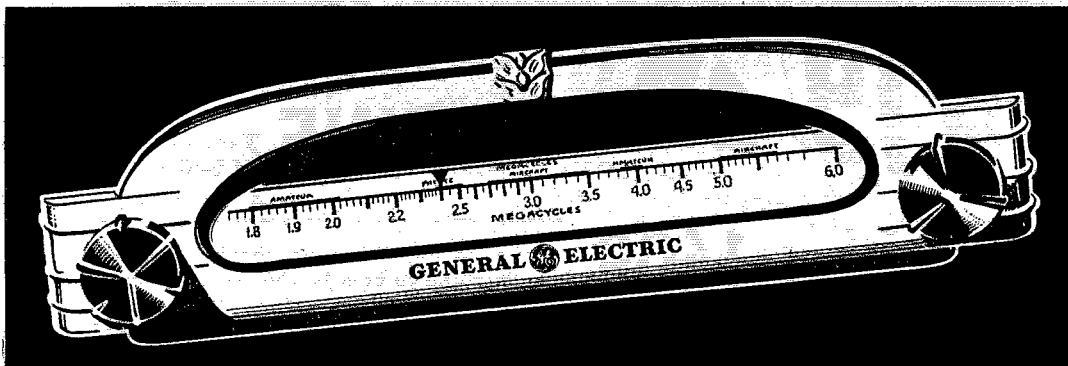
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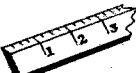



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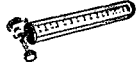



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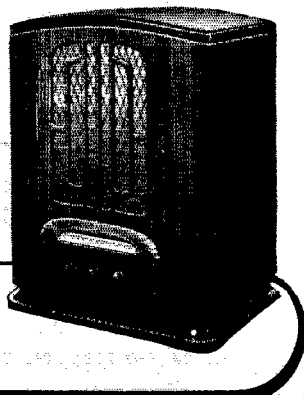
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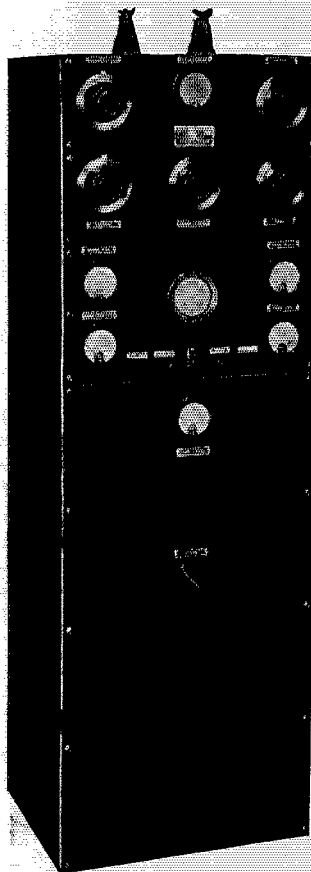


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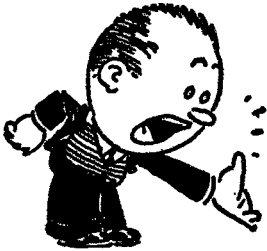


QST

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devoted entirely to

AMATEUR RADIO



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**January
1936**

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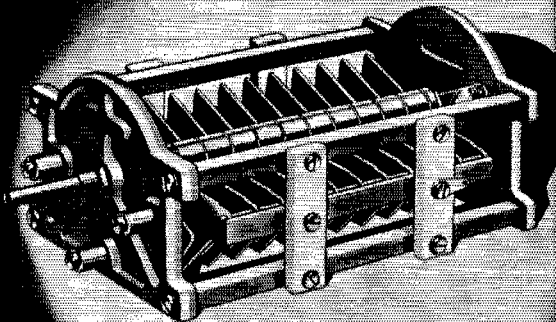
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It is an incorporated association without capital stock, chartered under the laws of Connecticut. Its affairs are governed by a Board of Directors, elected every two years by the general membership. The officers are elected or appointed by the Directors. 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 nation 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 prerequisite. Correspondence should be addressed to the Secretary.

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THE EDITOR'S MILL

THERE are some practices in the 'phone bands that to us do not smell so good. We observe some of these fellows with remote control switching on the transmitter and letting it idle between QSO's, with the carrier on the air for hours on end. Awfully unsporting, we think, taking a slice out of the ether that way to nobody's advantage. More offensive is this imitation broadcasting which seems to be springing up. How does anybody get that way, in this day and age, addressing a public over an amateur station, acknowledging SWL cards, playing a nice phonograph record for them which it is hoped they will enjoy? That isn't amateur radio!

Of course these things violate the regulations. The monitoring inspectors will catch up with them sooner or later. But why do you other 'phone fellows stand for them? Why don't you hop the eggs who perpetrate these blinking nuisances, and hop them hard! Success in amateur telephony depends to a pretty big extent upon popularity. If a bunch of the 'phone boys would make it a point to take these offenders to pieces on the air some night, it would straightway become unpopular thus to maintain a nuisance and the situation would cure itself.

WHAT are we going to do about these vaudeville radio entertainers who call themselves "radio amateurs"? We refer to the scourge of "amateur hours" which infest or decorate the broadcasting band, depending upon one's point of view. We say that these people aren't radio amateurs, and of course they aren't as we know the term, but we've all been in amusing difficulties explaining to friends just what kind of amateur radio it is that we pursue.

What ought we do about this? We don't see much of anything effective that can be done. The League has put out publicity on the question but it hasn't made a dent: the presses of the entertainment world seem greater. "Amateur night" has been an institution in the entertainment world since the days of the old opry house. Its present broadcast phase of course will pass and we'll be here just the same, even as we were before. In the meantime each of us can do a little missionary work, grabbing off every opportunity to explain that there are radio amateurs as well as "radio amateurs."

UNDER the general heading of things that ought to have something done about them is this difficulty of getting QSO. Schedules solve a lot of it but that is no answer, for we all want to be able to hook up with new stations. We suppose that we can raise one out of two fellows who call CQ near our frequency. Twenty kilocycles away it is a different story. And we can call a fellow on the other end of the band until our tubes are white in the face and never never raise him. We have drifted somehow into the practice of listening for replies only near our own frequency. Why is this? Interference isn't the answer, because interference generally consists of only one or two undesired signals riding the desired one, and it's about as bad one place as another. The answer seems to be that there are so many of us that it's almost like taking a census to tune from one end of the band to the other, so each of us concentrates upon that little section of the world near his own signal, learns to know it rather thoroughly, and lets the rest of the world go by.

Thereby, it seems to us, we are missing a great deal. There are other interesting chaps in other parts of the band. Of course we can change crystals, send out a CQ, and thus get acquainted in another portion of the band. But there is small satisfaction in that thought when we hear a friend calling CQ, or a station we would much like to work, on a frequency 200 kc. removed from ours. We haven't a chinaman's chance of raising him and we can't buy crystals for every five kilocycles.

The most helpful suggestion made to date is that stations calling CQ give an indication of the portion of the band in which they will listen to replies. The little article on page 54 of December *QST* is well worth re-reading. We are strongly in favor of this idea and would like to see it come into more general adoption. But even it doesn't solve our difficulty, because a particular CQer that we very much wish to QSO may never elect to indicate his intention to listen for replies in that portion of the band which we grace. We might build flexible transmitters, capable of rapid shifting to any desired frequency. We might even develop a technique where the receiver itself was the exciter for the transmitter, with transmissions thus automatically on the frequency of the CQ to which we are listening. But after about

sixty seconds of that, with 200 fellows answering a CQ on the same frequency, there would be such a din as would move the earth on its axis. No, that idea is decidedly out.

What to do, then? Has anybody a brilliant idea? We would be very glad to open our correspondence columns to a discussion of this problem.

K. B. W.

New Cosmic Phenomenon

Unusual Radio Conditions Correlated With Solar Eruptions

By J. H. Dellinger*

IN RESPONSE to the request of the editor of *QST*, I am glad to report to amateurs the latest developments in connection with the phenomenon described in December *QST*.¹ First of all, the phenomenon appeared on schedule on October 24th, in altered but most interesting form. Second, my suspicion that each fade-out is due to an eruption on the sun has been confirmed.

On October 10th began a great increase in sunspot activity, accompanied by a general improvement in radio transmission on the higher frequencies, just as reported in your October 21st ORS and OPS Bulletin. Amateurs and others found that they received excellent daytime signals on much higher frequencies than usual. By October 21st to 23rd the upper limit of frequency had reached the highest value ever observed in our work here at the Bureau. Then, for a single day, October 24th, this was completely reversed. The upper limit of frequency on this one day dropped to half its value on the preceding days, and on October 25th and succeeding days returned to the high previous values. This was accompanied also by a remarkable change in the virtual height of the F_2 layer of the ionosphere; this height shot up to 460 km. on October 24th from a height of about 250 km. on the preceding and following days. These changes were the most pronounced ever observed by the Bureau. There was a magnetic storm on October 24th.

Magnetic disturbances, sunspot activity, and poor high-frequency radio transmission have hitherto been considered to go together in general, but with many puzzling exceptions. We are perhaps now in a position to begin to unscramble the relation. High-frequency radio transmission improves as general sunspot activity increases (probably because of increased ultraviolet radiation), but some particular, relatively sudden eruptions on the sun have the reverse effect (impairing high-frequency radio transmission on

the illuminated side of the globe) and also give rise to terrestrial magnetic disturbances.

Assuming this to be true, it was of great interest to inquire whether there were any visible eruptions on the sun at the times of the special radio fadeouts. Through the courtesy of Dr. George E. Hale, Dr. S. B. Nicholson, and Mr. R. S. Richardson, I have received a report of solar observations made by Mt. Wilson Observatory at Pasadena, California. When I read the report I was astonished. The spectroheliograph showed sudden marked changes in form and intensity of a hydrogen flocculus within a few minutes of the time of each of the radio fadeouts of July 6th and August 30th, and also showed a similar phenomenon on October 24th. (No observations were made at the times of the March and May fadeouts.) Mr. Richardson's report says the August 30th and October 24th eruptions were unusual.

The synchronous radio fadeouts and visible solar eruptions, lasting only a few minutes, appear to be some sort of climax of a process occurring over a period of hours. The October 24th radio observations revealed the disturbed condition over such a longer period rather than the climactic sudden type of fadeout.

It is not yet proved, but it may be that solar flocculi eruptions (visible or not) are the usual cause of widespread daytime impairment of high-frequency radio transmission, and also of at least some terrestrial magnetic disturbances. Even if only a small proportion of the effective eruptions should have a visible stage, certainly further study of such visible effects, and comparison with radio effects, will be of value and will incidentally aid in elucidating the great mysteries of terrestrial magnetism. While we have now learned that a widespread radio fadeout is approximately synchronous with a solar eruption, depending directly on the changed ionization produced in the ionosphere by the solar emanation, a magnetic disturbance, on the other hand, is a derived effect resulting from the cur-

(Continued on page 79)

*Chief, Radio Section, National Bureau of Standards, Washington, D. C.

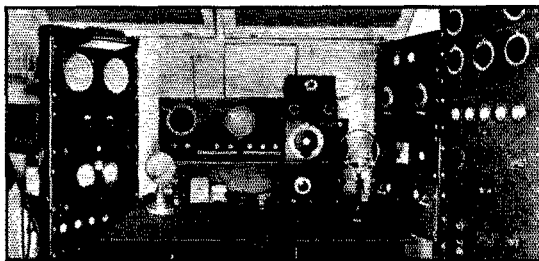
¹"A New Radio Transmission Phenomenon," p. 21, *QST*, Dec., 1935.

28-Mc. Activity at All-Time High

W6FQY Makes WAC on 'Phone; 21 Stations Report Working All Continents

NO THRILLS left in ham radio? If you think so, we don't need to ask if you've been getting in on the ten-meter work in the past few months! Of course we admit that the same places have been worked before on other bands, but then the most verdant greenhorn knows that all-continent DX, if not an everyday occurrence, is at least common enough to pass without note. The number of WAC certificates proves that. But it was not until October, 1935, that an amateur succeeded in working all continents on 28 megacycles—fourteen years after the first amateur signal spanned an ocean, and more than seven years after the 28- to 30-mc. band was opened to amateur operation. A band so universally considered "dead" that early DX work was practically forgotten has suddenly come to life, rewarding in good measure the few who struggled along on it with meagre results, and providing a new experience for those adaptable enough to take advantage of the opportunity. Most of us who have been on the ground would be willing to swap a couple of years' routine operating for the excitement of the past two months when ten at last "got hot."

We can't attempt to make this an achievement



W6FQY—FIRST STATION TO WORK ALL CONTINENTS ON TEN-METER 'PHONE

This station, owned by Dr. Frank E. Breene, is located near San Jose, California.

story, at least not in terms of individual accomplishments. A stack of reports several inches thick can't be compressed into a few *QST* pages, and anyhow a listing of DX work done by the hundreds of stations now on the band would make pretty dry reading—it's too much like what goes on regularly on 20, except that in many cases it's been done a lot better and easier on 10. However, the stations that have worked all continents certainly desire special mention—we know of twenty-one of them so far. Here they are: D4ARR, G2YL, G5BY, J2HJ, W2DTB, W3FAR, W4EF, W5QL, W6DOB, W6EWC, W6FQY, W6JJU,

W6RH, W7AMX, W7FLU, W8CRA, W9BPU, W9HAQ, W9NY, X1AY, ZS1H. The listing is alphabetical, not in the order of making it. Note



ONE OF THE BEST-KNOWN TEN-METER SIGNALS EMANATES FROM THIS STATION

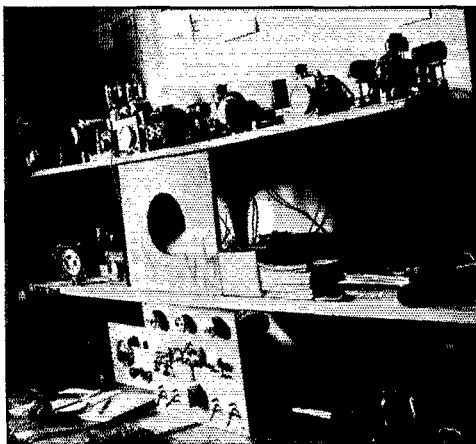
Yes, this is ZS1H, the station of G. A. Shoyer, in Rondebosch, near Cape Town, South Africa. Input to the push-pull final in the transmitter averages 50 watts. The receiver is an FB7 with preselector, using home-brewed coils for ten.

that every U. S. district except the first is represented; for this we bow our heads in shame, but it's not for want of trying. Anyhow, New England never was such a hot place for DX. (No remarks from the audience, please!)

A few interesting facts in connection with the above WAC's: The honor of being the first British station to make both WAC and WBE on 28 mc. goes to a YL, Miss Nelly Corry, G2YL, and also the distinction of having made WAC in the fastest time, 6 hours and 20 minutes! The nearest one to that in speed is W7FLU (W9FG-BYC in a Wyoming location) who made it in 25 hours and then minutes, starting from scratch—by which we mean that the first outside contact of his WAC series was his first foreign on ten! This contact, with G5BY, is we think the first W7-G QSO on the band. W4EF had a marvellous opportunity to be the first station in the world to work all continents on ten, having worked all but Europe by October 6th, but a business trip called him away just a few days before the Europeans started coming in. By the time he had returned the deed had been done, as reported in last *QST*. W6FQY made his on 'phone, which not only makes him the first station to make a 'phone WAC on ten but also represents a considerable achievement on any band—or all of them put together, for that matter.

At this writing it looks as though the peak of good DX conditions has passed, at least for a time, although we're hopefully waiting to be

proved wrong about this. Here in the East, at least, mid-October gave us the best European signals, while the VK's and J's hit a high in early



A VIEW OF F8VS, AT HARAVILLIERS, FRANCE, FROM WHICH MANY AMERICAN STATIONS HAVE BEEN WORKED ON BOTH 'PHONE AND C.W.

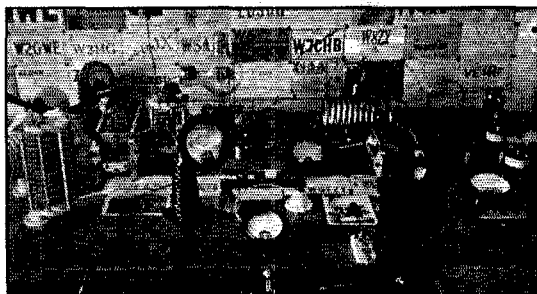
This station, owned by Andre Ferry, uses a pair of 10's in the final transmitter stage. The receiver is similar to the SW3 in design.

November. Peak conditions for Europe and the West Coast seem to have been during the latter part of November. While there is some evidence of a cyclic variation in conditions, each succeeding "wave" is relatively poorer than the one preceding, and although DX signals are still coming through, they are not as numerous or as loud as a month or two ago. At the same time shorter-distance work, within the United States, has been improving. This is more or less in line with the behavior of 14 mc.

Weekends find innumerable American stations on the band—actual QRM at times. The old familiar crowding at the low-frequency edge is in full swing, with most stations in the first one or two hundred kilocycles. However, a good many 'phone stations are working in the harmonic area of the 20-meter 'phone band, which helps a bit. We have yet to find a station venturesome enough to go beyond 28,800 kc.; few of them even get that far! Speaking of 'phone operation reminds us that there are apparently a few fel-

lows who aren't yet aware that a ten-meter 'phone has to meet the same requirements as those operating on any of the lower-frequency bands, according to the present regulations. Most of those operating are better than the average on other bands, but a very small minority is evidently under the impression that a modulated oscillator is OK. ND, OM's! Dig out August QST and take a look.

Why this sudden activity on ten? Have we been ignoring a band which could relieve a lot of the load that 20 is carrying? How come amateurs are just waking up to the fact that there is some territory between 14 and 56 mc.? Well, we for one don't join in the happy chorus now chanting praises and predictions of continued prosperity. Ten has had its moments before, invariably followed by a relapse into complete somnolence. But never has there been so much activity as this Fall, never such a good opportunity to find out whether the band is good for work every day in the year, be it over 500 miles or 5000. We incline to the opinion that on the average ten is neither as good nor as bad as it has at times been painted. In other words, while the DX is not likely to last forever, the band is probably open for communication over some distance a much greater proportion of the time than has been thought—if (and a big "if," too) only there were enough stations at enough different locations working on the band during the supposedly dead periods. The experience of the past ten months bears this out; in the whole period there were very few completely blank days, although conditions admittedly



THIS TRANSMITTER ACCOUNTS FOR THE SIGNAL FROM EA4AV

A 59, 800 and 852 comprise the tube line-up. EA4AV is owned by Esteban Muñoz, of Madrid.

varied between wider extremes than on lower-frequency bands. It is the common experience of the dyed-in-the-wool ten-meter man to find no stations on the band except a single one who's putting in an R9 signal. If one, why not others?

On the other hand, we may be in the midst of a favorable period in the sun-spot cycle this year.

We've heard supposedly "authoritative" predictions that 1936 will be both completely dead and that the peak conditions will not be reached until 1936-37. Take your choice. As for us, we're sticking along to see what happens. There's always the chance that something will, and if that's not ham radio, what is?

What does ten offer, besides uncertainty? For one thing, a stretch of territory considerably

(Continued on page 88)

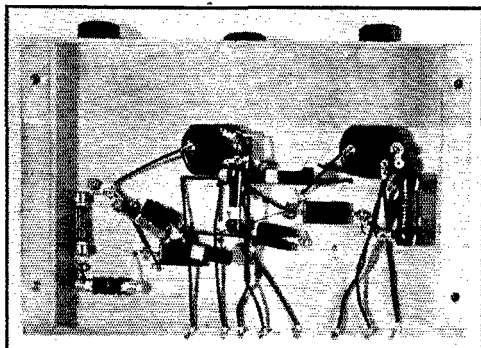
Transmitters for Ten Meters

Some Medium-Power Rigs of Simple Construction

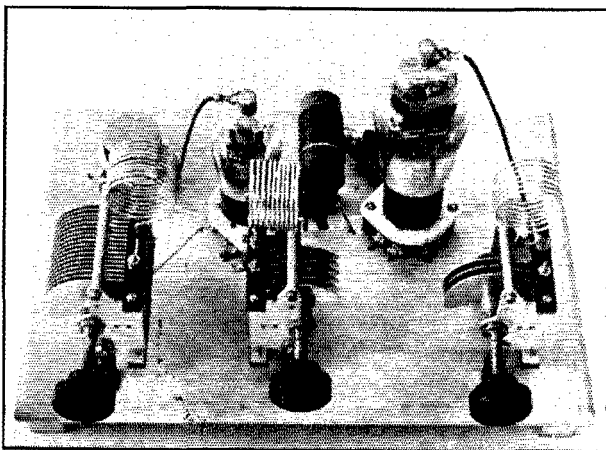
By Geo. Grammer, Assistant Technical Editor

GETTING a transmitter to perk in the 28-mc. band is not the hardest nor yet the easiest thing in the world. By which we mean that the regular technique of adjusting a crystal-controlled rig is employed, but that this technique has to be modified to some extent to meet conditions imposed by the higher-frequency operation. For one thing, circuits operate at lower efficiency, even if the tubes themselves are doing a good job, and this, coupled with the fact that ten meters is just one band farther away from the crystal than twenty, makes it much more difficult to excite an amplifier on 28 mc. than on, say, 7 mc. Too, it is a bit harder to keep the higher frequencies in the paths in the circuit where they belong, so that circuit points which theoretically should be "cold" may in practice turn out to be "hot." However, these difficulties are not insuperable by any means, nor is it necessary to have an elaborate many-staged transmitter for ten-meter work with moderate power output.

Many stations working successfully at 28 mc. are using their regular equipment for the 14-mc. band with the simple substitution of a 28-mc. tank in the final stage, using the final as a doubler. Providing there is a fair amount of excitation in the first place and providing the bias on the final



A BELOW-BASEBOARD VIEW OF THE 89-802 RIG
By-passes for each stage are returned to a common ground point with short leads. A single wire connects the grounds of the two stages.



A LOW-POWER 28-MC. TRANSMITTER OR EXCITER

Using an 89 Tri-tet driving an 802 Doubler. Oscillator cathode, oscillator plate and doubler plate tank circuits in order from left to right. The self-resonant doubler grid coil is between the two tubes. The 28-mc. output is ten watts or more.

is raised a bit to help the efficiency, this works out very well for c.w. even with tubes of the 203A type, which according to the books are not so good at ten. Even though the efficiency may be low, it doesn't take a whole lot of power to get out on ten when conditions are good, and if conditions are poor no amount of power is going to help much. On the other hand it does pay, in satisfaction if nothing else, to have a transmitter built for the band.

If a 28-mc. transmitter is being built from the ground up, it is as well to choose tubes especially suited to high-frequency work. Tubes having the plate lead brought out remotely from the other elements are especially desirable, since high r.f. voltages across "mud" tube bases can be the source of considerable r.f. loss. In the low-power field, ceramic-based 10's or 801's are considerably superior to bakelite-based 10's on this count. Bakelite bases will blister and char only too readily when the tubes get down to real work.

Dispensing with generalities, the best way to illustrate how to get on ten meters is to describe some practical equipment. The transmitters pictured here, breadboard layouts for the sake of economy and simplicity of construction, will deliver reasonable amounts of power at rated tube voltages. One is a complete rig ending up in a pair of RK18's; the other consists of two units, a

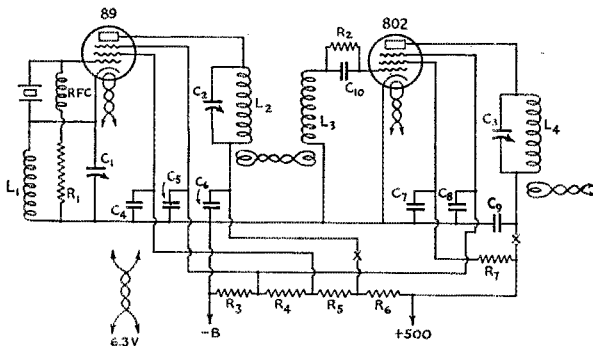


FIG. 1—CIRCUIT OF THE 89-802 LOW-POWER TRANSMITTER OR EXCITER

C₁—365- μ fd. variable (Cardwell Midway, Type MR-365-BS).

C₂—50- μ fd. variable (Cardwell Midway, Type MT-50-GS).

C₃—20- μ fd. variable (Cardwell Midway, Type MT-20-GS).

C₄ to C₉, inc.—.002- μ fd. mica condensers.

C₁₀—100- μ fd. mica.

R₁, R₂—50,000 ohms, 1-watt.

R₃—10,000 ohms, 1-watt.

R₄, R₅—10,000 ohms, 10-watt.

R₆—3500 ohms, 10-watt.

R₇—25,000 ohms, 25-watt.

L₁—10 turns No. 14, spaced to occupy winding length of 1 1/4 inches.

L₂—10 turns No. 14, spaced to occupy winding length of 1 inch.

L₃—20 turns No. 24 on 1-inch diameter tube, winding length 1 inch.

L₄—7 turns No. 14, spaced to occupy winding length of 3/4 inch.

L₁, L₂ and L₄, coil diameter 1 3/8 inches. One-turn link on same tube as L₃, closely coupled to ground end. One-turn link coupled to L₂ made of hook-up wire.

two-tube exciter and a separate amplifier, which can be hooked together or used separately with other tube combinations.

A Two-Tube Low-Power Transmitter or Exciter

THE gadget with the two top-capped tubes would hardly be called a formidable transmitting layout, but actually it will deliver enough power on 28 mc. to get somewhere, judging by the way some of the stations now on the band are reaching out with fly-power. After getting out a bug or two (yes, they show up in even such a simple-looking rig) it was found to be capable of delivering a measured output of better than 10 watts (circuit output, not the tube alone) at rated tube input, even though the second tube, an 802, is used as a doubler. The oscillator is an 89, Tri-tet connected, working from a 7-mc. crystal.

The circuit diagram, which includes all voltage divider and

dropping resistors so the rig can be worked from a single power supply having an output of 500 volts at about 100 ma., is given in Fig. 1. There are no particularly unusual features to it, the chief point of interest being the self-resonant grid circuit of the 802 and its link coupling to the oscillator. In the first circuit tried capacity coupling was used between the two tubes; while this arrangement gave exactly the same output as the circuit shown, it was quite a job to get all tuning condenser rotors at the same r.f. potential, even though each stage had its individual ground point to which all returns were made. The inductive coupling was substituted to avoid the necessity for utilizing the common ground lead as part of the coupling system, and the self resonant coil to avoid having an inordinate number of knobs to twirl.

The cathode tank of the oscillator is, as usual, tuned to a frequency considerably higher than that of the crystal. The plate circuit, L₂C₂, is tuned to the second harmonic, on 14 mc. is approximately resonant at 14 mc., while the 802 plate tank circuit, C₃L₄, is tuned to 28 mc. The coils, wound with No. 14 bare tinned wire, are wound on a one-inch form, the natural springiness of the wire making the diameter of a finished coil about 1 3/8 inches. The ends are simply bent to fit the condenser terminals. While not extremely rigid nor superlatively beautiful, these coils possess the ham virtues of cheapness and easy construction.

In full operation, the voltages on the various tube elements with a 500-volt supply are approximately as follows: Oscillator plate, 325 volts; oscillator screen, 150 volts; oscillator suppressor, 50 volts; doubler plate, 500 volts, doubler screen, 200 volts, and doubler suppressor, 50 volts. Milliammeters to read oscillator and doubler plate currents should be inserted at the points marked "X" in Fig. 1; in the actual unit a pair of leads is brought out from each of these points to corresponding pairs of terminals at the back of the baseboard. These terminals may be shorted if no meters are used after the set is tuned up.

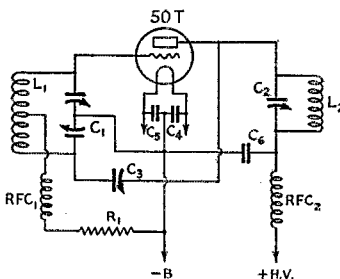


FIG. 2—THE 50T AMPLIFIER CIRCUIT

C₁—Split-stator condenser, 50- μ fd. total (see text).

C₂—High-voltage variable, 65- μ fd. (Cardwell Type XC-65-CS).

C₃—Neutralizing condenser (National Type NC800).

C₄, C₅—.005- μ fd. mica.

C₆—.01- μ fd., 5000-volt mica condenser (not critical, .002 or more satisfactory).

RFC₁—National Type 100 choke.

RFC₂—Ohmite high-frequency layer-wound choke.

R₁—10,000 ohms, 20-watt.

L₁—8 turns No. 14, diameter 1 3/8 inches, winding length 1 inch.

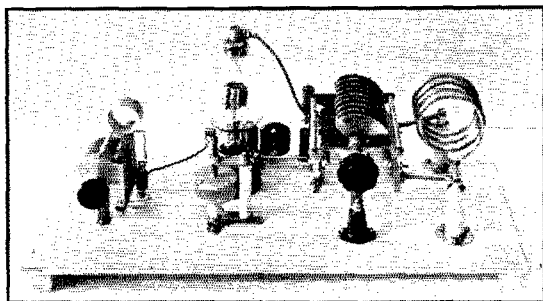
L₂—4 turns 1/4-inch copper tubing, diameter 2 1/2 inches, length 3 inches.

One turn, same diameter as grid coil, will serve for link coupling to the exciter of Fig. 1, with similar one-turn link at exciter end.

To tune the rig, the link should be decoupled from L_2 and the oscillator given first attention. The 802 should be out of its socket, since there is no fixed bias to hold down its plate current in the absence of excitation. With the 89 hot and a 7-mc. crystal in the circuit, tune C_1 down from maximum until the plate current drops, indicating the start of oscillation. The non-oscillating plate current probably will be about 40 ma.; while oscillating, the plate current will depend upon the setting of C_1 . With C_1 set well below the point where oscillations start, the plate current will be between 25 and 30 ma. Tuning C_2 to resonance at the second harmonic should cause the plate current to dip to about 20 ma. A neon tube touched to the stator plates of C_2 should show a fair glow.

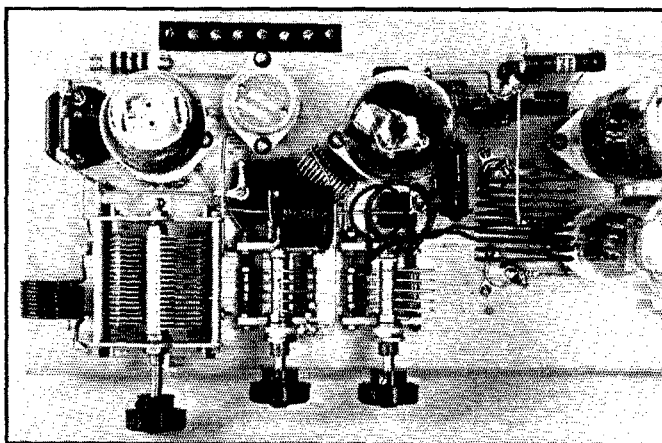
The link coil may now be coupled to L_2 by inserting it between the turns of L_2 at the "cold" end. This will cause the plate current to rise to about 25 ma. and may necessitate a slight retuning of C_2 to maintain resonance. The neon bulb should show a glow when touched to the grid terminal on the 802 socket. The 802 may then be plugged in and its plate circuit adjusted to resonance. Off resonance plate current probably will be about 60 or 70 ma., dipping to approximately 30 ma. at resonance. The correct adjustments for maximum power output can be found quite readily by connecting a small 110-volt lamp across a few turns of L_4 . It should be possible to go somewhat beyond the rated plate current of 60 ma. before all the power is taken from the circuit. At 60 ma. a 10-watt lamp should be lighted to full brilliancy or better.

A view of the under-side of the baseboard is



A 28-MC. SINGLE-ENDED AMPLIFIER USING A 50T
This amplifier may be link-coupled to the output of the two-tube exciter for operation at 1000 or 1500 volts.

given in one of the photographs. Short ground leads from screens and suppressors were considered more essential than good appearance. The



CLOSEUP OF THE LOW-POWERED END OF THE RK18 SET
In this layout the by-passes were mounted above board which accounts for crowded appearance. Power-supply terminal board is a bakelite strip at the rear.

divider resistors are simply hung on convenient terminals.

This unit may be operated from a power supply built around one of those 550-volt transformers with 7.5-volt filament windings. A resistor of 0.9 ohms in series with one leg of the 7.5-volt supply will drop the filament voltage to the proper value. The -B lead may be keyed, if desired, or the key can be connected in the cathode circuit of the 802, by-passed by a condenser in the set to keep the r.f. where it belongs.

A 50T 28-Mc. Amplifier

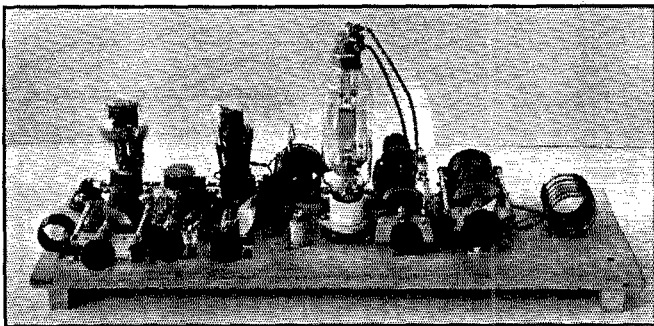
THE 50T amplifier shown in another of the photographs may be driven by the low-power outfit just described or, at the higher voltages, may be excited by a more powerful driver stage.

Although the 10-watt output of the small set is adequate to drive the 50T at 1000 or 1500 volts on the plate, it is doubtful if the excitation would be sufficient for the high-efficiency type of operation required with 2000 volts or more. In case excitation power of 25 watts or so is available, the plate tank circuit is capable of handling the higher plate voltages, since the tank condenser, C_2 , has ample plate spacing. If built for operation only at 1000 volts, an inexpensive condenser of closer plate spacing could be substituted.

The circuit, given in Fig. 2, is a familiar one. "Grid" neutralization is employed so that the plate tank circuit need not be split; this helps in increasing the tank

impedance, relatively low at this frequency anyway, and thereby aids the plate-circuit efficiency.

ected, and the link between exciter and amplifier completely removed. An easy cure is that of



COMPLETE RK18 TRANSMITTER READY FOR ANTENNA TUNING

not tying the low-voltage and high-voltage supplies together, or if you don't like that, connecting them through an r.f. choke. Things like this are more or less to be expected, since it's only one more step down to five meters, where chokes in the filament leads begin to be necessary. However, anticipating trouble never helps one's peace of mind; this is mentioned in case someone else has the same difficulty of finding some r.f. in the tank that can't be neutralized out.

The split-stator condenser in the grid circuit is an altered 250- μ fd. Midway, the stator being sawed in half. A regular split-stator condenser could be used, of course, but none of the right size happened to be on hand when this unit was built. The grid coil, L_1 , is center-tapped and connected to the grid leak, R_1 , through an r.f. choke, the latter being for the usual purpose of avoiding unwanted resonances caused by grounds on both condenser and coil.

Using a 10,000-ohm grid leak, the d.c. grid current under no-load conditions, if the exciter already described is used, should be 20 to 25 ma. It will drop about 5 ma. or so when the tube is delivering power. With

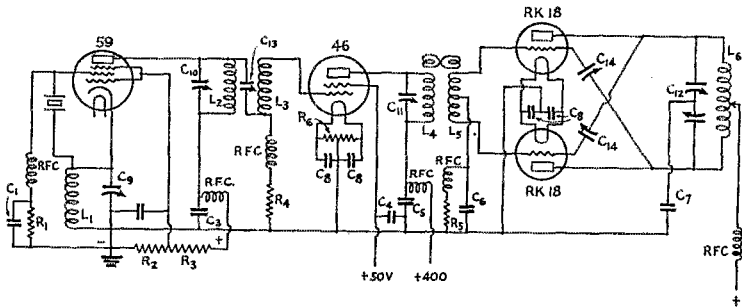


FIG. 3—CIRCUIT OF THE RK18 28-MC. TRANSMITTER

- R_1 —50,000 ohms, 1-watt.
- R_2, R_3 —10,000 ohms, 10-watt.
- R_4 —50,000 ohms, 1-watt.
- R_5 —10,000 ohms, 10-watt.
- R_6 —Center-tap resistor.
- C_1 to C_8 , inc.—0.002- μ fd. (C_5 and C_7 must withstand entire plate voltages).
- C_9 —365- μ fd. variable (Cardwell MR-365-BS).
- C_{10}, C_{11} —25- μ fd. variable (National SEU-25).
- C_{12} —35- μ fd. (total) split-stator condenser (Cardwell MT-70-GD).
- C_{13} —30- μ fd. trimmer condenser (National Type M30).
- C_{14} —Cardwell 852 neutralizing condenser (NA-5-NS) with reduced spacing (see text).
- L_1 —9 turns $1\frac{1}{2}$ " o.d., winding space $5/16$ ", enameled No. 12 wire.
- L_2 —11 turns $1\frac{1}{2}$ " o.d., winding space 1", enameled No. 12 wire.
- L_3 —13 turns $3/4$ " o.d., winding space $1\frac{1}{2}$ ", tinned No. 14 wire.
- L_4 —6 turns $1\frac{1}{2}$ " o.d., winding space $1\frac{1}{2}$ ", enameled No. 12 wire.
- L_5 —9 turns 2" o.d., winding space $1\frac{3}{4}$ ", enameled No. 12 wire.
- L_6 —6 turns 2" o.d., winding space 2", copper tubing.
- RFC—National No. 100 r.f. chokes.
- Link one turn, diameter of coil, at each end.

The plate tank coil, L_2 , is made of copper tubing, chiefly for the convenience of having a stable, self-supporting coil rather than because of current-carrying requirements. Resonance is found with the tank condenser set near minimum capacity.

The neutralizing process is carried out as with any other amplifier, and needs no particular discussion. If there is still an amateur who does not know how to go about neutralizing an amplifier, the procedure is explained in detail in the *Handbook*. There is, however, one possibility which can lead to false results—stray r.f. from the exciter getting into the tank circuit via a common ground lead between units or power supplies. We ran into that one early in the game, after discovering that r.f. showed up in the tank even with the tube out of the socket, the neutralizing condenser discon-

1000 volts on the plate, the resonance dip in plate current should be to 40 or 50 ma.; at 100 ma., the rated plate current of the tube, the power delivered to a load should be 60 to 70 watts. A nicer-looking dip in plate current can be secured with fixed bias, but it doesn't seem to mean anything so far as actual output under load conditions is concerned.

Antenna coupling is left to the preferences of the constructor, since nearly everybody has

(Continued on page 80)

Considerations in Speech-Amplifier Design

Practical Pointers on Building High-Gain Amplifiers

By R. O. Lund,* W9SGA, and W. C. Howe,** W9UVP

THE requirements for a speech amplifier for the amateur transmitter are changing rapidly as new equipment is perfected. The modern speech amplifier must operate entirely from the power lines. To accommodate the justly popular crystal microphone, it must have high gain but the hum level must be low. It

sary to set down the performance to be obtained and the mechanical characteristics desired. In the amplifier herein described, it was decided the output power should be 18 watts, since experience had proven that this amount of power was sufficient for driving any Class-B stage up to and including 203A's. At the input circuit, we wanted

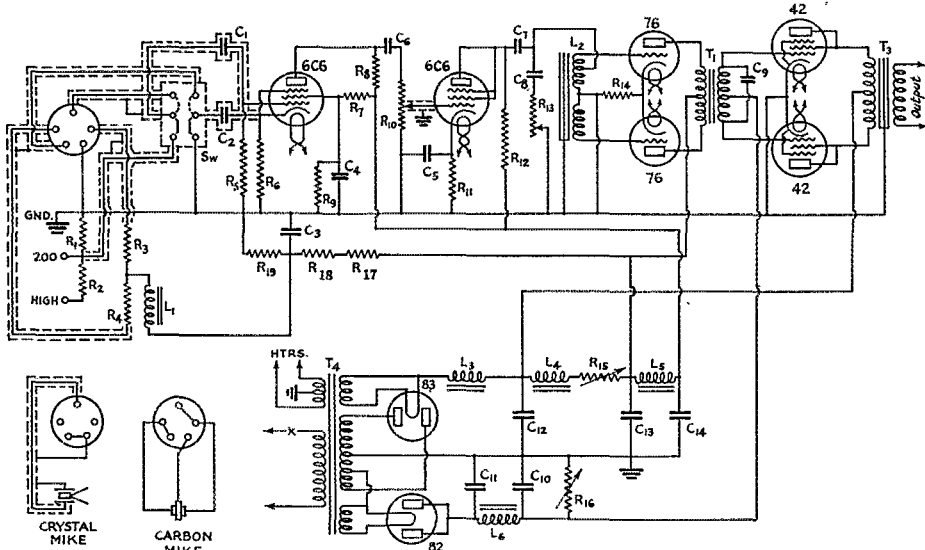


FIG. 1—COMPLETE CIRCUIT OF THE AMPLIFIER DISCUSSED IN THE TEXT

This general-purpose unit, with its audio output of 18 watts and high overall gain, is capable of driving a high-power Class-B modulator or can be used for public-address work.

- C₁—0.1- μ fd. 400-volt metal-cased.
- C₂, C₃—25- μ fd. 25-volt electrolytic.
- C₄—8- μ fd. 200-volt electrolytic.
- C₅—25- μ fd. 25-volt electrolytic.
- C₆, C₇—0.1- μ fd. 400-volt tubular.
- C₈—0.003- μ fd. 400-volt tubular.
- C₉—0.01- μ fd. 600-volt tubular.
- C₁₀, C₁₁—8- μ fd. 200-volt electrolytic.
- C₁₂, C₁₃, C₁₄—8- μ fd. 450-volt electrolytic.
- R₁—200 ohms, 1-watt.
- R₂—10,000 ohms, 1-watt.
- R₃, R₄—200 ohms, 1-watt.
- R₅—5 megohms, 1-watt.
- R₆—2200 ohms, 1-watt.
- R₇—0.1 megohm, 1-watt.
- R₈—0.25 megohm, 1-watt.
- R₉—20,000 ohms, 1-watt.
- R₁₀—0.25-megohm volume control.
- R₁₁—2200 ohms, 1-watt.
- R₁₂—50,000 ohms, 1-watt.
- R₁₃—0.25-megohm variable (tone control).

Important—The power supply components shown in this list will furnish 25 watts of field power for dynamic speakers. In case no speakers are used, a 5000-ohm, 50-watt resistor must be connected across the high-voltage output.

- R₁₄—1500 ohms, 1-watt.
- R₁₅—10,000-ohm semi-variable, 30-watt.
- R₁₆—1500-ohm semi-variable, 30-watt.
- R₁₇, R₁₈—5000 ohms, 10-watt.
- R₁₉—1250 ohms, 1-watt.
- L₁—7.2 henrys, 120 ma. (Thordarson T-5319).
- L₂—Push-pull input transformer connected as described in text (Thordarson T-7431).
- L₃—10-30 henry swinging choke, 150 ma. (Thordarson T-7429).
- L₄—22 henrys, 35 ma. (Thordarson T-1892).
- L₅—42 henrys, 15 ma. (Thordarson T-7430).
- L₆—7.2 henrys, 120 ma. (Thordarson T-7549).
- T₁—Push-pull input transformer, 800-ohm secondary, ratio 1.5 to 1, total primary to total secondary (Thordarson T-7432).
- T₂—Power transformer, 450 volts at 150 ma. with tap at 75 volts, 6.3-volt, 5-volt and 2.5-volt filament windings (Thordarson T-7428).
- T₃—Output transformer, depending on load to which amplifier is to be coupled.

should be possible to realize the rated power output with a negligible amount of distortion.

In the design of any speech amplifier, before determining tube types and circuits, it is neces-

sary to set down the performance to be obtained and the mechanical characteristics desired. In the amplifier herein described, it was decided the output power should be 18 watts, since experience had proven that this amount of power was sufficient for driving any Class-B stage up to and including 203A's. At the input circuit, we wanted

*2517 Thayer St., Evanston, Ill.
**6639 Kenwood Ave., Chicago, Ill.

for either use. Our financial status was no different than that of 99.44% of all hams, so cost was a prime consideration.

OUTPUT STAGE—GRID REQUIREMENTS

It was first determined to use 42's in Class-AB in the output stage. These tubes are capable of

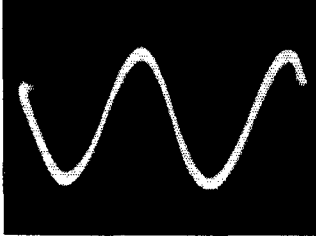


FIG. 2—OSCILLOGRAM OF OUTPUT WAVE-SHAPE WITH AMPLIFIER DELIVERING FIVE WATTS

The operation is purely Class A, no grid current being drawn.

voltage amplifying stages, resulting in quieter operation and lower hum level than for the lower voltage tubes. As an additional feature, the amplifier could be switched to battery operation if desirable. Class-AB operation makes possible high efficiency with low plate voltage, which is very desirable from a cost standpoint.

A breadboard setup of the final stage was made, and the grid voltage required for 18 watts output measured by applying a voltage from the power line. This was found to be 55 volts r.m.s. per grid, or 110 volts total. With this figure established, we next went to the driver stage.

Most tube manuals recommend the use of a single 42, triode connected, to drive two more of the same type tube. With the 42-tube triode connected, the μ is 6.2 and the power output is given as 0.65 watt. However, the Type 76 tube has a μ of 13.8 and computation showed that a pair of them in push-pull would deliver better than a watt. In addition, the plate current for the 76's is 21 ma. less than for the single 42. The fact that a push-pull circuit practically eliminates the even-order harmonics made the vote unanimous. The wisdom of this choice is clearly demonstrated by oscillograms given later in this article.

Best performance of a Class-B or AB push-

pull driver stage is obtained with a plate-to-plate load approximately eight times the plate resistance of one of the tubes. In the case of the 76, the load would be 8×9500 ohms, or 76,000 ohms. The grid impedance of a 42 working Class-AB at maximum output is approximately 8550 ohms. The turns ratio of primary to one-half secondary of the driver transformer for this impedance ratio would then be

$$\sqrt{\frac{76,000}{8,550}} = 3$$

or the overall ratio would be $1\frac{1}{2}$ to 1 stepdown. With this step-down ratio, 165 volts must be generated across the primary to drive each of the grids to 55 volts r.m.s. The actual gain of a 76 tube in this type of circuit is about 9, so that 18.4 volts r.m.s. are required from grid to grid of the 76's to reach this level, or 9.2 volts per tube. In accordance with the tube charts, the 76's should be biased to 13.5 volts. The peak voltage of a sine wave having an amplitude of 9.2 volts r.m.s. would be 1.4 times this, or 13 volts. This is less than the bias voltage, so the 76 stage will operate purely Class-A under these conditions. If the peak voltage

were higher than the bias, it would be necessary to decrease the step-down ratio of the driver transformer, so the required voltage on the grids of 42's could be obtained with a peak voltage on the driver

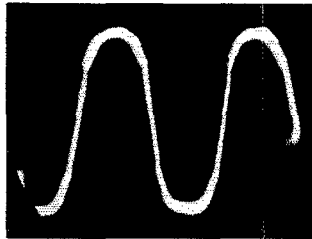


FIG. 3—WAVE-SHAPE AT EIGHT-EEN WATTS OUTPUT

The slight irregularity near the peak of the wave marks the beginning of grid current flow. The distortion is not apparent to the ear.

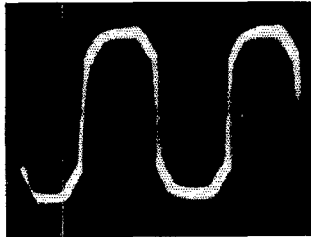


FIG. 4—EFFECT OF EXCESSIVE INPUT TRANSFORMER RESISTANCE

Power output and operating conditions same as in Fig. 3 except that an input transformer having a secondary resistance of 3655 ohms per side was used. To the ear the quality is "fuzzy."

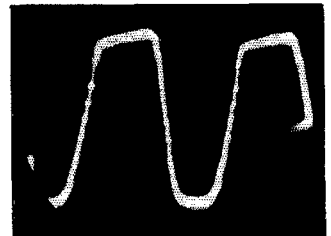


FIG. 5—A SINGLE-ENDED DRIVER STAGE GAVE THIS OSCILLOGRAM

The non-symmetrical shape of the wave results from core saturation effects, as explained in the text. Quality harsh and unpleasant.

tubes of less than the bias voltage. The reflected load on the driver stage would then be lower, causing an increase in distortion.

To check the calculations, the driver and power stages were set up and the grids of the 76's excited to just below the grid current point, at which the output of the power stage was 18

watts, showing that the driver tubes and transformer were operating under optimum conditions.

VOLTAGE AMPLIFIERS

From this point we are interested only in voltage amplification since all tubes up to the output stage are operated Class-A. Since the crystal microphone has the lowest output of any of the devices intended to be used, the gain had to be made high enough for the crystal microphone and the signal from other devices attenuated to approximately the same level. One crystal microphone manufacturer specifies an output voltage of 0.008 across a 5-megohm resistor. This measurement was taken with a single frequency tone source close to the microphone, so we decided to use just half this value so the amplifier would have sufficient sensitivity for a low speaking voice. To amplify the 0.004 volts out of the microphone to the 18.4 volts required across the grids of the 76's would mean a voltage gain of 4600. It was almost imperative to secure this gain from two audio stages, since more stages usually introduce almost insolvable problems of oscillation, hum, tube noise and other kindred ailments.

former coupling into that stage. For good frequency response the plate impedance of the tube working into the primary of the push-pull input

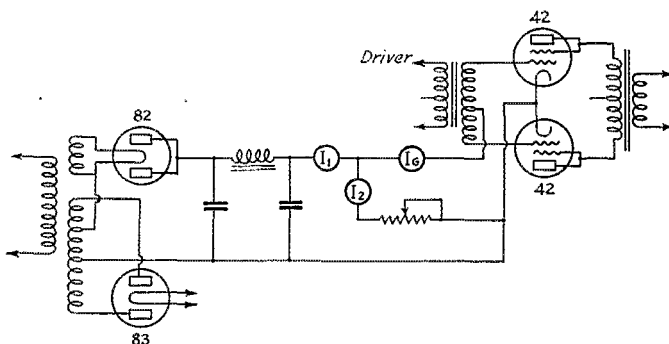


FIG. 7—IMPROVED CIRCUIT FOR GRID-BIAS SUPPLY Utilizing a tap giving the proper bias voltage permits the use of a low-resistance bleeder to improve voltage regulation, without causing transformer overload. Data given in Table II.

transformer should be reasonably low. A 76 would be satisfactory if the gain were higher, but the input transformer ratio would have to be 6 to 1 step-up to secure the gain of 51 required in the tube and transformer, and the frequency response of such a transformer would be poor. However, a 6C6 triode-connected (screen and suppressor tied to plate) has a μ of 22.5 and a plate resistance of 10,000 ohms. A gain of 14 is relatively easy to secure from the tube, and with a 4 to 1 step-up ratio in the input transformer the drivers can be excited with some to spare.

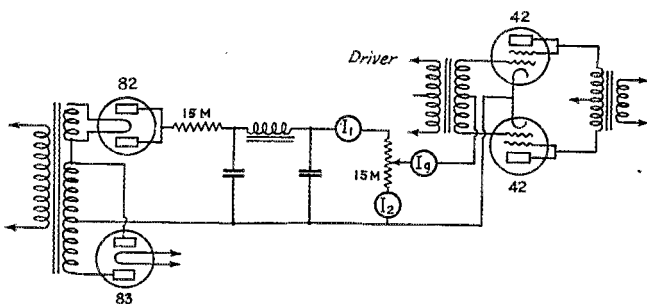


FIG. 6—THE CONVENTIONAL FIXED-BIAS CIRCUIT, UTILIZING A SEPARATE RECTIFIER-FILTER WORKING FROM ONE SIDE OF THE HIGH-VOLTAGE WINDING OF THE POWER TRANSFORMER See Table I for data on bias voltage regulation resulting from grid-current flow.

A Type 6C6 was chosen for the first voltage amplifier tube, since it is possible to realize a gain of 90 with this tube pentode-connected. Because of the high plate impedance, resistance coupling is the most economical method for good frequency response. The gain of 90 would give us a signal voltage of 0.36 at the grid of the second amplifier stage, which still had to be amplified 51 times fully to excite the 76 drivers. Since the drivers are in push-pull it is logical to use trans-

response, the plate of the 6C6 triode was parallel fed through a 50,000-ohm resistor, with a condenser blocking the d.c. out of the primary. By using an auto-transformer connection of a high-quality 1 to 1 overall ratio push-pull input transformer (connecting the finish of the primary to the start of the secondary) and using the inside half of the secondary as a primary winding, the good frequency characteristic of a 2 to 1 transformer is secured along with a voltage gain of 4 to 1. This can be done, of course, only when the plate of the tube is parallel fed. The circuit comprised by the primary winding and the coupling condenser was resonated at 60 cycles to give a 2 db rise at the low-frequency end of the response curve.

The next step was to measure the overall gain of the amplifier. A voltage of 0.0036 r.m.s. at 400 c.p.s. applied to the grid of the first tube gave an output of 18 watts. Since our estimate of the output of a crystal mike was .004 volts, we had gain enough with a nice factor of safety.

CIRCUIT DETAILS

Since the amplifier is a general-purpose unit, some of the circuit details will be of interest. Likewise, there are some important precautions to be observed in the construction of this and similar high-gain amplifiers of relatively high audio output which are worthy of discussion. The complete circuit diagram is given in Fig. 1.

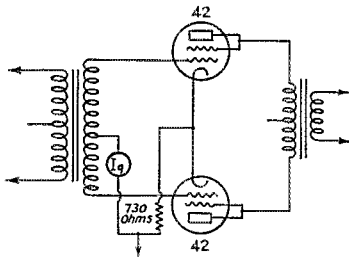


FIG. 8—ORDINARY SELF-BIAS CIRCUIT

Self-bias limits the output because of poor regulation, as explained in the text, although under the conditions discussed it proved to be better than the so-called fixed-bias circuit of Fig. 6. See Table III for data.

The input circuit for the crystal microphone is entirely conventional. Too much emphasis cannot be placed on the shielding of leads in the input circuits. The shielding must all be connected to a common ground. Do not depend on the metal chassis for ground returns, but run a lead through the amplifier to which all grounds are made. It is important that the by-pass condenser C_2 , which is across the biasing resistor R_6 in the first stage, have large capacity (25 μ fd.) or hum trouble is certain. It was found that even the coupling condenser C_1 would pick up stray magnetic fields unless the metal cased "bath tub" type was used and the case grounded. As shown in the diagram, shielded wiring was employed on all circuits up to the grid of the first 6C6.

The circuit used to couple the carbon microphone is not widely known and has seldom been used because of the low output of the microphone with this type of coupling. The audio voltage is developed across a center-tapped resistance, the microphone voltage being fed in the center tap. The two ends of this resistance are then coupled to the grid-cathode circuit of the first tube through condensers. The advantage of this type of coupling arises from the fact that the resistances are non-inductive and consequently are not affected by magnetic fields and currents in the chassis. The amplifier is so sensitive that even triple shielded transformers in high permeability

cases would pick up a considerable amount of hum with the power unit removed several feet from the amplifier proper. The microphone connections were terminated in a socket so that either carbon or crystal microphone could be connected to the same socket by using different connections to their respective plugs. Microphone current for the carbon mike is supplied by means of a small voltage divider and a separate filter. Another filter isolates the plate supply to the voltage amplifier tubes. If this filter is not used there is a likelihood of interaction between the microphone and the amplifier stages resulting in a form of "motorboating."

The double-pole double-throw switch, Sw , connects an alternate input circuit for 200 or 10,000 ohms if it is desired to feed a pre-amplifier or high-impedance pickup into the speech amplifier. The gain control is placed in the grid of the second tube, where it has the least effect on the frequency response of the amplifier.

A tone control, C_3R_{13} , is connected across the output of the second 6C6. This will reduce the normal high-frequency response of the amplifier by about 8 db at 5000 cycles, and is useful when the amplifier is used in public address work to compensate to some extent for local acoustic conditions. For speech amplification in a transmitter it should not be required.

The output transformer shown in the circuit couples to a 500-ohm line, which is very convenient when the speech amplifier is any distance from the modulators or the modulated r.f. stage. A 500-ohm to Class-B grids, or 500 ohms to r.f. load transformer is required at the other end of the audio line. If it is desired to drive the Class-B grids directly, a transformer designed to couple an 8000-ohm plate-to-plate load to Class-B grids may be substituted for the output transformer.

EFFECT OF DRIVING STAGE

Reams have been written in the discussion of driver transformers about secondary resistance, leakage reactance, etc., all of which is mainly of academic interest to the average ham. The oscilloscope was set

up, and photos taken showing different effects in the driver and output stages.

Fig. 2 is the output wave of the amplifier with 400-cycle input at an output level of 5 watts. The amplifier was operating strictly Class-A, since grid current does not begin to flow until the output is about 6 watts.

Fig. 3 is the same amplifier at 18 watts output.

(Continued on page 7#)

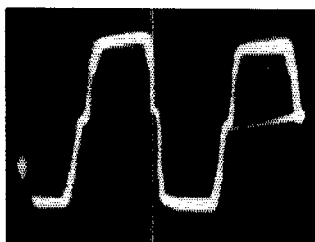


FIG. 9—THE EFFECT OF POOR BIAS VOLTAGE REGULATION IS CLEARLY SHOWN IN THIS OSCILLOGRAM

The bias circuit was that of Fig. 6. Drastic flattening of the peaks, together with discontinuities at the point of transfer from one tube to the other, result from poor bias voltage regulation. Except for the bias circuit, the amplifier was otherwise as given in Fig. 1. Quality very mushy, almost unintelligible.

W9NY 28-Mc. Contest Winner!

THE A.R.R.L. bronze watch charm award for the most valuable and consistent communication work in development of the ten-meter band during the year October 1, 1934 to October 1, 1935 goes to Mr. Herbert F. Waring, W9NY, of Milwaukee, Wisconsin.

During the contest W9NY had 256 contacts with 128 different stations, working six countries in four continents, all on 28.3 mc., station keyed manually at all times by himself alone. The input at W9NY at no time exceeded 200 watts, a pair of 801's being driven by a conventional Tri-tet arrangement using two 59s and a 7-mc. crystal during the last half of the contest. For the first six months of the contest the final was a pair of '10's running at 80 watts input. A photo of this rig appeared in May 1935 *QST*, page 11. A half-wave dipole vertical antenna, 16½ feet in length on a housetop, fed by a transposed 440-ohm line, wire spacing two inches was used, a quarter-wave transformer* being inserted at the center of the antenna, to secure a match from the line to the 80-ohm antenna. A homebuilt t.r.f. receiver successfully brought in 28-mc. signals from several continents, but was supplanted by a new HRO for improved selectivity and signal holding ability during the latter months of the contest.

A point was awarded in the contest for "each completed 100 miles of contact," working the same stations oftener than once each calendar month not counting extra points. A score of 2260 points was turned in by W9NY, giving him 47% of the possible 50% for this contest factor. Both W4AJY and W9NY got the full credit (25%) for equipment description and development work. The number of weekly reports to A.R.R.L. counted 25% (W9NY submitted reports for 51 of the 52 weeks!), and the excellent performance on this score is really responsible for winning the contest, for the next highest competitor, W4AJY, had a small edge on points for DX QSO's. The contacts listed by districts and countries:

W1 (20), W2 (17), W3 (10), W4 (11), W5 (16), W6 (14), W8 (8), W9 (19), VE3 (2), VE4 (2), LU1 (1), LU3 (2), LU9 (1), VK2 (2), VK3 (1), X1 (1), ZS1 (1). The operating log submitted by W9NY summarizing band conditions and operation for the contest year employing single spaced typing, covers 47 legal size sheets!

Julian Dixon, W4AJY, Birmingham, Alabama, with 236 separate contacts made a DX score of 2399 points in the 28-mc. contest and deserves great credit for his fine accomplishment; 135

*See January 1934 *QST*, p. 17.

stations were worked. He ran behind a few per cent on the important "regular reporting" factor, placing close to the contest winner in the final result. W4TZ with the "patriotic" score of 1776 points comes in third. In all there were six of the many hundreds engaged in 28-mc. work who submitted formal entries in the 28-mc. contest. FB, everybody. The order of precedence in the final results is as follows:

W9NY 97% (2260)	W4TZ 71.3% (1776)
W4AJY 85% (2399)	W4AGP 65% (1540)



RECEIVING POSITION AT W9NY

W6CAL 58.3% (1150)	W9FFQ 42.8% (893)
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All had relatively good DX scores. Photographs of the equipment at W4AJY, W4TZ and W6CAL have already appeared in May 1935 *QST*. A dozen or more amateur operators stood high in consistency of regular reports, and would have undoubtedly had a good rating to their credit had they submitted a tabulation of DX Score with experimental data and apparatus description, at the end of the contest. Their valuable reports were appreciated and we are pleased to give them honorable mention.

W9GFZ, W1ZB, W9FM, W1CUN, VE2AC, W9EGE, W6JJU, W9DHN, W4MR, VE3DU, W1CKF, W9GBJ, W9HAQ.

Attention is called to the announcement of the 1936 A.R.R.L. 28-mc. Contest which runs throughout the year 1936 (details page 56, November '35 *QST*, and page 54, December '35 *QST*). The band is still hot, new WAC records are being made. Valuable data on transmission conditions are being collected through these contests. The '36 contest runs along similar lines to that reported above, 50% credit for actual scored points for QSOs, each representing 100 miles or more of DX, 25% credit for your description of equipment and development work at the con-

(Continued on page 62)

● What the League Is Doing ●

League Activities, Washington Notes, Board Actions—For Your Information

Occupancy Surveys

The chief object of the surveys as planned by the Cairo Committee is to find out the kind of occupancy in the various bands in question. Simple statistical occupancy is of interest, undoubtedly, but can be ascertained by inspection of the Berne lists and others. In many cases these lists include stations *en projet*, for instance. Aside from these, however, the mere number of assignments and the number of stations that may be heard is formidable. On the other hand, closer inspection shows an overwhelming percentage of what one hears on the air to be made up of "superfluous signals," dots sent by a vibrator, repeated V's, and sometimes mere repetition of the call of the station that is monopolizing the particular frequency. If a frequency is used for serious traffic, that is one thing. It is quite a different matter when the preponderating bulk of the time is filled up with useless signals. In the present stage of the science and art, such can no longer hide under the guise of experimental emissions. Neither can they plead the need of keeping the transmitters hot and ready for traffic by continuous operation of some kind. If this last is of importance, much better results would be obtained by the use of dummy antennae.

Occupancy curves show statistical effects but do not show emission characteristics. It is of great value to have the surveys record the percentage of time each station spends in the different kinds of activity, including traffic. Commercial stations are not experimental. They cannot afford to be. Neither is it at all necessary. The demand for experimental results is better met by other kinds of stations. Hence the one and only excuse for the existence of a commercial station is traffic. Lacking such, they have no right to allocations in any respect.

—*The Cairo Committee.*

New F.C.C. Chief Engineer

Dr. C. B. Jolliffe, since 1930 the chief engineer of the F.C.C., resigned in middle November to accept a position with R.C.A. He has been succeeded by Lt.-Comdr. T. A. M. Craven, U.S.N. (Rtd.).

The entire art regrets Dr. Jolliffe's departure from F.C.C. An able administrator, a skillful engineer in his own name, the distinguishing characteristic of his administration was the confidence that all radio interests felt that they would be treated by him with complete justice. He has been a good and fair friend of amateur radio. At

R.C.A. he occupies a position created especially for him, in charge of all frequency allocation matters for their affiliated companies and in charge of their representation at all conferences affecting frequencies.

Commander Craven was for seventeen years a naval communications officer. As a technical adviser to the American delegation at the Washington conference of 1927, he carried the major burden of negotiating the frequency allocations to the high-frequency services. Resigning from the Navy in 1930, he engaged in private consulting practice in Washington, where he obtained much experience in the broadcast engineering field. He is no stranger to the Commission, having been loaned to the old F.R.C. by the Navy Department in 1928 to administer communications other than broadcasting. He has attended numerous international communications conferences and knows the ropes. He is a co-author of the current revision of "Robison's Manual".

Lt.-Comdr. E. K. Jett, U.S.N. (Rtd.), continues as the assistant chief engineer in charge of the Telegraph Division, the active administrator of amateur radio.

High Frequency Notes

For the last eighteen months, members of the A.R.R.L. staff have maintained daily schedules with various Boston stations on 56 and 112 mc. Reliable two-way communication is had over what is probably the longest indirect path regularly operated on these frequencies in the world. For the last year, Ross Hull has been making a continuous record of tone signals transmitted from the Blue Hill Observatory near Boston. The signal variations shown on these recordings are being analyzed against meteorological data and the resulting correlations are clearly destined to recognition as an important contribution to our knowledge of ultra-high-frequency behavior.

In every community where 5-meter work becomes popular, complaints follow about interference, particularly when voice-modulated oscillators occupy half the band. Although any apparatus is permitted in this band, in the interests of freer experimentation, amateurs building new equipment are urged to content themselves with nothing less than an M.O.P.A. rig. The more selective receivers, in fact, are incapable of receiving a signal from a modulated oscillator.

Don't forget, gang, that modulated oscillators do not go on 10 meters, even though they are

still lawful on 5. In the 28-30 mc. band precisely the same calibre of signal and quality of plate supply are required by regulations as in the 14-mc. band and lower.

Financial Statement The League showed a gain of a little over \$1700 from operations in the third quarter of 1935, before expenditures against appropriations. This amount is about normal for that season. By order of the Board of Directors, the figures are here presented for your information:

STATEMENT OF REVENUES AND EXPENSES,
EXCLUSIVE OF EXPENDITURES CHARGED
TO APPROPRIATIONS, FOR THE THREE
MONTHS ENDED SEPTEMBER 30, 1935

REVENUES	
Membership dues	\$11,982.50
Advertising sales, QST	18,149.75
Newsdealer sales, QST	11,447.40
Handbook sales	4,768.34
Booklet sales	1,385.23
Calculator sales	1,196.84
Membership supplies sales	1,995.65
Interest earned	767.70
Cash discounts received	189.28
Bad debts recovered	129.24
Net adjustment covering miscellaneous unclassified sales	98.89
	\$52,110.82
<i>Deduct:</i>	
Returns and allowances	\$ 3,870.09
Cash discounts allowed	240.83
Exchange and collection charges	44.88
Increase of provision for newsdealer returns of QST	70.50
	4,226.30
Net revenues	\$47,884.52
EXPENSES	
Publication expenses:	
QST	\$13,873.12
Handbook	2,666.76
Calculators	\$1,635.86
Less: credit balance in booklet publication expense account ¹	208.17
	1,427.69
Membership supplies expenses	1,104.09
Salaries	20,119.64
QST forwarding expenses	900.63
Telephone and telegraph	477.60
Postage	1,407.17
Office supplies and general expenses	1,578.94
Rent, light and heat	812.39
Traveling expenses	1,307.68
Communications Dept. field expenses	118.91
Headquarters station expenses	155.65
Provision for depreciation of furniture and equipment	233.89
	46,182.16
Total Expenses	46,182.16
Net Gain before Expenditures against Appropriations	\$1,702.36

¹ Credit balance resulting from the transfer from the booklet publication expense account for the three months ended Sept. 30, 1935, of the calculator publication expenses of prior periods, previously included in the former account, now to be segregated in separate account.

Portable Operation In this department in December we referred to some slight difficulty we are having with the F.C.C. concerning the regulations governing portable operation, and reported the suspension of several amateurs. One such amateur—one of our SCM's—is being unjustly treated, we feel, and we believe that our interests require that the regulations be clarified. The League has therefore assisted its member in filing an appeal for a hearing, and his suspension has been set aside temporarily. With our assistance, he is now moving for reconsideration and reinstatement, and at the same time we are requesting a clarification of the rules so that these embarrassments may be prevented in the future.

Museum Slowly we are accumulating at headquarters a modest but very interesting collection of early amateur apparatus, where it may be preserved for posterity and viewed by visiting hams. There are still a number of pieces of gear, once immensely important in amateur operation, that are not represented in our assembly. Has any kind-hearted member an old Leyden jar kicking around which he would like to contribute? And who possesses a genuine Gernsback electrolytic interrupter, most interesting device that ever graced a 1910 station? Other items that we would like to secure are an electrolytic detector, a Multi-Audi-Fone, a Crystallo detector, and a set of Turney spiderwebs. "Whatsa, somebody?"

Applying for a Renewal Amateurs who make renewal application of the F.C.C. too far in advance of expiration sometimes have their applications returned to them by the Commission. This has led to some confusion over the regulations. It is true that Rule 16 requires renewal applications at least sixty days before expiration but the Commission is precluded by the basic law itself from issuing station renewals more than thirty days in advance of expiration. Moreover, Rule 221b permits an amateur to operate not over sixty days without the operator license in his possession, while it is being renewed (and in no case beyond the date of expiration). When one applies for renewal three months in advance of expiration, it is going to be sixty days before the Commission can possibly act upon it, and more likely seventy-five days before the renewed license is returned. In these circumstances the Commission returns the application, the idea being that the applicant should hold it until the time is shorter, so as to avoid interruption in his authority to operate. We suggest that K6's and K7's aim at getting their applications into Washington exactly two months before expiration; for the United States proper, we would suggest that six or seven weeks is ample.

(Continued on page 79)

Pocket Superregen Receivers

By W. Van B. Roberts,* W3CHO

Although we have come to think of the superregenerative receiver as something exclusively useful on ultra-high frequencies, it still has a number of applications on lower frequencies including the broadcast band. Dr. Roberts, the author of this article, has interested himself in applying superregeneration to lower-frequency circuits and has devised a number of interesting self-contained models. One of these, it will be recalled, he described in a previous QST article. Because of the widespread interest among our readers, Dr. Roberts has been persuaded to describe for us several later designs of even more compact receivers. While such receivers might not be considered especially useful for regular amateur communication on the lower frequencies, they have a field of their own of a special-purpose nature. For instance, they are especially useful to the watcher of a big football game or other athletic event which is being broadcast from a nearby station, permitting him to follow the expert analysis of the radio reporter and thereby providing detailed information which he might not get through his own eyes.—EDITOR.

AN EARLIER article (QST, March 1932) describing a superregenerative receiver in a cigar box brought so many inquiries for further information regarding the winding of the interruption frequency coil that further experiments were made to see if such a receiver could



FIG. 1—ALTHOUGH SMALL ENOUGH TO SLIP INTO A SUIT-COAT POCKET, THIS SELF-CONTAINED SUPERREGENERATIVE RECEIVER (INCLUDING ITS LOOP ANTENNA) IS EFFECTIVE FOR RECEIVING SIGNALS ABOVE THE STATIC LEVEL.

not be made up of standard parts. A number of receivers were built, some designed to provide room inside the case for stowing away the 'phones when not in use; some compressed to the smallest feasible size to allow carrying in the pocket, the 'phones being carried separately; and some being pocket size, yet having inside provision for carrying the earphone. When limited to the use of standard parts it is believed that the second type is the most practical considering performance, battery life, and the fact that it is a certain amount of nuisance to stow away a 'phone and cord neatly in a small space while it is relatively

* 155 Hodge Road, Princeton, N. J.

easy to shove a pair of 'phones into a small leather carrying pouch.

All of these receivers employed substantially the same basic circuit, which is given in Fig. 2. Fig. 1 shows the model that is believed most practical, with a field glass case behind it to give an idea of its size. It may be carried in the side pocket of most suits, being only 4 by 1 27/32 by 7 7/8 inches, not counting knobs on top. It is made of 1/8-inch ply wood, the front and back being given a trifle of overhang to protect the loop which is wound around the outside of the box in two sections with the knobs between. The inside dimensions are about 3 3/4 by 1 7/16 by 7 1/16. 'Phone tip jacks are worked into the "musical" design on the front as the middle two notes, the first note being a nut for mounting the core of the

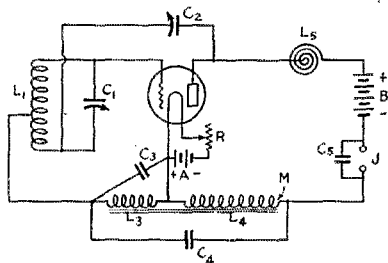


FIG. 2—CIRCUIT OF THE MODEL ILLUSTRATED IN FIG. 1

The other models use a similar arrangement with modifications as given in the text. The parts used are as follows:

- L₁—42 turns No. 28 d.c.c. wound on box, tapped 17 turns from bottom.
- L₂, L₃, L₄—Types 1693 and 1694 coils (Sickles).
- L₅—R.f. choke coil (Hammarlund midget).
- C₁, C₂—140-μfd. condensers (Hammarlund Star midget).
- C₃—0.005 μfd. condensers (Dubilier or other small type).
- C₄—0.1 μfd. condensers (Dubilier or other small type).
- C₅—0.1 μfd. condensers (Dubilier or other small type).
- R—30-ohm rheostat (Clarostat Type R M H).
- M—Magnet core, obtainable from S. G. Frantz, Mohawk Machine and Tool Co., 161 Grand St., New York City, price \$1.00 postpaid. (Thin strips of transformer iron may be used for the core if available.)
- Tube—Type 30.
- B—Battery 9 volts of "Penlite."

i.f. coil system. The rheostat shaft is between the condenser knobs and is provided with a slotted end rather than a knob (to discourage unnecessary adjusting by persons unfamiliar with filament controls that should not be turned up too far). Fig. 3 is a view of the internal arrangement, the back cover being removed.

The tuning range with the loop described is about 650 to 1600 kc. Other ranges may be obtained by altering the number of turns on the loop. Assuming that the tuning knob has been calibrated to show the best settings for the various stations that can be received, the operation of the receiver is simple: Just set the tuning knob to the station desired and then turn up the regeneration control to the point of best reception. If the

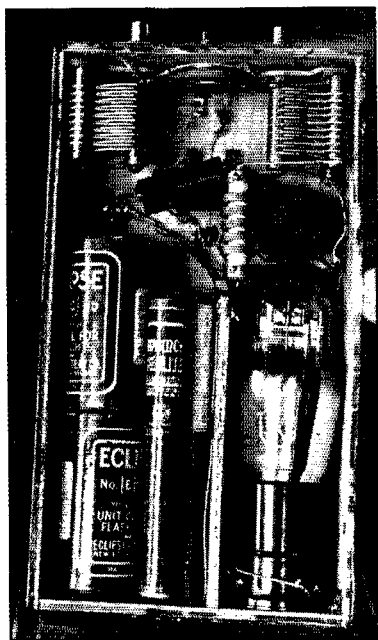


FIG. 3—REAR VIEW SHOWING INTERIOR CONSTRUCTION OF THE "MUSICAL" MODEL

i.f. oscillation stops, turn the regeneration control back to minimum and then turn it up again but not so far this time. It should be found that stations giving a sufficient field strength for consistent reception through summer static will be received clearly.

The following notes may be useful in the actual construction of the receiver.

If a different choke is used, the best tapping point on the loop will have to be found by trial. The best separation of the coils L_3L_4 will also have to be determined by trial, but $\frac{1}{2}$ -inch or so is probably very close to correct. (The coils may be held in position by rubber bands around the core.) The entire i.f. assembly may be replaced by

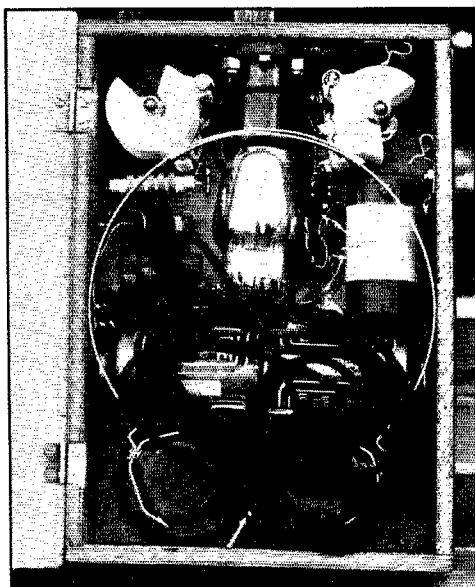


FIG. 4—INTERIOR VIEW OF THE LARGER DESIGN WITH A HEADSET INCLUDED

a single inductance of 50 to 100 millihenrys suitably tapped near the grid end. Both the tap point and the best value of C_4 will then have to be found experimentally. Coils L_3L_4 must, of course, be so poled as to produce i.f. oscillations, which being in the audible range are easily heard in the 'phones. L_4 is the larger of the two coils.

Hand capacity effects are least when the rotors of C_1 and C_2 are connected as shown in Fig. 2. C_3 may be widely different in value from the one given. C_5 may also depart somewhat. As to C_4 , its value depends on so many factors that no best value can be given. For example, greater selectivity and sensitivity at the low-frequency end of the range may be had by making C_4 larger, while less annoyance from the i.f. is obtained by making C_4 smaller.

A small partition alongside the tube makes a convenient support for clips holding the B batteries.

Fig. 4 shows the inside of a larger receiver designed to carry a pair of Trimm "featherweight" 'phones (which may be either the 2000-ohm or the 4000-ohm model), as shown in Fig. 4. The front view is of no particular interest as the location of parts is shown completely in Fig. 6. A few differences in makes of parts are noticed as compared with Fig. 3, but these are of no significance. A coil and switch are shown, however, to provide a short-wave range as will be discussed later. The box is of $\frac{1}{4}$ -inch ply wood, the internal dimensions being $5\frac{1}{2}$ by $8\frac{1}{4}$ by 2 inches. This receiver is much too big for a pocket but is small enough for many purposes.

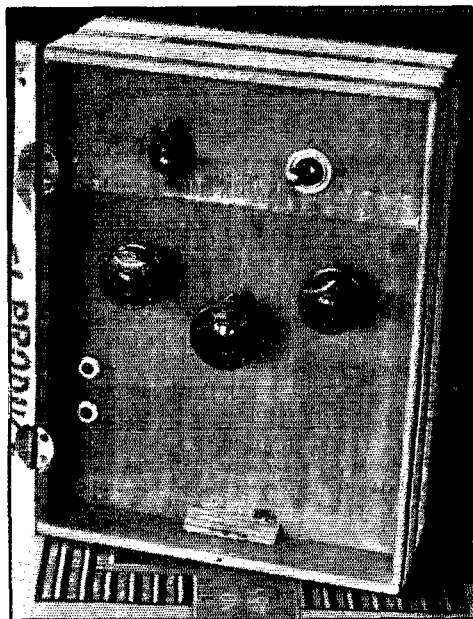


FIG. 5—FRONT VIEW OF THE RECESSED PANEL RECEIVER

Fig. 5 shows an attempt to reduce size still further while sticking to standard parts and providing space inside for the phone which in this case is a single Trimm "featherweight" 2000-ohm ear-piece on a single head band, and which is stowed away at a lower corner of the panel with the head band circling around the controls. The

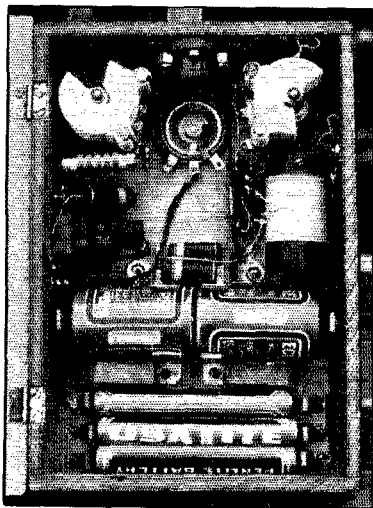


FIG. 6—ANOTHER VIEW OF THE LARGER RECEIVER WITH THE PHONES AND TUBES REMOVED TO SHOW THE CONSTRUCTION MORE CLEARLY

panel is recessed $\frac{3}{4}$ -inch to take care of the 'phone and knobs, except that the upper part is less recessed to save space inside. This box measures 5 by $6\frac{1}{2}$ by $2\frac{3}{4}$ outside, and is made of cigar box wood about $\frac{1}{2}$ -inch thick with a hinged front cover. On account of its smaller loop and single ear-piece, the performance of this receiver is inferior to that of the preceding one, but it is free of projecting controls. The two switches shown on the upper panel are for a different sort of wave range change from that used in the preceding receiver, and which will also be described later.

Finally, Fig. 7 shows the smallest self-contained receiver made so far. Unfortunately, the parts are practically all special and the performance is not so good as the others, partly because of the single tiny "deaf-set" type ear-piece, and partly because of the space available being in-

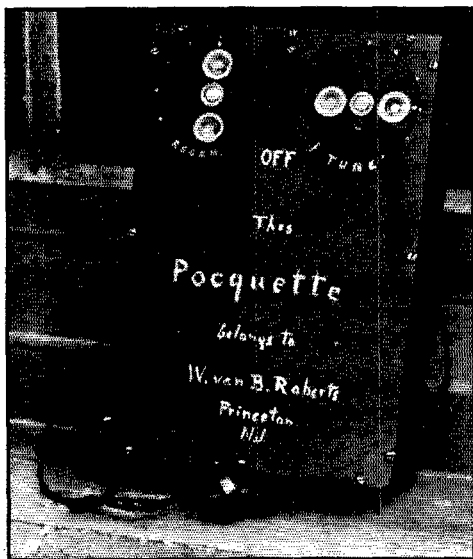


FIG. 7—THE SMALLEST "POCQUETTE"

sufficient for a modern tube. The condensers were specially made by Hammarlund with only $1/100$ -inch clearance between plates, and have a capacity of about 250 μ fd. which gives a tuning range of about 600 to 2000 kc. in this particular receiver. Fig. 8 shows the inside viewed from the back after a sliding cover is removed. Some other interesting features of the receiver are: The dials are flush, with finger holes for tuning while the set is in a pocket. The rheostat adjustment is also flush. The tube socket design allows the tube to be swung out so as to clear the side of the box. The entire assembly is on a sub-panel which can be lifted out of the case. The material is linen bakelite, and has six shallow slots milled around the sides to make a decorative feature of the green silk loop wire which is wound in these slots, five

turns per slot. The overall dimensions are $4\frac{5}{8}$ by $6\frac{13}{16}$ by $1\frac{7}{16}$. The chief interest in this receiver is that it makes it appear possible to build something small enough to be carried in the breast pocket of a coat and capable of bringing in stations of good field strength intelligibly.

DUAL RANGE SWITCHING

The lack of a small condenser having a three-to-one tuning range makes it desirable to provide some sort of auxiliary high-frequency tuning range. This may be done in several ways. The receiver of Figs. 4 and 6 uses a small coil which is switched in parallel with the loop by the double-pole single-throw switch seen between the tube and the coil. A center tap on this coil is permanently connected to the loop tap. Another tap slightly off center is brought out to a Fahnestock clip for connection to a short antenna when available. The center tap is also brought to a Fahnestock clip for connection to ground, but that proved unnecessary. Fig. 9 shows this arrangement. The small coil is adjusted to give the desired short-wave range.

Obviously this extra coil method reduces pick-up and takes up space. So in the receiver of Fig. 5 a different method was used. The loop was wound in two equal parts, each part being mid-tapped. Two double-pole double-throw switches

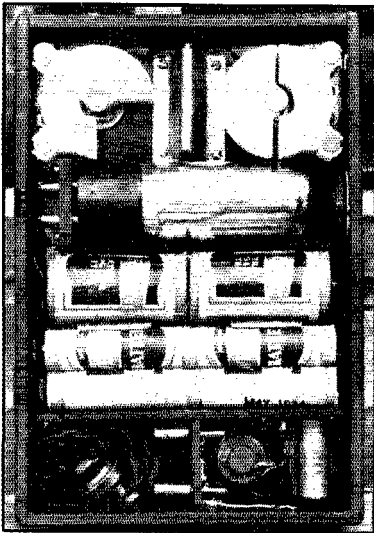


FIG. 8—THE COMPACT INSIDE ASSEMBLY OF THE SMALLEST "POCQUETTE"

arranged as in Fig. 10 then throw the two parts of the loop in series or parallel, the tap point being in the centers when in parallel but off center when in series. (If a choke of larger inductance than the Hammarlund midget is used, such as the

(Continued on page 68)

Allen H. Babcock

WE REGRET the duty of reporting the death of Allen H. Babcock, former director of the Pacific Division of the A.R.R.L., in San Francisco on October 26th, at the age of 70 years. For over eight years—from 1923 until the end of 1931—Mr. Babcock represented his division in the A.R.R.L. Board of Directors and was an important voice in the shaping of amateur affairs in this country. He was W6ZD and continued more or less active on the air.



Born in Buffalo, schooled in Oakland and at Phillips Exeter Academy, the University of California and Lehigh, Mr. Babcock was a well-known member of the electrical engineering profession. Commencing with the Thompson-Houston Electric Company in 1891, he became electrical engineer of the Harriman Lines in 1903, of the Southern Pacific Company in 1909, and in 1912 was elevated to the title of consulting electrical engineer of that company, which he retained until his retirement in 1933. Amongst his outstanding electrical achievements was the designing and building of the mammoth suburban electric system of the Southern Pacific Company in the Bay Counties. He was a fellow and past vice-president of the A.I.E.E., past president of the Engineers' Club of San Francisco, a member of the American Association for the Advancement of Science and of the S.A.E. He represented the United States as its principal delegate at the Inter-American Electrical Communications Conference at Mexico in 1924.

Of decidedly nautical leanings, Mr. Babcock was an expert amateur navigator and yachtsman and a deep-sea fisherman. Until he reached retirement age he was a lieutenant-commander in the Naval Reserve and made several cruises with the fleet as a radio officer. He was also interested in astronomy, seismology and volcanology and was a member of the Astronomical Society of the Pacific.

In 1933 he retired from business and removed to what had been his country home at Inverness, in Marin County. There, with his wife, his dog, his boat and W6ZD, he spent his later years in peace and contentment after an exceedingly active career.

(Continued on page 66)

Washington Radio Club Hamfest

Government Spokesmen Discuss Cairo Matters

WE DO not usually have space to report in *QST* the numerous hamfests held every month. But the one of the Washington Radio Club on November 2nd in the nation's capital was of such unusual interest and importance that we break our rule.

About 250 amateurs gathered in the Italian Garden of the Mayflower Hotel for an afternoon session which was followed by a dinner, the awarding of door prizes, and a dance. At the dinner, besides the president of the club, J. Stanley Brown, and the toastmaster, Roy C. Corderman, there were just four speakers, each the ranking head of his particular branch of radio: Commissioner Irvin Stewart, chairman of the Telegraph Division of the Federal Communications Commission; Major General James R. Allison, U.S.A., Chief Signal Officer of the Army; Captain G. J. Rowcliff, U.S.N., Director of Naval Communications; and Dr. Hiram Percy Maxim, our own president. What made the occasion of particular importance was that the speakers were well aware of our desire to obtain additional frequencies at Cairo and spoke to the point on that subject. Both the Chief Signal Officer of the Army and the Director of Naval Communications dwelt upon the liaison between the services and the amateur, the value they place upon us, and forcefully asserted the intention of their arms to cooperate with us in every possible way in securing additional frequencies. Loud applause of course greeted these pledges, as it did the statement of Dr. Stewart that no delegation at Cairo would be found willing to go farther on behalf of the amateur than the United States one. But Dr. Stewart coupled with this a plain warning to American amateurs not to go farther than their own delegation was willing to go.¹ We think his remarks of sufficient importance to warrant reproduction here in full:

I came here tonight to say one thing, and when I have said it I am through. It is this: in your preparations for the Cairo Conference, keep your feet on the ground.

It is no news to you that frequency allocation must be determined by international agreement. It is no news to you that some countries endeavor to suppress amateurs; that many countries merely endure amateurs; and that only a few countries actively encourage amateurs.

¹ Of course we shall all have to be loyal to the U. S. stand, once that stand is determined. But it seems to us that has nothing to do with what is right and proper for us in making plans and preparing our representation before the United States planning group. It is also to be observed that many of the amateur bands are not exclusive but are shared with other services in the international allocation table, a system which permits each government to subdivide the use of the band in accordance with the numbers and actual needs of its amateurs.

You can be proud of the fact that of approximately 60,000 amateurs in the world, some 45,000 of them are in the United States. You must recognize, however, that those figures furnish the source of your greatest weakness in an international conference. Aside from the United States and certain parts of the British Empire, only one country has as many as 1,000 amateurs. Bands that to you mean terrific congestion, to some countries represent waste space. Far from wanting to set aside more space for amateurs, many countries may feel that too much space is now set aside for amateurs. After all, if space is needed for some service deemed nationally more important, what is more logical than for a delegation to insist that it be made at the expense of that service which is deemed nationally of less importance?

The moral? Simply this: at Cairo no important delegation will go farther for amateurs than the American Delegation, and many will be reluctant to go as far.

I do not know who will compose the American delegation nor what its position will be. I am sure, however, that a conscientious effort will be made by the delegation to establish that position which is best conducive to the development and use of radio and, therefore, to the best interests of the United States. Actively assist in the formulation of that position, and, once it has been formulated, whether or not it contains everything you desire, support it loyally.

If you try to go farther than the American position, you may lose part of what you have. If you work with the American delegation, there is a fair chance that the American position may be adopted internationally.

Mr. Maxim described the early days of amateur radio and the A.R.R.L. To complete this galaxy of speakers, only the President of the United States was needed. He was not present, but did send the following letter:

THE WHITE HOUSE
WASHINGTON

Hyde Park, New York,
November 1, 1935.

Dear Mr. Brown:

I have just been informed by Mr. E. Malcolm Williams that some three hundred radio amateurs, many of them being members of the Army Signal Corps or Naval Communications Reserves, will convene in Washington this coming Saturday.

The fine services of the radio amateurs of America—I refer to the communications which they made possible when Admiral Byrd was in Little America, and the exceptional service they have rendered during many emergencies within and without the boundaries of our country—merit recognition by as well as the high praise of those in Federal, state and local government.

It is my earnest hope that this convention will be one of the most successful since the advent of amateur radio.

Very sincerely yours,

FRANKLIN D. ROOSEVELT

J. Stanley Brown, Esq.,
President, Washington Radio Club,
Mayflower Hotel,
Washington, D. C.

At the afternoon meeting, various pieces of apparatus were described and displayed by Dr. Eugene C. Woodruff, W8CMP, director of the Atlantic Division and chairman of the A.R.R.L. Cairo Committee, and by John L. Reinartz,

(Continued on page 58)

M.R.A.C.-A.R.R.L. 56-Mc. International DX Contest!!!

Jan. 1, 1936 through Dec. 31, 1936

NOW that 28 mc. has reached a W.A.C. communication status and more is continually coming to light about the transmission characteristics of the band, it is felt that a similar "annual" contest for five meters should serve to focus more experimental attention on the 56-mc. band, and serve well in adding to general knowledge of its characteristics. On each ultra-high-frequency band more experience with directive radiators, special arrays, high power in lieu of antennas that give high gain, or high power combined with antenna gain is bound to extend the communication boundaries and add to existing knowledge about the frequencies in question.

All operating facts possible should be collected for study. Correlation of these at intervals with solar and terrestrial data of different kinds is important to progress. We are, therefore, without further explanation, pleased to announce a 56-mc. international DX contest, to run throughout 1936, and to the winner there will be the award of a silver loving cup (16-inch) offered by The Milwaukee Radio Amateurs' Club for 56-mc. DX achievement!

This trophy is of spun gold finish, is mounted on a black bakelite pedestal, and general appearance as shown in the photograph. The cup will be on display at A.R.R.L. Headquarters until awarded, and has been engraved "The Milwaukee Radio Amateurs' Club, Inc. 56-mc. Achievement 1936. Won by" also bearing the A.R.R.L. Emblem. All will agree this is something well worth working for. Here are the rules:

1. The contest is open to all licensed radio amateurs, in any country in the world.
2. The contest begins at 0001 Greenwich, January 1, 1936 and ends at 2400 Greenwich, December 31, 1936. All contacts for score must be within this period.
3. Transmissions must be in accordance with government regulations in all respects as regards power, frequency, log-keeping, etc.
4. Proof of contacts in writing may be required by the contest committee.
5. All contestants must submit entries consisting of a summary showing the number of weekly reports sent Hdq., and the points score

based on completed contacts in accordance with these rules, this to reach A.R.R.L., West Hartford, on or before January 31, 1937, in the case of North American participants, or on or before March 15, 1937, in the case of all other continents.

6. (a) One point will be scored for each completed 100 miles of contact, with a specific station (e.g. a contact with a station 99 miles away scores no points, contact with a station 658 miles away scores 6 points). All distances will be measured by a Great Circle line between stations.

(b) In computing his final score a competitor may claim points for each different station worked once during each calendar month.

7. An A.R.R.L. Award Committee shall consider the file of reports and data submitted by competitors to the A.R.R.L. Its decision will be based on:

- (1) The number of weekly reports to A.R.R.L. on 56-mc. work, 50%.
- (2) Number of points in accordance with Rule 6, 50%. Examination of all reports with ratings weighted on these factors will determine the 1936 56-MC. ACHIEVEMENT AWARD.

8. Decisions of the award committee shall be final, and the right is reserved to declare no competition if less than two entries of sufficient merit are received.

Rules 5, 6, and 7 are worth reading twice if you are out for that cup. Note that, as well as QSO points counting for the winner, that the matter of *weekly reporting* on band conditions, with respect to DX heard, and experimental developments, receiver design (new features for tone or c.w. reception), antenna research, results of tests, etc., and any correlation of DX and variations in the signal strength of certain stations you may select to test with and the relative humidity, barometric conditions, temperature, sun spot and magnetic data is given *equal* importance, with the DX worked. In the absence of outstanding DX of consequence, it is conceivable that the award might be made based on the number and value of weekly observations reported. This factor is important in that it will help to keep the band populated, as well as

(Continued on page 68)



With the Affiliated Clubs

Attention, W7's!

DIRECTOR GIBBONS, W7KV, has appointed W. L. Miller, W7AAN, Northwestern Division chairman for the A.R.R.L. Cairo Survey. Mr. Miller will be in charge of organized survey work, especially as pertains to club groups.

Providence, R. I., Hamfest

The Providence (R. I.) Radio Association will hold its Fourth Annual Hamfest on January 18th at Jim Smith's Inn, Pawtuxet, in the town of Warwick, R. I., registration commencing at noon. A.A.R.S., U.S.N.R. and traffic meetings will be held in the afternoon, in addition to speakers on special subjects. Banquet at 7:00 p.m., followed by short talks and prize drawings. Festivities will wind up with a dance. Tickets purchased in advance—\$1.00; purchased on the day of the hamfest—\$1.25. Reservations may be made from the club secretary, Chester S. Lyon, 200 Indiana Ave., Providence, or the Rhode Island S.C.M., C. C. Gordon, W1HRC. Club members will be on duty at the P.R.A. Club rooms, 3 Valley St., Providence, to assist out-of-town guests in locating the hamfest headquarters, to furnish transportation, etc.

American Legion Convention

W9KFL of the Mound City Radio Amateurs and W9BGE of the O.B.P. handled traffic for delegates to the 1935 American Legion Convention in St. Louis. This resulted in much favorable



COMMITTEE IN CHARGE OF THE OAKLAND RADIO CLUB—A.R.R.L. TRI-SECTION HAMFEST

Upper row, left to right: S. G. Culver, W6AN, Pacific Division Director, Shurley McClara, W6AKB, H. C. Stryker, W6GZT, Elvin Feige, W6TT. Bottom row: Charles Moser, W6HS, Stewart Ayres, W6GEA, Horace Greer, W6TL, Charles Ziegler, W6RT. 710 amateur radio stations were silent on Saturday evening, September 28th, as the largest gathering of amateur radio men in the history of Northern California convened. Over \$600 worth of prizes, an Italian dinner and a dance were the outstanding highlights of the Hamfest.

comment, and W9BSH, M.C.R.A. secretary, suggests that clubs take every opportunity to perform similar services for the public. The next A.L. Convention will be held in Cleveland, Ohio.

28-mc. Cup Offered

The Fellsway Radio Club of Medford, Mass., will award a cup, suitably inscribed, to the first radio amateur in the First District, who, after January 1, 1936, Works All Continents on the 28-mc. band. QSL cards confirming contacts should be sent to the secretary, W. J. Stevens, 30 Belmont St., Malden, Mass. The club's decision will be final.

Cup Awarded to W3FAR

At a recent meeting of the York Road Radio Club, W3FAR was presented with a silver loving cup for being first to Work All Continents on 28 mc. The meeting, attended by approximately 100 amateurs, was devoted entirely to 28-mc. discussion and stimulated much interest in that band.

Greater Wisconsin Hamfest

The Greater Wisconsin Hamfest, held under the auspices of the Kilocycle Club of Milwaukee, was a stellar success. Opening at 5:30 p.m., October 26th, with more than two hundred hams present, the doings lasted until 4:00 a.m., the 27th. Among other features was the reception of the club's regular broadcast from W9XAZ. Speakers included Dr. Miles J. Martin, University of Wisconsin; A. R. Woolfolk, W9ROO; Ralph E. Welton, General Electric; A. R. Morton, Centralab; William Gainer, W9SO; and Fred Catel, W9DTK. Several vaudeville acts were presented, and a buffet supper was served continuously from 7:00 p.m. to closing. Dancing was enjoyed by scores of the "delegates." Yes, there were the usual prizes! The Kilocycle Club plans to make its hamfests into annual state conventions.

Victoria Short Wave Club

VE5EZ, station of the Victoria Short Wave Club, was set up at the Provincial Exhibition in early September. A part of a complete amateur exhibit, this station handled 316 messages in one week.

The Annual Banquet of the V.S.W.C. was held November 23rd. Although called a banquet it was more a hamfest. Activities included a movie travelogue of Canada, "From Sea to Sea," loaned by Canadian National Railways, recitations

(Continued on page 66)



110-Volt Transmitter Using 48's

One tube which offers possibilities for the low-power transmitter which must operate from a 110-volt d.c. line is the Type 48, a power amplifier tetrode the construction of which is such that it has pentode characteristics. This tube is capable of an output of about 2.5 watts as an audio amplifier, and should give more when operated at the higher efficiency characteristic of r.f. circuits.

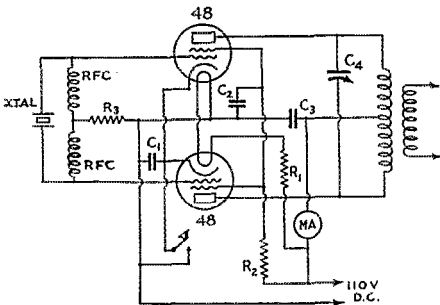


FIG. 1—A 110-VOLT D.C. TRANSMITTER USING TYPE 48 TUBES

- C_1, C_2 — $.003\text{-}\mu\text{fd.}$
- C_3 — $.005\text{-}\mu\text{fd.}$
- C_4 — $100\text{-}\mu\text{fd. variable.}$
- R_1 — $200\text{-ohm variable resistor}$ to carry at least 0.4 amp.
- R_2 — 15 ohms.
- R_3 — $25,000$ ohms.
- R_4 —Short-wave chokes (2.5 mh.).

As suggested in the text, four tubes may be used in push-pull parallel, in which case R_3 should be $15,000$ ohms and R_1 may be omitted, the four heaters being connected in series across the line. The plate coil should have the requisite inductance to resonate at the crystal frequency in conjunction with C_4 .

A crystal circuit which has been used successfully by Dr. A. L. Russell, W9VOD, is shown in Fig. 1. It is adapted from the transmitter circuit given in *How to Become a Radio Amateur*, with such changes as are necessary to use the 48 tube. Using two tubes, a number of stations were worked on the 7-mc. band with an input of only 11 watts, one of them being 1100 miles distant. The screen voltage was dropped slightly by means of the 15-ohm resistor.

In an attempt to increase power, four 48's were used in push-pull parallel, the circuit diagram being the same as given except that two tubes were used on each side, the elements being connected in parallel. This permits connecting the heaters of all four tubes in series directly across the 110-volt line, and the resistor R_1 can be omitted. With four tubes the value of the grid

leak, R_3 , should be reduced to $15,000$ ohms. Other constants remain the same. The power increase was found to be worthwhile, since a higher percentage of calls were answered and the transmitter got out better. It should be possible to run the input to 25 watts without much difficulty—a power which is not far from the average of many transmitters using 350- or 400-volt power supplies.

W9VOD reports a curious thing in connection with using Type 48 tubes; apparently the tubes require "seasoning" during a few days' operation. At first very loose coupling to the antenna must be used; after the set has been in use for a while the coupling can be increased and more power taken from it. After the "wearing in" process is over, however, the transmitter has been found to be perfectly stable.

Breakin Plus Monitored Keying

The idea contributed by W8FU in the Experimenters' Section of October *QST* suggests the further possibility of a complete breakin system without any relays or other moving parts.

The circuit is shown in Fig. 2. The receiver and transmitter negative terminals are grounded

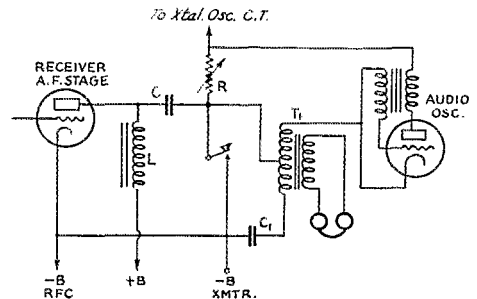


FIG. 2—COMBINED MONITORING AND BREAK-IN SYSTEM WITHOUT RELAYS

- L — 30-henry choke.
- C — $0.5\text{-}\mu\text{fd.}$
- C_1 — $0.5\text{-}\mu\text{fd.}$
- R — $400\text{-ohm variable resistor.}$
- T —Audio transformer.
- T_1 —Push-pull output transformer.

at a common point. When the key is pressed three operations occur simultaneously: The receiver output is grounded; the transmitter is put into operation, and the audio oscillator puts a signal into the 'phones.

When the key is released the transmitter and audio oscillator cease to work, and the receiver output is connected to the 'phones.

Several precautions should be observed. The leads carrying audio frequencies should be kept short. The key should have as little capacity as possible otherwise the received signal may be by-passed to ground through this capacity when the key is open. A navy type key, i.e., without a metal base, is satisfactory. The two wires going to the key should be placed several inches apart and kept short.

For breakin operation the crystal oscillator should be keyed. Since the oscillator takes a small current, sparking will be negligible.

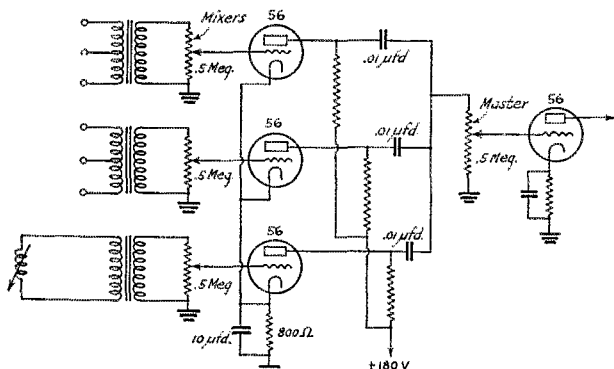


FIG. 3—AN INEXPENSIVE MIXING SYSTEM FOR AUDIO AMPLIFIERS

The plate resistors are each 100,000 ohms.

The idea is presented for what it is worth, because the writer has been unable to get the equipment to see if it is practicable.

—Richard Libertucci

Mixing System

The circuit of Fig. 3, for mixing inputs from various sources, is contributed by Charles M. Dibrell, W5BLW, with the thought that it will be of interest to hams doing P.A. work and possibly also to 'phone men. He writes, "With this method . . . several sources, such as microphones and phono pickups, can be mixed without the necessity for expensive constant-impedance volume controls for each channel. Ordinary 500,000-ohm potentiometers are used in each grid circuit, and the variation of any one control has no noticeable effect on volume or frequency characteristics of the others regardless of their settings. Thus a music background for speech is easily obtained. Any number of channels could be used, as well as other types of tubes. One of the twin tubes like the 53 might be used with two channels."

Another possibility is the use of a 6F7 tube for a two-channel mixer when it is necessary to provide more gain for one tube than the other.

Variable Antenna Coupling

In Fig. 4 is shown a scheme which I found very helpful in adjusting antenna coupling.

As you can see in the diagram, the adjustable arm of the copper-tubing coil is bent so that it is the radius of an arc with standoff insulator No. 1 as the center. The slot may be made by boring holes along the tubing for about $\frac{3}{4}$ inch and then filing until that part of the slot is smooth on both sides. The remainder of the slot is sawed with a hacksaw, using two blades in the hacksaw to obtain the necessary width. A light filing is necessary to finish the job nicely. In use, the bolts in standoff insulators 1 and 2 are loosened slightly (No. 1 less than No. 2) and the coil is adjusted for desired coupling. Tightening the bolts gives a rigid "job" with desired coupling.

Needless to say, the adjustable arm is flattened before drilling and sawing operations are begun. Quarter-inch copper tubing is used here.

—King Ramsey, Jr. W5EJS

A Sleet Melting Antenna

Nearly every winter we have sleet storms in this section and many transmitting antennas are broken down by the weight of the ice or rendered useless by excessive losses and the detuning effect of the ice.

Several years ago it occurred to me that the most dependable type of antenna would be the

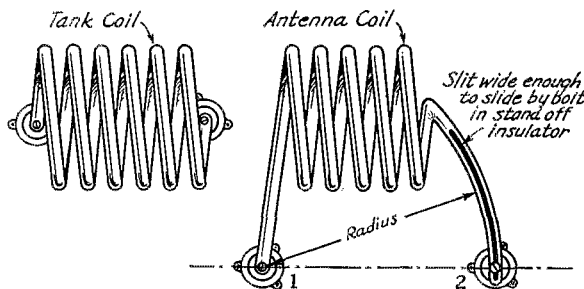


FIG. 4—METHOD OF LOCKING THE COPPER-TUBING ANTENNA COUPLING COIL IN PLACE

feederless end-fed type since the total weight and exposed insulation is much less than with other types. However, the detuning effect of sleet is still serious, and in an effort to correct this condition, a scheme of sleet melting by means of a 60-cycle circulating current was devised and installed this Fall.

The antenna consists of two parallel wires,

closed at the far end and separated about one inch by spacers inserted every four feet. These spacers are one-inch square blocks of soft wood fastened in place by binding with fish line. The transmitter end is attached to a d.p.d.t. switch so that the antenna may be switched quickly to the heating transformer. A quick change over is desirable as it may be necessary to apply heat during listening periods to prevent the sleet from sticking.

From experience with melting sleet on power lines, I calculate that 230 to 400 watts will produce adequate melting at 0° F. for a 130-foot No. 14 wire antenna. The current is supplied by a 500-v.-, 115/11-22-volt sign lighting transformer. These transformers are comparatively easy to obtain around repair shops as many incandescent signs that once used them have now been replaced with neon signs.

With the end-fed antenna, better efficiency is

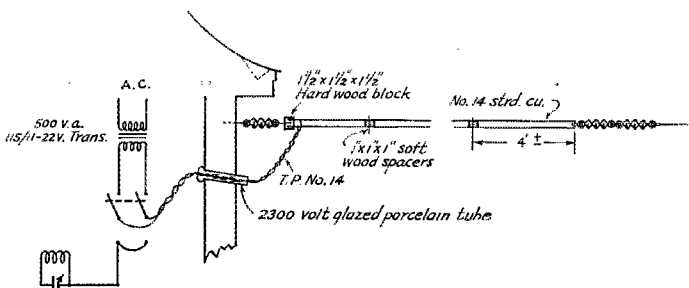


FIG. 5—SLEET-MELTING SYSTEM FOR AN END-FED ANTENNA

realized by using a high-*L* in the antenna tank. The coil here for 80 meters is 19 turns of No. 14 d.c.c., 3½ inches in diameter. The tuning condenser is a 7500-volt, 30- μ fd. size.

Even if you prefer some other type antenna for regular use, this type would be worth while as a stand-by for emergency use. It is well to remember that during sleet storms, amateurs are often called on to supply emergency communication.

—Chas. W. Carter, *WSAGT-WSEZL*

Shorting Link

In shorting the grid pipes in my stabilized five-meter oscillator, every system I tried only served to pull the pipes together or push them apart, thus throwing them out of parallel. However, I bought two 60-ampere fuse clips, five cents each, connected them with a piece of flexible copper strip, put them on the pipes, and there you are. The 60-ampere size gives a great contact on 5/8-inch outside diameter pipe.

—Jack W. Turner, *W3ERY*

Calibrating the E.C.M.O.

In investigating the use of electron-coupled circuits as applied to the transmitting field, it was found feasible to use the electron-coupled

oscillator of the transmitter as a sort of frequency meter after due calibration. The hitch to this was that the oscillator control of the transmitter—the circuit, as usual being high-*C*—was hard to calibrate because a small change in the setting of the oscillator condenser caused a very large change in the oscillator frequency. To remedy this, we employed the band-spreading scheme outlined in June 1934 *QST*, putting the band-setting variable inside the grid coil. Since the cathode tank circuit is on the next lowest amateur band in the interests of stability, it will be necessary to change the band-spread tap on the 80-meter coil in order to get the correct spread on 40 meters. This is simply a matter of moving the tap nearer the ground end of the coil however.

The receiver now in use here happens to employ the same type of spreading system, therefore it was possible with a little cut and try to get the same amount of band spread upon both the receiver and oscillator dials.

After this was done the two were calibrated together, by means of the band-setting condensers, so that when the receiver was tuned to any certain frequency its dial setting was the same as the dial setting of the oscillator for the same frequency. By the judicious use of the tapped-coil system and the use of the band-setter condensers this did not prove as difficult as would appear.

As a result of this little time spent, it is now possible to run over a band with the receiver, pick out a spot a little more free from QRM than the others (none seem to be entirely free, and sometimes you get fooled when some high-power station is listening and suddenly pops on your chosen frequency about the time you have set the transmitter there) swing the oscillator dial to the same setting and there you are.

Naturally this system has its defects—don't try to land right on the edge of the band with it—but it is really a great improvement over the usual system, and if the calibrations of receiver and transmitter are checked periodically it works with precision and ease.

—B. K. Willoughby, *W9NTW-OHK*,

Strays

Christmas Seals

An interesting thing has happened in this issue of *QST*. One of our advertisers is making their contribution to the National Tuberculosis Association in the form of Christmas Seals stuck onto their page in *QST*. To the best of our knowledge this is unique. The advertiser bought the seals and our printer kindly licked them and stuck them on: 53,000 stamps, 53,000 licks!



OPERATING NEWS



Conducted by the Communications Department

F. E. Handy, Communications Manager

E. L. Battey, Asst. Communications Manager

A.R.R.L. Trunk Lines are all one-spot crystal-controlled lines. Traffic is being handled faster and with a higher percentage delivery figure than ever in League history, due to the effective lines and to a large number of successful Section and area nets of "reliables." Official Relay Stations establish a standard to work toward and set an example. At the same time we find in amateur radio some newcomers who haven't yet caught on to the idea of a "preamble," who conceive of nothing to a message but adr-text-sig. Let it be a matter of personal responsibility to put these good men right by explaining the whole standard message form and incidental practices, so these men may become equally fine examples of carrying forward the A.R.R.L. tradition by perfecting their technique so they may become equally skilled as they join the ranks of the old-timers and win appointments in the ranks of "reliables," organized for traffic and for emergency readiness.

DOING FIRST THINGS FIRST

Did you ever work a fellow for about a half hour, right up to sixed time, rag chewing about wx and what-not—and then find the guy had a message to give you, just as you had to sign? Just reminds us to say what a lot of hams don't seem to appreciate, that the message should come *first*. If you've got business on the hook say so, and let that come first. If conditions get tough then the available time can be used to put the message through. The incidentals of rag chewing and report can take place anytime.

Next to accuracy on messages, speed is the thing. In large degree this depends on the personal responsibility of the operators handling to keep a particular bunch of traffic on the move—and to move it expeditiously right after a contact is established is a first principle of communication. Messages have priority over incidental dabbling in radio. Business before pleasure is an old adage which applies here. It is time-honored amateur tradition to "clear the hook" before worrying about the incidentals. Handling traffic gives point, prestige, and purpose to station operation.

Whatever we undertake, it is always worthwhile to put our best foot forward, and do it *well*. QTC? QRV? Make the messages complete, and preambles in standard A.R.R.L. form adopted by amateurs for amateurs. Let the business of clearing the hook come *first!*

W.A.S.

To "work all states" is quite a test of operating ability. The rules for getting into the W.A.S. Club are given elsewhere in these columns. We don't know how many hams there are who never more than get out of their own back yards all their amateur lives, but we have been led to suspect there are a few. On the other hand, with real operating ability and even a mediocre signal, we have known fellows to work all over the map, especially if they have made it a point to invest in good receiving equipment.

For a given set of schedules for reliable work in an 800-mile radius we are quite willing to admit that excellent communication of the two-way variety is possible with something less than worked-all-states capability in our heap. Just as seldom-used 100 H.P. peak performance in our automobiles gives reliability in the tight spot where a little extra acceleration counts, and the reserve of spare power gives extra smoothness and pleasure in driving, the like business of testing our station and operating abilities for completeness of coverage has points in its favor. If a station can do a real job

of communication with our brother amateurs over this whole great country, then it is reasonable to believe the station will come through when QRM or some other snag arises in routine communication.

The announcement makes us scurry around to look at our own stack of QSLs to see if we can make it—and how many to go! You will find that finding stations in some states is like looking for a needle in a haystack, as elusive as Asia has been to an easterner who wanted to make W.A.C. up to this season, for example. Careful listening, and searching the "station activities" section and calls heard lists will show what stations can be depended on for certain states. Ability to "band switch" to take advantage of the right band, for the right time of day and the right station will also help. The greater the flexibility of the station as to crystal switching and band switching, the quicker it can W.A.S. Unlike W.A.C., a considerable larger volume of operating achievement is required, and the "elapsed time" of making W.A.S. will probably remain at a high figure indefinitely on that account. Many who rank well in the current "SS" or in O.R.S./O.P.S. parties will find themselves on the road to W.A.S. when they glance over acknowledgment cards and log, but advance queries make it apparent that there will be plenty of stations working for official W.A.S. recognition to help us all make the grade during the coming months!

Not only to the new ham, but to many who have been in the game for years, W.A.S. will serve as a new objective.

—F. E. H.

Did You Know

that January one was the time to make some good operating resolutions?

that the F.C.C. now require that 'phone stations working in the amateur bands below 30 mc. employ means "to insure that the transmitter is not modulated in excess of its modulation capability"?

that today is the right time to draw up the list of parts and build an inexpensive (a) modulation indicator, (b) keying monitor, (c) frequency meter, or whatever gadget will really put your station in line with regulations and modern practice?

that ten meters was "hot" back in '28 and '29 and transcontinental and transoceanic work fairly common? (See QSTs of those dates.)

that the Board of Directors went on record at the last meeting, recommending (1) dummy antennas for testing, (2) employment of methods for reducing power for local work, and (3) use of band-switching and other arrangements promoting more diversified use of bands?

that January first is the time to start a new "number sheet," amateur message practice being to run a full series of numbers annually? (This is to avoid confusion in tracing, which might result if two messages of the same number were simultaneously in circulation.)

that a good stable modern receiver with proper shielding and no antenna connected is excellent for monitoring work and may be used with a standard as a "frequency divider"?

that testing and adjusting should be done in daylight—not in congested evening operating hours?

that QSL? means "Can you give me acknowledgment of receipt?" and refers to messages and communication—and only in amateur radio has the use been extended to mailed cards or letters?

that wabby and broad signals and spurious radiations are out, but in spite of many F.C.C. discrepancy reports, new recipients are coming on the air every little while?

that the 1715-2000-ke. band is perfectly swell for communicating good distances without skip troubles?

that the W.A.S. Club is open to amateurs of all countries? that your local affiliated club invites you to attend and exchange ideas with other hams and "belong"? Drop us a line for the address of the nearest affiliated club.

that the Cairo committee needs your help in putting the preparatory survey over properly? Have you got your "For More Frequencies A.R.R.L." button yet? What are you doing about it? A postal card will bring information.

that 'phone harmonics from 3.9-4 mc. 'phones and off-frequency 7-mc. operators are giving two widely separated press association services a headache? Calls for looking into bias, antenna couplings, and general readjustment—to avoid F.C.C. notices and ham heartaches.

that your S.C.M. (address page 5) would like an activity report from you on the 16th of every month, whether you are an A.R.R.L. member or not, and whatever your type of interest in amateur radio?

that W8LJZ as winner of Official 'Phone Station get-togethers is entitled to be known as King of the O.P.S.?

that an S.C.M. cancelled his own appointment for what he deemed insufficient activity—but hopes to be able to re-issue it within another month? A.R.R.L. organization is built on conscientious adherence to high standards.

that the first "SS" was won by W1ADW with 13,158 points (153 stations, 43 Sections) and he received one of the three "real broom" awards denoting a clean sweep for the national high?

that only 117 reported on the first "SS" while now the logs come in by the thousand . . . this was the "sixth annual"?

that the A.R.R.L. DX Contest had similarly modest beginnings?

that the A.A.R.S. and N.C.R. deserve your interest and support, not only because of the hearty support they give amateur radio, but for the excellent emergency organization, operating technique and fun, not to mention the fine spirit of fraternalism that prevails?

that League affiliated clubs receive field organization bulletins and important additional "hot" information of general amateur interest for members? Join a local affiliated club now.

that a business or commercial message is defined as such depending on whether or not compensation is involved? That is, what the messages say isn't generally the point, but whether one gets paid directly or indirectly for handling them by radio.

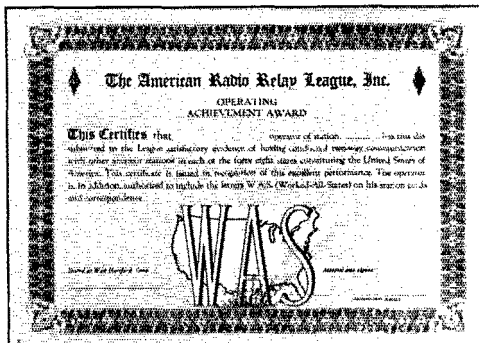
Andes-Amazon Expedition

W2DXO and W2AHC continue their schedules with the Andes-Amazon Expedition to Ecuador. The expedition call is HCAA E, frequency 4500 kcs. W2AHC has worked HCAA E direct on two occasions. However, in most cases, HCAA E's c.w. signals are relayed through HC1FG. On one occasion HCAA E's signals modulated HC1FG's transmitter. The W2AHC/W2DXO weekly schedule with the Expedition is at 10:00 p.m. EST Friday.

As an example of the conditions under which the expedition must work, W2DXO tells of an experience of John Ohman, W2DPQ, HCAA E operator: "John's canoe was preceding rafts downstream when a snake swimming the river struck the canoe, mounting inside, went right across his legs and then slid into the water on opposite side of canoe, continuing on its way across the river. The snake was the most poisonous in that region, being known to the Indians as Utsukulin. John also ran into bird eating spiders while putting up antenna! The expedition is now on the Curaray River, having completed well over a hundred and fifty miles down the rivers Villano and Curaray."

Among the interesting and pleasing things W2DXO has encountered while keeping his schedules with HCAA E is an example of the true amateur spirit. It happens that W4FT is right on HC1FG's frequency, and his signal was so loud one night it made expedition contact difficult. W2DXO called

W4FT, asked him if he would close down for the duration of the schedule, and all others to follow. W4FT QRT immediately, with no questions asked. W2DXO says, "It was the finest amateur spirit I have seen in a long, long time."



Announcing W.A.S.!!—Worked All States Club

In accord with general interest being shown in such an award A.R.R.L. announces certificates now available for those radio amateurs who "Work all forty-eight of the United States." Just as WAC means "Worked All Continents," henceforth WAS will mean "Worked All States." We're ready to receive applications for membership in the Worked All States Club. The award is available to amateurs the world over, regardless of affiliation or non-affiliation with any organization. Here are the few simple rules to follow in applying for membership:

- (1) Two-way communication must be established on the amateur bands with all forty-eight United States; any and all amateur bands may be used.
- (2) Contacts with all forty-eight states must be made from the same location.
- (3) Contacts may be made over any period of years, and may have been made any number of years ago, provided only that all contacts are from the same location.
- (4) Forty-eight QSL cards, or other written communication confirming two-way contacts made (one from each state), must be submitted to A.R.R.L. headquarters.
- (5) Sufficient postage must be sent with the confirmations to finance their return. No correspondence will be returned unless sufficient postage is furnished.
- (6) The W.A.S. award is available to all amateurs, everywhere in the world.
- (7) Address all applications and confirmations to the Communications Department, A.R.R.L., 38 La Salle Road, West Hartford, Connecticut.

Get going, gang! The list of hams to first qualify for "WAS" will be published in April QST. This will give all hands two or three months to QSO their "missing states." Check up to-day on the states you have worked and those from which you have received acknowledgments. List the missing ones and aim your "signal squirter" in their directions. We are right in the middle of the season of good radio conditions. Activity is at the year's peak. You will find no better time to WAS than NOW. We are delaying publication of the first list of members until April QST to give everyone time to make the necessary contacts, receive acknowledgments, etc. Start now and assure yourself a place in the list of Charter Members, WAS!!

Mr. Sheehan's article wins the C.D. article contest prize for this month. Each month we print the most interesting and valuable article submitted in connection with the article-contest. Contributions may be on any phase of amateur operating or communication activity which adds constructively to amateur organization work. Contributions should run between 500 and 750 words. Prize winners may select a 1936 Handbook, six logs, six message files, six pads blanks, or equivalent credit toward a combination of A.R.R.L. supplies. Let's have your article. Mark it "for the C.D. contest," please.

—F. E. H.

Hello, Ole Timer

D. R. Sheehan, VE2DG *

When you lose the thrill of a QSO
With a W-one or two,
When the fact that you're heard in some far distant land
Just don't mean a thing to you.

When sending a card is a burdensome task
And a "listeners'" card is taboo.
It's time you pulled switches and closed up your shack
For there's nothing in this game for you.

When you snub a beginner, when a "chirp" is a crime,
And a "QRS" plea you abhor,
You better get out of Ham Radio, friend,
For there's no fun for you anymore.

I just love to be told, "You're my first, VE2,"
If he only lives over the line.
The pleasure of working a Chirpy DC
Is a thrill, boy, to me anytime.

I like to "pipe down," send slow to a kid.
Sure—and tell him his keying is fine.
And when he comes out with that "Pse QSL,"
Believe me, the pleasure's all mine.

If you would enjoy this old Radio Game
Just pause and hark back o'er the years
When if you hooked a "seven" you thought you'd done fine,
And to lose him just almost brought tears.

You've got to think back to your lid days again
And remember that this is quite true,
You must do unto others in this Amateur World
As you'd have them do unto you.

* 4609 Melrose Ave., Montreal, P. Q., Canada.

New Members

The A.R.R.L. Emergency Corps

We are happy to welcome the following new members of the A.R.R.L. Emergency Corps: WIACV W1APA W1APW W1BAP W1BCF W1BGA W1BRL W1DUZ W1FYE W1GRU W1IGU W1IIS W1MC W2AQG W2BGO W2FBU W2IBP W3CQS W3ETM W3EZN W4AKI W4BDG W4BIN W4BUE W4CNA W4COW W4DGS W4DPA W4SC VE4WG K4BRN W5BUK W5BZR W5CMQ W5CPT W6GAS W6IYN W6KVQ W6LIQ W6LLW W6MAG W6QC W6TI W7AF K7AIF W7ASX W7BDD W7BWH W7ENQ W7EY/6 W8ENS W8FBC W8KSY W8MHE W9ABB W9BRA W9BWX W9BYV W9CRU W9DBO W9DHS W9DNX W9FJM W9MYV W9PGV W9RIL/TMB W9VVJ W9JAW W9SCA W9UDU W9UPW; Lake Worth (Fla.) Radio Club, W4AWO; Manteca (Calif.) Radio Club.

The A.R.R.L. Emergency Corps comprises those amateurs and amateur organizations possessing equipment (transmitter, receiver and auxiliary power) suitable for operation in an emergency when regular power and communication facilities are disrupted. All amateurs having such equipment are invited to enlist at once in the "Corps." Simply send a post card to the Communications Department,

A.R.R.L., West Hartford, Conn., listing in detail what emergency gear you have, including data on what frequency bands it works, etc., and stating especially what form of auxiliary power is available.

Every member of the Emergency Corps must make known his availability for emergency communication to local Red Cross officials, railroads, military units, police departments, representatives of press associations and the like. A membership card, which also serves as a card of introduction to these various services, is furnished every A.E.C. member. See page 59, November '35 QST.

Hams Afloat

W8ICE is captain of a ship on the Great Lakes; it might be interesting to hear of other amateurs who are ships officers, other than radio. W4BTM is operator on the Yacht *Carolina*, KMJR, Bridgeport, Conn. (at present). Carl Roehm, ex-W3AJT, is on the S.S. *Freeman*, WBCI. W3CEB is assigned to the S.S. *Gulfstream*, WJCI; he has been on fifteen different ships in the last seven and a half years. W8CLL is pushing the key of KENQ, the Tug *Sulphite* on the Great Lakes; the rig is a half kw. spark. W1BZA is sparks on the S.S. *San Juan*. KESV, the S.S. *Pueblo*, is manned by W5ADZ, well known by So. Texas hams for his A.R.R.L. organization work. K6JRN wonders if there is any commercial op younger than he; he is 16 years of age, and is operator on WJDD, the *Lanikai*, a fishing schooner, and on the S.S. *S. Bradley*, WOFR. W6DTY is op on the S.S. *Huguenot*, KIVQ. The S.S. *Torres*, WIGW, carries W6BQZ as op. W3ASE put in some time on the U.S.S. *Sebago*, C.G.

W8KVX reports the following attending the U. S. Coast Guard Radio School in New London, Conn., when he was there not many weeks ago: W1GVY, W1GKA, W1BMP, W1EKH, W3ESL, W4ZB, W7BCO, W8FOO, W9PCY, W1AII, W1EBT, ex-8OT, ex-K6AQO. W1GVY is now on the C.G. Cutter *Mojave*. W8KVX, ex-W8OT and ex-W9BHU are co-operators on the Cutter *Tahoma* located at Cleveland, Ohio. W8FFK is on the freighter *La Salle* on the Great Lakes.

W2FDM tells of his various berths as radio opr.: "The first assignment was HRBA, running down to banana land. It was a two-man radio job, which meant twelve hours a day on watch. It didn't take long for me to learn the difference between commercial and amateur radio! The next berth was on KGOV, the ill-fated *Morro Castle*. Next came WADT, the S.S. *Santa Cecilia*, sailing on an eight weeks cruise to west coast South American ports. As far as the radio gear was concerned that was a ham's paradise. The main transmitter was a 500-watt, combination long- and short-wave job, with continuous tuning from about 18 to about 60 meters in the SW section, and from 60 to 800 meters in the long wave end. It was nothing to sit down in the wee small hours of the morning watch and clear commercial stations on every continent. I wish I could use that towards a WAC certificate! Then there was the night I worked WAX, Hialeah, Fla., from a point near Valparaiso on 36 meters with the antenna relay open; I wondered why he said my sigs were so weak! The pet of the station was the little emergency transmitter, which used four 210's and gave an output of 50 watts on any wave from 600 to 800 meters. The power was obtained from a 12 volt storage battery, which drove a little MG set. It was easy to work 1500 miles with that baby on 600 meters. Since WADT, the itchy foot has possessed me and the following have resulted: WBDA, NYK to London; WLIA, South America; KDWK, NYK to Hamburg, Germany; WECB, coastwise; WBFZ, more coastwise; and finally the present berth on the sea going tug *Wyoming*, KLDW. The rig here is a nice little 200 watt c.w./i.c.w. job. My quarters are so small that it's just like camping out. I sleep with my feet under the transmitter and my head alongside the sink. My watches are stowed laying in the bunk. No remarks about it not being a soft berth. To send I have to kneel on the end of the bunk, or stand up. The mill has to be held on my knees, with my feet resting on the MG set. Fun, eh?"

The tuna-clipper *Taiyo*, WCFC, has a pair of '52's in a short-wave transmitter, and fishes between San Diego and Panama and the Galapagos Islands. W6UU is Sparks.

W9IH will be found aboard the S.S. *Fitzgerald* on the Great Lakes. WIIMO is with Mackay Radio, at present on KJXS running between New York and Porto Rico. W8FDY signs "DT" as First Operator on WUAF, the U.S. Army Transport *Chateau Thierry*, running between New York-Porto Rico-Panama-San Francisco-Honolulu and return. W6JQJ is operator on the S.S. *Kentuckian*, WACJ, sailing from Boston to Portland, Oregon or Seattle, Washington, with intermediate ports. The WACJ rig is a 1-kw. Telefunken Spark, receiver a 37 det.—38 aud. KOBV, the S.S. *Baldhill*, is manned by W3BNM. W3ZG is operator on the coastwise freighter *Volusia*, KUMV, using a 1-kw. spark transmitter and receiver of 1917 vintage. Hams aboard the U.S.S. *California* are W6JXA, W6KBH and W6MKS. W6LRA was formerly one of the *California's* radiomen, but is now in Panama signing NY2AD. JXA-KBH-MKS find 50-mc. portables a real boon to the "visiting gob"—they get dates and dinners in every port, with just a few CQ's!! W5ADZ is on the S.S. *Pueblo*, KESV. WSINX is r.o. on the S.S. *Pontiac*, KFMK. W8EEZ boosts the sigs on KLBK. W3ZI spent some time during the summer of '35 aboard the S.S. *Pastories*, KDBD, a United Fruit runner between N. Y. C. and Central and South American ports, stopping at Haiti and Jamaica. The *Pastories* is quite a famous craft, being well known during the war as one of the luckiest transports afloat; many trips were made through the war zone without a casualty. Among many shore stations visited by W3ZI were NAX, Gatun, C. Z., and broadcast stations HJ1ABA, HJ1ABB and HJ1ABG. While in Porto, Portugal, as radio operator on the U.S.S. *Aylinn*, Ed Wisniewsky, one of the brother-operators of W8QM, visited CT1CP. W8EVW and W3EOI, brothers, have quite a service record of ship-operating. W3EVW is ex-KQR, KQN, KDFK, KJOE, KUTS, KDEW, WCDQ, KUNP, KGQB, KGEJ, KDMA. W3EOI is ex-KQR, KJC, KDHR, KHR, KODC, KGQD, KUMS, KUZC. W1CDZ recently left the S.S. *Siboney*, WECZ, after a trick on the bounding main.

W9IU Wins O.R.S. Trophy Cup!

The W9AUH-O.R.S. Trophy Cup, offered to the three-time winner of National O.R.S. QSO contests, has come to rest in the shack of Les Gregg, W9IU, of Marion, Ind.!! First won by W9KJY in the October 1934 contest, the cup next went to W9MN, winner of the January '35 fray. Then W9IU won "three-in-a-row," the April, July and October '35 contests, and thereby won the coveted cup. The whole O.R.S. gang extends congratulations to Les, for every one knows that he had to *work hard* to win three of those battles!! W4NC, with Al Hege, W4ABT, as operator, came through second in the October contest, close on the heels of W9IU; Al didn't let any grass grow under his fist, either!

W9IU's closely contested victory (62,776 points) was derived from working 221 stations (212 O.R.S. and 9 O.P.S.) in 59 A.R.R.L. Sections. One hundred and twenty-three additional O.R.S. and O.P.S. were heard, in the 30 hours of contest operation. W4NC, with 61,914 points, worked 222 stations in 51 League Sections, and heard 84 additional stations, in 28½ hours work. It was a neck-and-neck proposition, the stations and operators very evenly matched, since the differences in central and eastern location were compensated for by an official scoring ratio of 4 points to 5 points respectively for the areas concerned. While to W9IU goes the glory of three wins in a row and the Cup, Al Hege of W4NC likewise made a



O.R.S. TROPHY CUP
Won by W9IU

record which is expected to stand for some time—working most O.R.S. in the short period of the party—218 of them and 4 O.P.S.! Congratulations to both winners, and to all the stations and operators placing in the high brackets.

It takes real ability and a superior station to make the following list in one of these quarterly periods devoted to testing the equipment and communicating ability that makes the signal go places:

Station	QSOs	Sections	Heard	Score	Power	Section
W9IU	221	59	123	62,776	250 watts	Indiana
W4NC	222	51	64	61,914	400/600	No. Car.
W9ELL	174	51	83	41,565	990	Kentucky
W3NF	151	41	154	28,376		E. Pa.
W3EOP	154	38	193	37,544	300/425	E. Pa.
W9ILH	170	45	76	35,145		Illinois
W1BFT	159	37	67	34,743	250/500	N. H.
W2AVJ	147	38	104	32,832		N. Y. C.-L. I.
W6LDJ	84	44	45	28,952	250	San Diego
W3ADE	120	41	70	28,577	100	E. Pa.

Call	QSOs	Power	Score	Call	QSOs	Power	Score
W1MK	136	400	28,564	W1OR	120	150	30,801
W1TS	127	700	27,664	W5CWQ	119	120	20,368
W6KFC	82	80	27,520	W8KBS	118	35	20,163
W1UE	136	35/45	27,008	W7BSU	63	500/999	19,110
W8GUF	148	60	26,580	W7NH	70	400	18,935
W3OZ	112	150	25,116	W2EYQ	105	300/500	18,840
W1GME	131	140	24,956	W8FIP	110	80	18,681
W8BYM	124	100	24,520	W9NNZ	94	110	18,050
W8KNB	151	30	23,105	W8KWA	120		17,792
W5CPB	116	300	22,819	W8KKG	107	200	17,391
W4BOU	111	110	21,361	W3LAW	106	180	17,259
W2DXO	108	350	21,280	W5DXA	90	250	16,810
W9DHN	108	40	21,216	W8SPB	113	150/200	16,490
W9ENH	113	...	21,160	W2AHC	90	400	15,936
W9RAQ	104	75	21,021	W8HMH	89	150	15,470

Eighty-six active stations have qualified for Official Relay Station appointment in the last four months. All interested hams are invited to drop a line to A.R.R.L. Headquarters or direct to their S.C.M.'s (addresses in each issue *QST*) for details on O.R.S. appointment. It is primarily a *traffic* appointment, for amateurs interested in regular traffic work, schedules, etc. Opportunity is given all O.R.S. appointees to test station performance during quarterly QSO Parties. The pleasure derived from these get-togethers can be fully appreciated only by participation. If sincerely interested in traffic handling, take steps *now* to obtain O.R.S. appointment!

Newly appointed "reliables" now included in the roster of O.R.S. are as follows:

W1INP	W3OZ	W6LMZ	W8LVU	W9LOL
W1BFR	W3EKL	W6IGA	W8EKG	W9JLC
W1DDE	W3EJD	W6LEW	W8NZZ	W9VEE
W1IEG	W3EFM	W6RE	W8KBM	W9NMZ
W1ALO	W4CBA	W6LCS	W8EFA	W9EDK
W1GHT	W4VC	W6KZG	W8MUR	W8DM
W1GVV	W4DJO	W6LBE	W8KEV	W9ETT
W1BEF	W4RAQ	W7EL	W8BYM	W9JL
W1PUP	W4AWO	W7EJZ	W8ATT	W9DNU
W1IEK	W4CJG	W7ETO	W8APC	K7DVF
W1JAH	W5BHM	W8FIP	W9SPG	VE1EP
W1IZN	W6HH	W8LII	W9SSC	VE2EC
W2ICL	W6LYM	W8LTD	W9KHD	VE3VA
W2EYS	W6JZJ	W8LWC	W9VCB	VE4SD
W2HFX	W6LMD	W8OCF	W9SCP	VE5CG
W2FWC	W6FGT	W8MXH	W9TGN	VE5AV
W3BXE	W6LON	W8FKW	W9SUV	VO1W
		W8JYP		

A.R.R.L. 'Phone Organization Notes

Since the last additions to the O.P.S. roster appeared in *QST*, the following 35 O.P.S.'s have received appointment:

W1BAP	W6AGF	W8EQZ	W8KNF	W9TRN
W2CIZ	W6KZN	W8MZL	W8BCA	W9NTP
W3ALJ	W6BKY	W8JTI	W8EMV	W9MYI
W4AL	W6KQK	W8LW	W8MGN	W9LUF
W4QL	W7AUN	W8ODI	W8JIM	W9PWL
W4ANU	W8GUY	W8OGK	W8LUT	W9JED
W4BCZ	W8DGL	W8LBE	W8MOP	W9TBF

If you have a good 'phone, why not drop a line to your SCM (address on page 5) for application blanks for O.P.S. appointment? A.A.R.L. Headquarters will also be glad to

send information regarding O.P.S. work to any amateur who inquires, including sample copies of bulletin material as long as extra copies last. Appointments are not made by Hdq., however, but handled direct with your duly elected administrative Section official, who has full authority in such matters.

The October O.P.S. Party

OFFICIAL Phone Station appointees are becoming more numerous in each A.R.R.L. Section, and with this increased interest the quarterly station-testing and operating is bringing more contacts and higher scores in the short week-end get togethers that come four times a year. During the October O.P.S. Party, Director Roberts, W8HC, addressed Ohio O.P.S. It is hoped that plans will soon be worked out by A.R.R.L.'s Phone Activities Managers, for regular O.P.S. round tables in different Sections and Divisions at which weekly and monthly contacts of a constructive nature will be sponsored in each Section.

The October Party was a spirited affair with stations available for QSO in many parts of the country simultaneously. W8IJZ retains his leadership, proving ability to contact 20 Sections and 51 stations and to better his previous records substantially. He shattered his own previous record, as did W9WC (with 36 contacts in 18 Sections) by a generous margin. The following records by leading 'phone operators speak for themselves.

Station	QSOs	Sections	Heard	Score	Power	Section
W8IJZ	51	20	15	5700	140	Ohio
W9WC	36	18	11	3636	100	Illinois
W8ITA	23	13	10	1755	140	Illinois
W8CSX	19	11	17	1419	75	Michigan
W8EMV	22	11	9	1408	75	Ohio
W8LNU	17	11	16	1287	60	W. N. Y.
W8CNY	23	10	4	1230	60	Va.
W8CHT	20	10	9	1180	100	W. Pa.
W8JZA	17	10	13	1110	100	Indiana
W8HFR	18	8	7	1090	100	Ohio

Call	QSOs	Power	Score	Call	QSOs	Power	Score
W8MOL	23	180	1032	W2DC	10	400	560
W9AED	16	150/200	990	W9FYP	10	250	480
W4BRA	15	990	990	W8BCA	13	200	426
W8DZF	14	110	840	W1GZL	5	75	388
W5DRR	13	...	837	W4QI	12	120	370
W8RG	15	...	801	W8JTI	12	150	370
W9ACU	13	15	800	W4CLB	10	50	360
W9PSP	11	40	790	W8UR	9	160	351
W8CPI	15	25	780	VE3NX	10	100	348
W8BDD	21	140	763	W9KEF	7	140	295

DX Notes

W5DXG was QSO PY2MO on 14 mc., October 6th, and advises that PY2MO is anxious to arrange 28-mc. schedules. He will be found on about 14,250 kcs., or may be reached by mail through PY2AG. FB8AB, ex-FB8C, was worked by W5DXG on 14 mc., November 12th. YT7VN, Jugoslavia, operates c.c. on 7044 and 14,088 kcs. W2DNG was QSO CR7GC (old CR7AO) at 3:15 p.m. November 7th, about 14,375-kcs., T8 signal. W6CXW reports Africans coming through exceptionally well. Several frequencies to watch: ZS6AF and ZT6Q 14,380 T9, ZT6AK 14,290 T9, ZE1JB and FB8AB 14,300, JB n.d.c., 8AB chirpy d.c., CR7GC 14,250-14,350 chirpy d.c., ZT5P 14,250 r.a.c., ZT6Y 14,300, ZE1JS 14,380. W6CXW says they come in best around 1630 GMT, but come through fairly well all morning. W6CXW QSO'ed CR8AA in Port. India, who told him that made WAC. Is this the first USA/CR8 contact? CR8AA is on about 7130 kcs. T9.

W1SZ reports J's coming through on 28 mc. daily (late November) between 5:00 and 6:00 p.m. EST—usually in for about 15 minutes. Their frequencies change from time to

time because they use M.O.P.A. rigs. However, J2EJ is about 28,200 kcs., J2JK about 28,500 kcs., J2IS about 28-150 kcs. W8CRA worked Japan five days in a row on 28 mc. W3EVW worked VU7FY, 7:06 a.m. EST, Sept. 9th, on 14,384 kcs. W6HTO, QSO with W6HYB, was heard in New Zealand, strength 3, on 3.5-mc. c.w., October 6th. D4ARR is heard on 80 meters again, coming through well right on the 3500-kc. edge after midnight EST. W6CUH says, "The best way to figure the rise and fall of DX conditions is to watch for the six to ten day drop-out of all good DX each month, rather than to check and predict the peaks. It is harder to identify the peaks because there are usually more than one, and they depend besides on the number of DX stations actually on the air. During October the low was around the 20th and 21st, the 21st being particularly poor. A bit of extrapolation shows that lows ought to occur on both March 1st and 28th, which makes the DX contest dates look very favorable this year."

KAIAN and KAIAK are active on 14-mc. 'phone and desire more W contacts. Frequencies: KAIAK 14,165, KAIAN 14,198 kcs. KAIAK has worked W6, X2, K6, VK, VU, PK and XU, two-way 'phone. KAIAN has worked SM, ZT, VK, ZL, PK, XU, W6, X2, VU and ON. W 'phones are urged to watch for these KA1's. Ex-CT2BK, now in Bolivia, hopes to be on the air with a CP call soon. He is at La Paz, at an elevation of 12,400 feet! He is now negotiating for a license, which are not easy to get in Bolivia, but will be back with the gang as soon as possible. W2HFF sends some frequency dope: YL2BB, Latvia, about 7175 kcs., T9, about 9:00 p.m., OM2RX worked November 1st, 7:22 a.m., 7 mc., CN8PRL T9 7100 kcs., CN8MI T7 7050, VU7FY T9 14,250 kcs. . . . W2HFF wonders if he is first W2 to work OM (Guam) on 7 mc. He works VK's on 14 mc. up to 11:00 a.m., VK3JK being R9 as late as 10:30 a.m. He also worked VK7KY on 14 mc. one sunny afternoon at 3:45 p.m.! ZL's also come through on 14 mc. up to 10:15 a.m.

By the way, DX men, "DX Notes" is your own particular "column." Send us any news you'd like to see in QST.

Official Relay Stations and Official Phone Stations maintain their equipment and operating at a high degree of efficiency. In addition to routine operation and activity with adherence to the highest standards, stations of these appointees are tested quarterly in actual communication work. The next scheduled tests will be made starting on the evening of January 25.

A Plea for Break-In

JUST a word about this QRM situation. It appears to me that most of the gang are forgetting to use break-in operation for working through this terrific QRM. They are not taking advantage of what is offered them. I have used the break-in system ever since I first went on the air, and it has certainly made ham radio operating a pleasure for me.

Naturally and logically we will have a better chance of copying the other fellow if the station on his frequency lets up every few seconds for a reply. During that time we can at least get enough of what he is saying to give an intelligent answer. In using break-in we are giving the other fellow a break as well as receiving one. If the operator at either end misses something, the receiving operator can break in and get a repeat without having to wait five or ten minutes to tell the transmitting station that he missed it. Break-in definitely makes long calls unnecessary. A simple "BK" inserted at frequent intervals during a call does the trick. The possibilities and advantages of break-in operation have been pointed out time after time in QST and the Handbook, but very few of us are doing anything about it.

It certainly can't be too much trouble to change the key to the oscillator stage and bias the amplifier stages to or near cut-off. A bias power supply can be built cheaply and is probably the most economical way of obtaining bias. Battery bias may be used if desired. Batteries will give good

service in the low power stages of the transmitter. They are not expensive equipment and may be replaced easily. A bias power supply can be built for five dollars and even less if some of the parts are taken from the junk box. There are very few of us who can't afford to build a bias supply. The money saved on the light bill will pay for it in a short time. If the high power boys can buy expensive equipment and big bottles they can certainly afford a few "B" batteries or a "C" eliminator. Most of the gang are using battery bias somewhere in the transmitter already; therefore, it is only necessary to increase the bias to the cut-off value. The new pentodes are certainly adaptable to break-in operation. They can be biased to cut-off with a few volts, and, as the grid current is extremely low, the cheapest and smallest battery will give very long service.

Other points in favor of break-in are: that it makes a very noticeable reduction in the power bill, permits speedier operation, permits a greater number of QSO's in a shorter length of time, to say nothing of the increased amount of pleasure derived from operating.

Let's keep these thoughts in mind when rebuilding the rig, fellows. Let's incorporate break-in features for it's certainly worth while even if only a few can use it. The time has come when we must do everything in our power to relieve the QRM situation in our hands. Don't put it off until you have time to rebuild or until "next week"; do it now! There is no great amount of work to it nor is there a lot of time involved. A S.P.D.T. relay will take care of the receiver. Get out your copies of QST and get the dope from their pages. There's nothing complicated about it. Let's go to it and get some action and results.

—Albert W. Randall, W9SYJ

Oakland Casualty Drill

56-mc. amateur radio was the sole means of communication used by the Communications Committee of the City of Oakland's (Calif.) Disaster Preparedness, Protective and Relief Plan during its casualty drill conducted Sunday, September 29th. Twenty-five amateur stations participated during the three-hour drill period. Of this number two were installed in airplanes, four in automobiles and nineteen in homes. The conditions under which the drill was held were the simulation of a catastrophe in a certain part of the city. Two headquarters stations were established. W6OT, station of the Oakland Radio Club, was set up at the Red Cross headquarters and was operated and directed by H. J. Burchfield. W6JTV, A.R.R.L. S.C.M. Contact was maintained at W6OT with all stations throughout the drill. The participation of the two airplanes indicated the field of usefulness of aircraft as a medium of emergency communication and transportation. The U. S. Navy's plane was dispatched to Mills Field where a letter was picked up for the Oakland Chapter, American Red Cross, brought to the Oakland Airport and delivered to the Red Cross by an officer of the Oakland Motorcycle Squad; all orders were passed to the airplane by radio. The Boeing plane under direction of the headquarters operator was dispatched to Mills Field with instructions to communicate with any of the peace officers or welfare organizations that might be reached by telephone. W6LSJ, on the plane, followed these instructions, received an acknowledgment and sent it back to the headquarters station.

During the casualty drill planes communicated with the mobile stations in automobiles and the fixed stations, which in turn transmitted messages from the planes to headquarters. Headquarters was in touch with all units during the entire program either directly or by relay. The following are the amateurs cooperating in the drill: W6OT, W6GPY, W6INA, W6ZA, W6LSJ, W6LSJ, W6ASJ, W6CBF, W6LBJ, W6ITH, W6DUB, W6IDB, W6BF, W6LVJ, W6DKS, W6FKQ, W6JTV, W6DWK, W6GNX, W6AKB, W6EE, W6GTD.

The success of this emergency test was due in no small measure to the cooperation of the several agencies assisting: The Commandant, 12th Naval District, the American Red Cross, the Boeing School of Aviation, the Port of Oakland, the Police Force of Oakland, the Oakland Radio Club.

BRASS POUNDERS' LEAGUE

(October 16th—November 15th)

Call	Orig.	Del.	Rel.	Total
W2BCX	78	175	1042	1295
W7UJ	193	108	935	1236
W5MN	31	338	436	805
W9FLG	26	26	696	748
W2EGF	57	43	915	715
W3GUF	66	58	588	712
W3EOP	37	22	610	669
W9KG	11	86	554	651
W3SN	125	105	419	649
W5CEZ	77	88	476	641
W8FLA	9	29	592	630
W1DCW	4	3	582	589
W9FAM	102	49	418	569
W3EZ	39	47	472	558
W9HUO	35	10	506	551
W2GGE	21	33	495	549
W9ESA	22	74	422	518
W8JTT	38	70	410	518
W4TH	10	76	426	512
W8DVC	70	16	426	512
W3BWT	67	121	314	502

MORE-THAN-ONE-OPERATOR STATIONS

W9BNT	315	480	821	1616
KAIHR	493	305	462	1260
W5OW	107	108	458	673

These stations "make" the B.P.L. with totals of 500 or over. Many "rate" extra credit for one hundred or more deliveries. The following one-operator stations make the B.P.L. for delivering 100 or more messages; the number of deliveries is as follows: Deliveries count!

W6CXK, 265	W6BPU, 117	More-than-one:
W6CDU, 251	W6JTV, 104	W8ZG*, 298
KAILG, 139		W6ZG, 132

A.A.R.S. STATIONS

Call	Orig.	Del.	Rel.	Total
WLM (W6XXM)	142	235	514	891
WLN (W6XZ-ZG)	24	48	440	512
WLN (W2BCX)	10	108	391	509
W1JB (W6CDU)**	46	214	15	275

MORE-THAN-ONE-OPERATOR STATIONS

WLM (W3CXL)	245	294	1426	1965
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A total of 500 or more, or just 100 or more deliveries will put you in line for a place in the B.P.L.

* September-October.

** B.P.L. rating on deliveries.

Much was learned as to the extent 56 mc. can be used for emergency relief work and additional drills are being planned. Actual supervision of the September 29 drill was by H. J. Burchfield, W6JTV, A.R.R.L., J. W. Garthwaite, chairman of the Oakland Chapter, American Red Cross, and A. C. Turner, Communications Committee chairman, City of Oakland.

Briefs

W8OYK has held the following calls: 2AHK, W3BCL, W3BZV, W3CTR, W2GSN. Who holds the record for number of calls held?

While at business, W2AYN, operating electrician at RCA Communications Central Control Office in New York City, W2HHG, transmitter engineer at RCA Communications transmitting station, Rocky Point, L. I., and W2UK, receiving engineer, RCA Communications receiving station, Riverhead, L. I., work each other all day over the numerous receiving and transmitting control lines. When they go home, they work each other with their ham sets.

One of the fastest routes between the Philippines and the east coast runs W3QP, W6CUU, KAIHR. OM1TB will soon be added to the chain. W6CUU has taken over the place previously held by W6TM. Traffic is invited by these operators.

On August 29, 1935 the following 1.75-mc. 'phone stations participated in a round table QSO: W2HMM, W2ISG, W2DHB, W2HTL, W2HSG, W2ILN, W2HVJ, W2ISS, W2FFG, W2HFH, W2IHL, W2HCE, W2HYG, W2IHC, W1GXU, W2GBG, W2EDI, W2IJU and W2HTH. W2FAR

also took part in this get-together working on 14-mc. 'phone.

The South Town Amateur Radio Club of Chicago held a 56-mc. round table QSO Friday evening, November 15th from 10:30 until 1:00 a.m. CST after the regular club meeting. Participants were W9AA (acting as master of ceremonies), W9ADU, W9CG, W9FKC, W9KXF, W9MDO, W9NRV, W9DQW, W9RT and W9TKM.

During the 1935 W/VE contest, VE4QZ sent his 88th message to W9TSV. Imagine the OM's surprise when he heard this come back at him: "Ur msg 88 red OK by XYL op hr!"
—VE4PQ

VE4KU was looking at the photo of W1MK in the Handbook; a few minutes later he heard and worked MK!

Attention, Call Jumblers!

Too much importance cannot be placed on the necessity for care in making good characters when sending call letters. Practically every call, when sent improperly, can be interpreted as a letter-combination entirely different than is intended. Just for example, take the call W1AL. If sent carelessly, this call might be copied any of eight different ways other than the right one: W1RD, W1AAI, W1EKI, W1ECE, W1ETL, W1ARE, W1AED, W1END!! Send carefully, leaving proper spacing between letters!

Another glaring example of poor sending is one heard almost any time we turn on our receivers—the manner of sending the word TEST:—just note some time and see if you don't copy "NV," "NST" or "TEV" for this much-abused "TEST"!! And still another combination that hams seem to delight in "disguising" is ABC. "WSC" is the favorite way of sending this one! There are many more examples of downright "rotten sending." All active operators notice them regularly. Let's use a bit more care and thought when sending!

When W7FO was in Missoula one day calling upon W7BVI, he noticed that BVI took the fire extinguisher off the wall and sprayed his volume control with it. And it wasn't "hot" either—it simply needed cleaning! Carbon



AT HAMFEST IN WHEELING, WEST VIRGINIA

Standing, left to right: W8AZD, N8ADI-NDE, W8HD-WLHF (the retired "Veteran SCM of W. Va."), W8CWY, W8GHB, W8CXR, W8HWT-W8HWL (W. Va. R.M.). Seated: W8KRU, W8KKG (present SCM, W. Va.), W8CUG (SCM, Western Penna.), (WSKWA W. Pa. R.M.), W8FVU.

tetrachloride did the trick! BVI says the fire extinguisher cleans his crystals too. Hi.

W8MFV was recently QSO a call bootlegger, who was signing W8ORT. In the middle of the contact who should walk in at MFV but the real ORT! Needless to say the bootlegger for the "bums rush"—pronto! W8ORT thinks he came uncomfortably near to QSO'ing himself.

A large and growing file of correspondence attests the value and interest in Hints on Improving Keying, which appeared on page 56 of November '35 QST. Everybody wants to get that thrill which comes only from mastering

correct operating technique! We hope to present more articles along this line soon.

T. R. McElroy, who holds the world championship operating record, advises that he will be glad to give us more dope soon. It is requested that definite questions about telegraph operating be submitted to QST or to Mac direct, so that he can pass along the "straight dope" on how to do it RIGHT in every detail!

W7BWH, Kallispell, Montana, was very active in handling traffic to and from the Helena earthquake area. He kept daily schedule with W7EAI, Helena, handling 186 messages to and from Helena within three weeks. About one third of the messages originated at W7EAI. All traffic other than that for the northwest was put on the 9th C.A.A.A.R.S. net. All work at W7BWH and W7EAI was on 1.75-mc. 'phone. They figure that they had 98% delivery on all their traffic!

During the summer of 1935 W7SO operated portable on the Prince of Wales Island, Alaska, while working for a fish cannery. W7BXQ handled a volume of traffic for him, for himself and other members of his crew to their friends and families in Washington and Oregon. The mail service to the Island is a matter of weeks. W7BXQ moved most of this traffic through A.A.R.S. nets.

16-Way QSO on 1.75 Mc.

Sixteen amateurs participated in a QSO birthday party held in honor of W3BSO on the 1.75-mc. band from 6:45 to 9:25 p.m., September 26th. Each operator sent greetings to W3BSO, many new friendships being made among the sixteen "at the party." The QSO was handled in round table fashion, each operator talking for two or three minutes, in turn. The stations participating were W3BSO, W3FGA, W1ITX, W3DEJ, W3BR8, W8BIH, W2CHA, W3BJU, W3FJP, W3DJJ, W8CPL, W8NVI, W2GAI, W2FEP, W3IU, W2FKB, all operating between 1805 and 1820 kc.

Code Practice

The following additions have been made to the list of stations sending code practice on the 1.75-mc. band: W6GUK, Marysville, California, is sending code lessons on 1805 kcs. Monday and Thursday, 6:30-7:00 p.m., Tuesday, Wednesday and Friday, 6:30-7:30 p.m. PST. These lessons are under the auspices of the Naval Communication Reserve. K6KDV, Honolulu, sends code practice on 1890 kcs. on Monday, Wednesday and Friday, 9:30-10:15 p.m. Hawaiian Standard Time. W8CVF, Baldwin, Michigan, on 1912 kcs. started code practice transmissions on November 10th and will continue them each Sunday, 10:00-11:00 a.m. W6KSE, Tempe, Arizona, maintains a code practice schedule on the 1.75-mc. band, although the times of transmission are not known. W6HGA, Los Angeles, transmits code lessons on 1810-kcs. each Tuesday from 8:00-9:00 p.m. PST. A complete list of stations sending code practice is available from A.R.R.L. Communications Dept., West Hartford, Conn.

O.B.S.

The following is a supplement to the list of A.R.R.L. Official Broadcasting Stations in November QST (page 60): W1BEF, W1BKQ, W2HTH, W4CE, W4DBG, W6GZY, W6KBF, W6LDJ, W7CRH, W7EOP, W9BDX, W9IPN, W3EOP, W4DGS, W5CXQ, W5EFV, W6TT, W9GQH, W9IBC.

National Ultra-High Frequency Hour!

W8LDM, Sharon, Pennsylvania, suggests a National Ultra-High Frequency Hour, when the bulk of ultra-high enthusiasts (56-mc. men in particular) will get on the air. W8LDM feels that this would make for more QSO's and would make 56-mc. operation more profitable all around. In small cities he feels this plan would be particularly help-

ful, since the number of ultra-high stations is limited, and concentrated operation in certain definite periods would make operating more interesting. He suggests the following as National Ultra-High Frequency Hours: 4:00 p.m. for those who can be on at that time, 7:00 and 9:00 p.m. for those who work during daylight hours, and 1:00 p.m. on Saturdays, Sundays and holidays. The times, of course, are "local" standard time. 56-mc. operators might try this suggestion and let us know how it works. What say, Om's?

National Highlights

This issue of QST finds us on the threshold of a new year. As radio amateurs we all welcome it with open arms because it means 365 days more in which to accomplish the things we planned to do in 1935. Time is something a ham never has too much of! Let's make good use of 1936. More time is wasted in poor operating than is commonly appreciated. Aim to make your operating correct in every detail. Make calls of reasonable length. By using break-in much time is saved both during calls and during contacts when QRM gets bad, signals fade, etc. Keep your CQ's short, signing your call at regular intervals. Avoid being branded a "CQ hound." Use common sense during QSO's. If you receive a report of RST 599, don't waste precious minutes by repeating each word two or three times. In fact, any RST report where the "R" is 5 indicates "perfectly readable" so why not send single? Adjust your sending speed to fit the QSO. If the chap you are working is sending fairly slow, don't try to "put him under the table." Send at his speed. Better to send good, clean stuff at 15 w.p.m., for instance, than to blunder along at 25 or 30 per, but to be asked to "pse repeat." A good, steady speed saves time in the end. In voice work don't repeat every thought three or four times, even though you phrase it differently each time. Repeats are necessary and logical only when requested by the station you are working. Briefly, gang, use discretion in your operating and watch your spare minutes pile up!

The annual "blow-out" of the Guadalupe Valley (Texas) Radio Club will be held December 28th, rather than 18th as previously announced. W5EUO will furnish details. The Providence (R.I.) Cairo Committee under the leadership of SCM Gordon, W1HRC, has completed twelve twenty-four hour periods of frequency survey. From the San Diego Section comes word of the "Gab and Goble Club" meeting on 1.75-mc. daily at noon. W6DEE, W6MNT, W6ERT, W6IVG, W6DJC and W6AM operated 56-mc. stations between pylons and judges stand at Los Angeles air races. W4CQD has been named Assistant SCM for Eastern Florida in charge of all O.R.S. activities. The Winston-Salem (N.C.) Amateur Radio Club was the guest of the Bluefield (W.Va.) Club recently; the interesting features included a trip through a coal mine, visits to ham shacks and an extremely palatable feed.

The "Knights of the Kilocycles," well known group of 'phone operators, will hold a birthday reunion over the air on December 29th. The Tampa, Florida, club is holding a contest for 10 watt 'phones on 1.75 mc. This club issues a paper for the Tampa gang called "The Monitor." W5ZM is organizing a New Mexico A.A.R.S. 'phone net to operate on 1.75 mc. W5BDI is now Acting SCM for the Southern Texas Section; that call is sort of a second cousin to the CM's MIM. A football game between Nashua and Concord (New Hampshire) was relayed over the air by W1GKE and W1BFT at the field in Concord with 56-mc. rig and W1HOV at home station relaying on 3.5 mc. to W1HQE and W1TA in Nashua.

W6JBI did a fine job in making contact with K7FAK when a plane of the Alaska Transport System became lost. He kept the pilot's relatives informed, as well as the press. A good net serving Northwestern Alaska is W7DBY-K7LW-K7EYU. Traffic is invited. K7CTU sends daily weather observations from Kennecott to Juneau via K7ELM. The Washington Section will hold a QSO Party on January 19th. Anyone with traffic for Central California should watch for the Central California Net on the 3.5-mc. band between 7:30-7:40 p.m. and 9:30-9:40 p.m. PST daily. Call "CQ CCCN" to raise members of this net. W2HZJ is looking for O.R.S.-N.C.R. stations for an Atlantic coast traffic network.

The Main Line Radio Club of Ardmore, Pa., displayed its station, W3FRQ, in a three night demonstration of amateur radio in a local store, Nov. 7th-8th-9th. Members operated the station and explained details of the equipment and things of interest in amateur radio to approximately 750 visitors; 71 messages totalling 3000 words were cleared. The La Crosse (Wisc.) Radio Club set up its rig, W9ZY, at the local hobby show, Nov. 9th-10th-11th. W7DIE had an amateur exhibit at a local church hobby night and created considerable interest. W2ATM had an FB exhibit in the Hobbies & Handicrafts Show at Y.M.C.A., New Rochelle, N. Y. We are glad to see amateur radio getting this fine publicity. FB, OM's.

The A.R.R.L. Trunk Lines are in particularly fine working order this season. For trans-continent traffic we recommend lines "A", "B", "D", "E", "G" and "L", which include the following stations: "A": W8GUF, W8LSF, W9ENH, W9QXP, W9DGS, W7AAT, W7BSU, W7CZY (all 3805-kcs.). "B": W3APV, W8MHM, W9CDA, W4CXY, W9MZD, W9RIZ, W9LJF, W6GQC, W6GYX, W8ILK (all 3795-kcs.). "D": W4BDT, W4BBV, W4DS, W5CWQ, W5ABI, W5AMT, W5BII, W5ZM, W6KOL, W6FQU (all 3865-kcs.). "E": W3CIZ, W8ELJ, W9PAZ, W9KEI, W9SGP, W9POB, W7DIE, W7ASA, W7AEA (all 3870-kcs.). "G": W1EVJ, W2BJA, W8JTT, W8DVC, W9NNM, W9AZR, W7COH, W7NH, W7DUE (all 3625-kcs.). "L": W2BCX, W2EGF, W8CIO, W9HUO, W9LCX, W9FAM, W9EKQ, W6AXN (all 3615-kcs.).

The following members of the Associated Radio Amateurs of Southern New England (W1AQ) are active in that club's "chain gang": W1AAD, W1AKA, W1EFC, W1HRZ, W1AVE, W1AOP, W1HXV, W1HQR. 56-mc. is more and more appreciated as the band for local get-togethers. Over one hundred amateurs attended a hamfest staged by the Charleston, West Virginia amateurs. W6ZX' "7294-kc. Club" is filled to capacity with 80 members and about 20 on the waiting list. W9RUJ, new Nebraska R.M., is organizing a state net to include both c.w. and 'phone stations. W9JZJ's Sunday North Dakota broadcasts (3971 kcs., 12:45 p.m.) are meeting with wide approval. W9OEL, SCM, furnishes timely notes for these special messages to North Dakota amateurs. The Dakota Division QSO Party was a real success, many good scores being reported.

A good New Year's Resolution: "I, an active amateur, do hereby resolve to report my activities to my SCM each month on the 16th." W9IGZ, president of the Minnesota-Dakota Radio Club, originates a message (QST) to members each week. At the first regular meeting in the spring, the member presenting the largest number of correct copies will receive a prize. This club is holding meetings on 1.75-mc. c.w. during the winter, with W9OWU as control station. The Southern Minnesota Radio Association held its annual convention in Mankato on November 3rd. An Upper Peninsula, Michigan QSO Party is scheduled for January 5th. An Upper Peninsula (W9) one-spot net works on 3630 kcs. The Lower Peninsula (W8) net uses 3656 kcs. Mail delivery to Isle Royale, Michigan, has stopped until the 15th of April; amateur radio is a real blessing there; W9PCU keeps the world in touch, and vice versa.

A well managed hamfest was held at Akron, Ohio, recently with over 200 in attendance. Director Roberts, W8HC, gave a talk on A.R.R.L. activities. Lt. Townsend, U.S.N.R., spoke on the N.C.R. The Ohio Official 'Phone Station organization is growing rapidly; there are now close to 30 O.P.S. in that state. The Fresno (Calif.) Naval Reserve Unit presented an interesting program at a recent meeting of the San Joaquin Valley Radio Club, several members recounting their experiences aboard Navy ships on summer cruises. W9ATO is newly elected SCM for the Wisconsin Section. The Tennessee Traffic Net under the guidance of W4CXY, R.M., is going fine on 3737-kcs. with the following participants: W4CXY, W4DEP, W4ATW, W4RO, W4AYE, W4PL and W4BBT.

The Section Nets in Northern and Southern New Jersey are working out very well. The Queen City (Bangor, Maine) held an FB hamfest on November 8th. W6RJ and W7DEB helped out with Helena earthquake traffic. W4DRE, W3EOU, W3BKZ and W8ATT handled Florida emergency traffic.

CENTRAL DIVISION

ILLINOIS—SCM, F. J. Hinds, W9APY-WR—R.M.'s: AND, ILH, KJY—P.A.M.: WC. LOL wants one schedule a week with some Illinois station, 28-mc. 'phone intrigues PGB. All the gang express their best wishes to KA and hope he has a complete recovery. NMZ wants to know how to eliminate oscillation from i.f. stages. Ten Chicago hams of the South Town Club held a 56-mc. round table Nov. 15th. It is with regret that we record the death of W9JQN, Oct. 12th. ANQ has his eye on 28 mc. TAY and OXA hope for new receivers from S. Claus. Illinois did well in O.P.S. party, reports WC, P.A.M. KEH knocked off his 5000th QSO. Chicago position on Trunk "A" is now handled by ENH. TCB is contemplating 'phone. ACU rolled up 800 points in O.P.S. party in 6 hours. QSL Manager JO has a flock of DX cards for Illinois hams—have you sent in your envelope yet? PNE got seven cards in one mail. The band that works best at any one time is the band that ATS uses. DLD, using a single '10, got R9 from EA on 7 mc. SKF reports HB9Y sticking on 3.5 mc. for the winter. Starved Rock Club is giving a prize to the member making highest score in W/VE contest. FTX is having trouble getting O.R.S. to take traffic, CGT's XYL is recovering from serious illness. Excellent conditions on 7 mc. helped JO work seven new countries in one evening. All of AA's rigs are working nicely now. BPU has had eight contacts with France on 28 mc. FO is trying to work a schedule with K7PQ. Lack of traffic hams in Illinois is worrying DOU. CHM suggests EAF for O.R.S. QQW's transceiver works better as mobile than at home! A.A.R.S. has several new members, among them NUF. MCC is working on a Beloit to Chicago line. KMN schedules GZLB. While QSO UPW, SOJD reported an earthquake at his shack, the whole station dancing a jig, even the tubes rolling off the table! College will force TXQ to resign as O.R.S. COW in mournful tones reports trouble with the new rig. UWF bought an engagement ring with the money he had saved for a new receiver! PHS, SQE and CMR report new arrivals! Hawaiian traffic is coming into the southern part of the state in excellent time, reports JVV. SMD wishes he could compete with LIV and EMN in SS. Over 500 QSO's at VES in the short time he has been licensed. OQ is returning to the air. NZI says his new SX9 Super Skyriver is a Wow.

Traffic: W9DOU 149 (WLT 61) CGV 144 (WLTG 16) RAQ 110 KJV 103 DBO 102 DDE 86 NXG 68 TBZ 64 ILH 55 HPG 45 GSB 33 LOL 29 JVV 28 MCC 27 DDO 26 TCB 18 AND 17 KEH-NUF 16 VNW 15 EAF-FTX 11 ATS 6 CEO-VES 10 ENH 9 ENQ-NUI 7 FO-HQH 6 OQW 5 CHEM 4 IGN 6 LIV 4 SSC-VCB-IYA-CUH-BPU-AA 3 KA-MRQ-JO-INY-KMN-WR 2 UPW-PGB-JSL 1 (Sept.-Oct. PGB 7).

KENTUCKY—G. W. Mossbarger, W9AUH—HNV letters in the following info relative the Ashland gang. Thanks, OM: GAQ is working 1.75-mc. 'phone, as neighbors will testify. GEE ops all bands, 'phone and c.w. plus 56-mc. activity with W. Va. gang. JDI was inoculated with miltitis. 5CZJ is now in Ky. with WCML. Here is hoping ACS is better, after his recent illness. HNV, twin to ARU, rebuilds. ARU swears he is ready for Ky. 'phone schedules. EDQ likes Ky. QSO parties, SDH handles some traffic, RAH! JVA experiments. OMW puts up new mast for SS. CDA schedules New Jersey to California and has new rig. He is on Trunk Line "B." UTO helps out on the YF fraternity in Ky. JYO threatens activity. BAZ has at last bought new receiver, has a dandy station, and has purchased a new mike; what does this mean???? HBQ, never-failing Ky. party winner, was seen looking over mikes, also. SDC and RBV are sweating at Purdue. MWR goes to 28 mc. IFM speeds up Ky. net. NEP reports traffic, Ray! for Paducah. TYQ is now on 56 mc. FZV is QRL work. RBQ is going on 14-mc. 'phone. CMB is operating 3.9-mc. 'phone at Fort Knox, KCZ at the mike. OX, CNE, AYH, HCO and HCD report. L.A.R.T.S. is meeting at Lexington, January 11th. Be there, boys. NGZ, TKF, ETT and SZK work 'phone consistently on 3.9 and 1.75 mc. Looky Lexington population: SHN-RBF-VBO-IFM-48N-JMR-MWR-KKG-MGT-CEZ-LH-BPB-CRJ-MKP-JL-UOW—and we get one report?????

Traffic: W9NEP 14 IFM 41 HBQ 120 BAZ 42 CDA 69 UTO 3 OMW 73 SDH 24 EDQ 79 AUH 15 ELL 16.

MICHIGAN—SCM, K. F. Conroy, W8DYH, 18030 Waltham, Detroit—The re-organization which we undergo every season is just about complete—we can use more help in this organization—you fellows may not know it, but this S.C.M. job eats into our operating time so much that in fact we haven't been able to get on the air in two months—anyone of you who feel that they'd like to help—'c'mon dig in, many things can be done in this Section and, if some of you fellows who feel thataway inclined will dig in with us, there'll be no stopping this Michigan. MICHIGAN NINES: W9PDE, Joseph Lessard, Box 223, Munising, Assistant SCM for the U.P., wants all the U.P. gang to attend the big U.P. QSO party Sunday, Jan. 5th—9 a.m. to 4 p.m. C.S.T. He and RHM have contributed an X cut crystal and holder—frequency will be that of the U.P. one spot net—3630 kc.—two points each QSO, one point each U.P. station heard but not worked, total multiplied by number of counties worked, no power handicap. The U.P. one spot net is gradually growing—all stations are invited to contact 9PDE, Ass't S.C.M. or R.M.'s 9RHM and 9ADY for information. RHM runs a bunch of schedules—too many to list on card! FB, Andy. CEI is waiting until all the deer hunting is over before getting thick with radio.—'C'mon, you hunters. The mail delivery has stopped at PCU until the 15th of April—ham radio is a blessing there! SQB is worried about his brother who was to act as judge in the PCU/SQB garden-growing/cake-baking contest—they sent him a piece of cake to judge and haven't heard from him since! ADY is working on the one-spot U.P. net also. CWR can find nothing to holler about, but does handle some traffic. KDE schedules a nice net for himself. TTY Bros. will soon have new receiver and new crystal rig. FB, fellows. HSQ wants calls of stations with whom he can arrange winter traffic schedules. FB. OZM is studying in Detroit school—wonder if he trusts his YL with the gang or puts her in cold storage? Don't forget to report to W8DYH and for O.R.S. O.P.S. application blanks contact W9PDE. He will handle the W9 situation, OM. MICHIGAN EIGHTS—One Spot—3 6 5 6 kc.—W8DVC, Chief R.M., as usual leads the pack with another B.P.L. under his belt! FB. He says he has crystals that'll allow him to tie into the Ohio net, the U.P. net and the new A.A.R.S. net on 3705 kc. Arrange a schedule to route your traffic thru him. OM wants the boys to drop around and enter his "Try-and-Neutralize-this-blankety-blank-'03A-on-14-mc.-contest."—We expect the prize will be an '03A—base! KXU and 9OZM are among the students at 8AFH's Comm'l School in Detroit. LTD joins the Michigan O.R.S. ranks—formerly of Williamson, W. Va. Welcome. JPV's rig is in rack—spent two days trying to find the trouble—had '46 in crystal and '47 in buffer by mistake! LTH expects to try 14 mc. with new RK-18 in final. NQ is getting set for one-spot net. KMH is QRL at Wayne U. ATO schedules FEP daily. Heard WRDS (M.S.P.) Broadcast OEL's car stolen—had SOEL on rear tire cover—one way of getting publicity! HL DEN scooped it up a bit and is getting out FB. FWU is after O.R.S. NKS plans to become Public Enemy number 1 Kw.—1.75 mc. Flint will be represented in one-spot net by NJB. MYG is another O.R.S. aspirant (?). NUL is using wave and a half antenna. AIJ is one of the few O.P.S. who report regularly—how's about the rest of you? KPL couldn't get traffic locally so went and worked K6LBH for his total! FB. DOI is completing his forestry course at U. of M., but schedules BMZ bi-weekly. MV is now bothered by DYH and NXT within two blocks! NXT is now at 17425 Barlow, Detroit—carries his dentist's tools with him to club meetings—the gang furnish their own gas! ABH plans to get into C.C.C. net. LYS will be Pontiac's outlet in one-spot net. LTT is going to town with schedules. BRS sends in total of 52—and cracks "Lookit, you lug!" JKO is working the 3rd Dist. A.A.R.S. net up into a lather. FB. For the twentieth time ICM tells us he was in Montreal this summer and saw Rita for first time in five years—claims there'll be a wedding in June! DPE reports O.R.S. KNP now in Milwaukee—sorry to lose you, OM. Navy Day traffic boosted CFZ's total. Swell! West Michigan R.M. DWB reports IDZ done the DUBLE-harness. QT is on the road to recovery after illness. LLL is on boat. LSF will be new Detroit Westside R.M. when he fixes up A.R.R.L. membership, ICM east side—when he gets the two and—, MCV claims to be "the great rag-chewer." KSY reports the 56-mc. band

going well in Detroit. NKK is working 13 or 14 hours engineering at Detrola. NLV lost his antenna. AIU is etching himself an edication. NNE looks for traffic in vain—he's gonna get mad and originate some if the gang don't show some to him! JUQ, Allegan, is having good luck with 56-mc. code practice. MBF figures that while he is paying for his schooling he'd better make the best of it—hamming will have to be suppressed! HUD-3 is at Lehigh U., Bethlehem (in keeping with Xmas spirit), Pa., and will portable from there. ARR pounds out on 56 mc. and 3.5 mc. AKN is prettying up the new rig and promises to leave 'er alone! The DYH's (Patsy, Polly and Ken) take this opportunity to wish everyone of our hundreds of friends a Prosperous New Year. Thanks for the scores of kind remembrances—we wish we could visit everyone of you and thank you personally but that is humanly impossible—so please accept this thanks from the bottom of our hearts.

Traffic: W8DVC 512 LSF 232 DWB 177 (WLTF 54) CF7 170 DPE 152 ICM 135 GUC 64 (WLTC. 96) JKO 64 BRS 52 LYS 43 LTT 35 DSQ 31 ABH-JTK 19 GQS 16 DED 14 JYP 10 CAT 9 FOI 7 FX 6 NQ 5 KPL 4 AIJ-FWU-NUL 3 MYG-NJB-NKS-NVP 2 DEN-NZO-OEL 1. W9RHM 264 CE-PDE 15 PCU 8 ADY 6 CWR-KDE 5 TTY 1.

OHIO—SCM, Robert P. Irvine, W8CIO—Well, fellows, here we are again. 8GZ-ZG leads the state, but he did it on special Army frequencies. Looking over the rest of the report I find the old reliable ones again doing their bit and looking for more. One thing seems to be lacking, fellows, and that is the comments. Remember, we can't make up a good report from a lot of blank cards. Surely you know of some little thing that happened during the month that will be of interest to the rest of the gang, so let's have it. During the past month a well arranged Hamfest was staged at Akron and was well attended by over 200. Director Roberts gave a fine talk on League activities. Lt. Townsend, U.S.N.R., spoke on the activities of the N.C.R. and several new members were signed up. Several new appointments have been made this month, among which are 8APC, R.M.; 8LUT, 8AKQ and 8JDJ, all O.P.S. The O.P.S. organization is growing fast and by next report there should be at least 30 O.P.S. in Ohio. HMH is doing good work on Trunk Line "B." ISK is now Alt. N.C.S. 5th C.A. with call WLHO. LZK is plenty busy but finds time for schedules. NGZ is rebuilding for higher power. UW and HCS report by radio. WE reports Intercity Radio Club planning 56-mc. tests between airplane and ground. MXH will have 211D working all hands soon. NAL is nicknamed "General." INT resigned as R.M. APC reports via "YE OLD HEN" and is new R.M. for Cleveland. MUR schedules 5G. BYM has a "5 and 10" traffic score. LCY sends a traffic map that looks like a cross-word puzzle. DVL is out after DX. AQ has new rig working with '03A in final. LZE has complete new station. FKW says best DX on 56 mc. is 15 miles. LAU says SI, CFW, CYC and himself all work at same shop. JFZ is still QRL at University of Cincinnati. NAF is new reporter from Mt. Vernon. KLP is still trying to get on the air. NJJ is new reporter from Madison. LJJ worked a W7 on 3.5 mc. with one-watt input. RN is still pounding brass on KFNN. DIH reports N.A.R.A. will be on the air soon. IET has a transmitter and receiver going, but . . . needs an antenna. ORM is new reporter from Cleveland. LQM, new reporter from Columbus, makes three deliveries. NUO is getting interested in traffic and will soon be O.R.S. AYB has 43 countries to his credit in four months' operation. EME is out after DX on 7 and 14 mc. ANJ reports hearing the Reserve-Denison U. football game being transmitted to Denison University by CIO. OPJ, new reporter from Middletown, is ex-2GLH. FSK finally worked his "J" for complete W.A.C. FSK, IBN and FVV are active on 56 mc. MFV reports by letter. ORT got his ticket by taking a course at Port Arthur College in Texas. LQA and MFV have gone crystal control.

Traffic: W8CIO 188 (WLHC 126) HMH 125 MQO 123 ISK 108 LZK 72 NGZ 70 UW 52 ITR 45 WE 43 MXH 38 NAL 33 KIM 31 INT 23 MQC-APC 22 MUR 21 KUY-BYM 20 HCS 18 LCY-DVL 17 AQ 10 LZE 9 FKW 7 LVU 8 LAU 1. W8GZ/ZG (WLH 512) W8CMI (WLHI 34).

WISCONSIN—SCM, E. A. Cary, W9ATO—HSK quit T.L. "A" because QRL A.A.R.S., but he still has a list of

abbreviations after his name that looks like a rehased alphabet. AKT sends in dope on Madison gang. RSR spends 97% of his time on traffic. Watch him lead the state before long! OXP gets down to work with his new station. SES is working hard handling traffic. UGE has push-pull '10's TNT with 70 watts input. ATO was elected S.C.M. Many thanks, boys. Let's get together and put Wisconsin on the traffic map. RKP was heard in England. LFK is building another 56-mc. transceiver. OTL visited OZM; he belongs to A.A.R.S. net. TJI requests dope on traffic handling. RQM worked VP1JR, ZL3FZ, X2N and CM2AF during week of Nov. 10th; he had 13024 points in O.R.S. party. SJF is going to U. of Wis. OKS sends nice report on Northern Wisconsin Radio Club. Jim Gundry, ex-8KNP, is waiting impatiently for his "9" ticket. KJR is attending U. of Minn. JNU is QRL job. ONI is doing nice job on A.A.R.S. in District 5. VCB is patiently waiting for new PR16. VKX is new ham in Wausau. ROU worked French West Africa on 7 mc. Oct. 14th. TDN is working DX. NPU has 'phone rig on 3.5, 14 and 28 mc. and is looking for someone to listen for him. CJU is still rebuilding. DCU visited Madison. SUG is QRL high school. RZL is chasing YL's. Don't we all? RNU has bugs in his receiver. SST can't get his crystal to give off electricity when he squeezes it. DTF showed members of his speech class the transmitter at CD. 30 members of the class supplied the "OH's" and "AH's." EYD is grinding crystals. Attending U. of Wis. are: BOP, EYD, DTF, SJF, SSR, SDK, IYL, TDN and KLF. PFQ is going to University Extension in Milwaukee. LWY is still in New York. TSC has antenna troubles. UGN sees OXP lots; maybe it's the YL down the street. VNH is a new ham in Madison. LED, RQM, LWX, PCH and PAX have Class A tickets. Clubs: The Northern Wisconsin Radio Club has held two meetings this year, on Sept. 24th at Eau Claire and Oct. 29th at Rice Lake. The September meeting was the annual banquet. Nov. 26th a meeting will be held at the home of FBU at Greenwood. New officers are: pres., JNU; v.-pres., GIT; secy., OKS; treas., CTH; activities manager, DNE. Four Lakes Radio Club again sends its newsy newspaper with dope on all the Madison gang. They have among other things, a DX corner, a QRA section and are looking for a swap editor! AKT is editor and has several assistants. They performed a real service at the motor-boat races which took place about two months ago. GXN, in charge, secured the services of RNX, HBH and RZL. Others who assisted were IYL, RNU, SUG and IHB. Barr transceivers, furnished through the courtesy of Radio Parts Co. were used at both stations. One station was established on the official barge and one on shore. La Crosse Radio Club had their rig, ZY, set up at the hobby show Nov. 9th, 10th and 11th. The affair was sponsored by the American Legion. Few QSO's were had because of poor antenna and noisy downtown location.

Traffic: W9HSK 174 AKT 51 RSR 50 OXP 40 SES 34 UGE 29 ATO 21 RKP-LFK-OTL 4 TJI-RQM 2.

INDIANA—SCM, Arthur L. Braun, W9TE—MBL has Class A now. DJJ likes QSO parties. DPL wants more power. UIX is QRL school work. OEC likes 'phone best. YLO, VNM and VNQ are new at Goshen. DET gets out FB with his 7.5 watts. AGG just got married. TGC is getting plenty of traffic on 'phone. ODH is new O.R.S. HBK uses single '04A Hartley. JRK is rebuilding. TBM is QRL work. EGQ has new super perking at last. VPL is new at Gary. HPQ is trying to get on 14 mc. CWO entered matrimony. IYK is W.A.C. and handles DX traffic. UYP joined A.A.R.S. VNZ is new at South Bend. NQL is building rigs for the locals. HUV is getting out fine on 28 mc. JST is putting up 50-ft. mast. HSF is building new speech equipment. AXH is about ready for 14-mc. QSY. JIW is ready for heavy DX. LLV is planning neon oscilloscope. NTP is getting out fine on 1.75 mc. HUO is keeping A.A.R.S. net going hot. TYF is DXing on 7 mc. VHF will have his P.P. '10's. IU has new RK-28. PPF uses '46's mod. by a 53. CB is new O.R.S. SFG is having trouble with new rig. SDQ is going in for high power 'phone. Please note new QRA of S.C.M.: 530 East Morris St., Indianapolis.

Traffic: W9MBL 6 DHJ 27 DPL 5 UIX 6 DET-AGG 1 TGC 38 ODH 32 HBK 4 JRK 26 TBM 101 EGQ 6 HPQ 10 LYK 2 HUV 7 AXH 2 HUO 551 TYF 6 IU 167 SDQ 4.

MIDWEST DIVISION

IOWA—SCM, Phil Boardman, W9LEZ, WLUD—R.M.'s-9ABE, 9CWX, 9HCH, 9LCX, P.A.M.-9AED. A very fine report with lots of traffic handled. Nice work, fellows, and keep it up. The Northeast Iowa Ham Club reports following new officers: MXC and SWZ, joint presidents; STA, treasurer. AED has several prospective O.P.S. lined up. He also has done hard work to put Iowa on top in O.P.S. contests, but where are our other O.P.S.? O.R.S. appointed: DNU, AWH and PGG. O.R.S. applied for: AEP. O.R.S. cancelled: ERY and FZO. More will be cancelled if activity is not indicated. To scramble a saying, "A traffic net is only as strong as its weakest O.R.S." IEZ is still trying to work a VK. LCX send report of fast handling of death messages, Iowa to Colo. Nice work, OM. NNM reports Trunk "G" now complete. AWH has a fine line-up of schedules including a WI. HCH is having key-click trouble. RCR is thinking of joining Army as radio operator. CWG is still working on super-het kit he won last spring. NVG and REH are active in Army traffic net. FYE visited Iowa City. ACL feels the urge to try 28 mc. NTW needs Africa for W.A.C. SQL says, "Killing the bugs, one by one." IPC won grand prize at Rock Island. PAH's rig is still not finished. MXC was elected radio club officer. SWZ increased voltage and hooked several VK's and K6. STA is new treasurer of his club. RDK entered the SS. JMX has new QRA: Gifford, Iowa. SRP reports very interesting intercept work, including stratosphere balloon. AEP is again living in Des Moines. CCE makes first report since 1929. Welcome back, OM. VTD, ex-5MU, is now living in Cedar Rapids. AED made over 1000 points in last O.P.S. contest. SRK took Class A exam.

Traffic: W9LEZ 456 (WLUD 113) LCX 261 NNM 177 AWH 130 HCH 176 RCR 47 PGG 36 CWG 32 NVG-REH 15 FYE 9 ACL 7 NTW 9 RSVZ-SQL 2.

KANSAS—SCM, O. J. Spitzer, W9FLG—KG and RIZ: R.M.'s. RHG reports for first time. BEB, also new reporter, is using pair of '10's in final; he is a member of U.S.N.R. SIL is on 7 mc. with single '46. OFR is on 1.75-mc. 'phone. RIZ says the more schedules the happier he is. BYV has P.P. 211D's. BJJ now uses Tri-tet osc. BBM is showing signs of returning activity. LFN is still QRL WIBW. We hear a big noise again signing DEB.

Traffic: W9FLG 748 KG 651 RIZ 379 RAT 123 EYY 94 SJV 59 SIL 30 RHG 29 BYV 16 FMX 13 PB 8 OZN 5.

MISSOURI—SCM, J. D. Mills, W9CJR—SGP gets his traffic totals by running seven daily schedules and a couple weekly ones. OLC worked four continents on 28-mc. band. "Miss Missouri O.R.S." OUD. runs several regular schedules and handles traffic. IGW is hard after W.A.C. DI, former Nebraska O.R.S., moved into this Section and O.R.S. was transferred. HUG is moving into the country among the big acorns. KCG is new O.R.S. Trunk Liner KEI says things are beginning to go. EDK has daily schedules which can handle C.Z. traffic. DHN says, "Been doing little of everything on all bands." VEE enjoys O.R.S. party and R.M.-NITE. DIC is DXing with VK and K6. CCZ is rebuilding crystal rig and using '03A TNT during process! NNZ has P.P. 50T rig coming up. OWQ is back on the air with new transmitter and reports for the Sedalia gang as follows: AZL put up LVA's pole "on paper"—LVA has WX interference on new vertical antenna—PVW is building 1.75-mc. 'phone—SHW works 14-, 7- and 3.5-mc. c.w. BTD has job and no time for radio—, KEF worked VE5 with 100 watts on P.P. RK-20 3.9-mc. 'phone. MLR is having trouble getting rig and receiver to cooperate, CJR, also, has been having some of that coop trouble . . . final '03A won't coop with buffer. PSM is QRL work. SHK is trying new Collins rig. BDX reports for K. C. gang.—EL is rebuilding 14-mc. 'phone. RMB is building new rig—BMA is on 7 mc. now—LD is having swell time with a kw. 'phone on 1.75 mc. W9TGN looking for Asian for WAC.

Traffic: W9SGP 157 OLC 68 OUD 47 DI 38 HUG 33 KCG 28 KEI 15 EDK 15 DHN 11 VEE 10 CCZ 1 BDX 38 CFL 10 DIJ 2 LD 6 CJR 1 NNZ 17 TGN 349 JAP 25 AIJ 461 (Sept.-Oct. W9DIC 11 NNZ 41).

NEBRASKA—SCM, Samuel C. Wallace, W9FAM—BNT tops the list as usual. FAM is going strong in both A.A.R.S. and A.R.R.L. traffic work. Trunk Line "L" is working through from coast to coast now. FAM handled

some important traffic to 9EKQ for Denver from 9LCX, relative to death of LCX's wife's father. EHW says he is going strong on 3.5-mc. c.w. and 1.75-mc. 'phone. TBD, new A.A.R.S., is doing his bit. RUJ, newly appointed R.M. for Nebraska, is working on traffic net in state, including a 'phone net. Hope the fellows will give him their support and make a real Nebraska net out of it. POB built portable transmitter and receiver for emergency work on the 3.5-mc. band. POB says he's not going to be caught asleep at the switch again. FB. How about the rest of us? TBF, new O.P.S., reports fine meetings and interest being shown in the northeast Nebraska Ham Club meetings. INR is looking for schedule between 6 a.m. and 7 a.m. M.S.T. DGL is still DXing. BQR works only A.A.R.S. schedules. TQD is doing some nice traffic work, connecting the southern Nebraska stations taking care of their traffic. KVB is doing some experimenting. DLK sends a very nice report of Southeastern Nebraska activities. TKK finally joined the A.A.R.S. and is interested in traffic work. POL is helping keep Fairbury active.

Traffic: W9BNT 1616 (WLU 108) FAM 569 EHW 154 TBD 78 RUJ 77 POB 48 TBF-INR-DGL-BQR 3 TQD 60 KVB 39 DLK 33 TKK 31 PLO 19.

DAKOTA DIVISION

NORTH DAKOTA—SCM, Hartwell B. Burner, W9OEL —LHS is going to California and will work portable from there on 14-mc. 'phone; he received a report from Europe on his 30-watt 14-mc. 'phone. JZJ works England on 28 mc. with 12 watts. STT and PGO keep road hot between Bismarck and Jamestown—YLitis—they also visit FKY. STT received appointment as D.N.C.S. for District 2, A.A.R.S. PRH worked X2 on 7 mc. SWC returned from New England. AZV is still in hospital with broken ankle. PGO visited St. Paul and took Class A exam. UJC moved to Billings and has his "7" call. PGO has B.C.L. trouble with his 1.7-mc. 'phone. TFC built universal exciter with pair of 59's and will soon be on 1.7-mc. 'phone. JZJ's Sunday broadcast is going over in a big way with nearly all the gang listening in as well as Minnesota and Canadian hams; he is organizing "Royal Order of Dumbers Club." Dakota Division is now operating spot frequency with BVH controller. Timely A.R.R.L. information received at OEL on this Sunday drill is passed along to JZJ at 11 a.m. and he puts it on the air at 12.45 p.m. JZJ is new A.A.R.S. member. HJC reports A.A.R.S. system FB, DM at Rock Lake goes to altar, and is now O.R.S. Congrats, Prof. New amateurs reporting: UNU, Wahpeton, UHU, Lidgerwood, and VJH at Hankinson. I wish to thank all you fellows for the swell cooperation you are giving JZJ and his broadcast—results of this broadcast are very encouraging and show FB results here in North Dakota. 73.

Traffic: W9OEL 340 HJC 335 KZL 339 DGS 293 PVA 170 STT 31 IBQ 23 PJT 22 BMR 22 PRU 20 SWC 19 RYZ 17 JAR 14 DYA 12 STJ 10 JZJ 10 RQX 9 PHH 6 UNU 5 TFC 8 SGN 29 DM 2.

NORTHERN MINNESOTA—Acting SCM, R. C. Harshberger, W9JIE—OOO operates in 3900-4000-cc. band. UJZ is still rebuilding. LJV, OWJ, LAY and RJF made good scores in Dakota Division QSO party. JIE is on 28 mc. with 300 watts to 50T's P.P. and has worked four continents to date. The last meeting for the year of Minn.-Dak. Radio Club was held at Elbow Lake. Meetings will be held on 1.75-mc. c.w. during winter with OWU as control station. IGZ, pres., originates message to members each week. In the spring at first regular meeting, the ham presenting the largest number of correct copies will receive a prize. RJF has new Hallicrafter receiver and renewed O.R.S. IPN schedules OWU. St. Paul Radio Club now meets first Friday of each month in Spanish Room, Hotel Lowry, 8:00 p.m. LAY has Class A ticket.

Traffic: W9OWU 4 000 8 RJF 51.
SOUTHERN MINNESOTA—SCM, Francis C. Kramer, W9DEI—The Dak. Div. QSO party was well attended by the So. Minn. gang. IJN was high man with 1620 points. FNH operated portable during QSO party. KDI suggests c.w. boys look for 'phone QSO's. BXC burned out a 3000 volt transformer, a receiver, and a 1.75-mc. transmitter in QSO party. KUI, besides holding a Class A ticket, has a

radiophone 1st-class and a 2nd-class commercial ticket. VRY is a new ham in Spring Valley. NZE has a pair of '46's with 25 watts on 3.5-mc. c.w. MOV enjoyed his second QSO party. JEQ is working at Sear's and Sawbuck. GIA took a trip to Florida. IEA finds little time for operating between work, night school, and YL's. HFF has a carrier-controlled 1.75-mc. 'phone. TQW is leaving 14 for 7 mc. due to erratic conditions. PBH has the YL's do all the talking on his 1.75-mc. 'phone. MHJ is now active on 1.75-mc. 'phone. TAT and JQI have their little troubles with their 1.75-mc. rigs. VSA is a new ham in Mpls. working 1.75 mc. DKL is trying to get high fidelity from his 3.9-mc. 'phone. IJN was overjoyed to receive QSO's from Russia and Japan. PBH was selected by the Mpls. Radio Club to gather Mpls. news for the S.C.M. Give him your support each month, fellows. VEP is a new Mpls. station. MWA is now on 3.9-mc. 'phone. LVR is rebuilding for winter operation. MOW turned in nice total in QSO party. VOQ is changing from rack and panel to bread board. POK is heard on 3.9-mc. 'phone occasionally. IXI and DGB are competitors in radio repair business. FMA enjoys warm sea WX on Pacific Coast. FNK reports reception better in his new QRA. ELA had a one-hour-and-ten-minute QSO with ZU6M. BTW worked 105 foreigners during Oct. DMA worked several DX stations on 28 mc. RAU is QRL school. FCS has a new '03A and a bug, so we can expect anything. BFC applies for O.O. appointment. EFK will have new vertical antenna. BTZ, Harry Palmer, an old-timer, and one of the best loved hams in So. Minn., is moving to Arizona. We are sorry to lose you, Harry. We all wish you continued success in your new QRA. DEI has been back on 28 mc. The S.M.R.A. held its annual convention in Mankato on Nov. 3rd. Over 100 attended. The officers and committees are to be congratulated on the fine time. MZN was elected assistant director of the Dak. Div. The Dak. Div. 'Phone Ass'n held a meeting in Mankato on Nov. 3rd. A free stag party was announced for its members, to be held in Mpls. Nov. 6th. (And they couldn't drink all the beer!) GLE has FCS' receiver. SJK is chairman of Mpls. Club Cairo Committee. RKG is thinking of 'phone operation. Several So. Minn. stations were active in Montana earthquake QRR work. Your S.C.M. wishes to take this opportunity to wish you all a Happy New Year.

Traffic: W0DEI 6 MOW 4 IXI 2 KUI 1.

WEST GULF DIVISION

NORTHERN TEXAS—SCM, Richard M. Cobb. W5BII—AZB had nice trip to Dallas and Ft. Worth, met several of the N.C.R. boys in Dallas and spent one evening listening to ELN's HRO receiver in Ft. Worth. DXA spent 14 hours in O.R.S. party with 90 contacts and 41 sections. DNE spends most of his operating time with schedules. BII is trying to rearrange schedules to fit in with working hours. EEW reports "Brad" (3CXL) and "EW" (9RYD) pound brass there at WLMF now. ZD reports direct by radio this month. CPB sends correction on O.R.S. score—22,819 points, 116 QSO's, 41 sections worked in last O.R.S. party. COK has new receiver for O.B.S. work and is really on the job. BXA is trying to work all VE districts on 3.5 mc. in early mornings. FBQ claims to be world's champion QSL hound. IA has been very busy with school. APW, O.B.S., reports several r.a.c. signals; he uses 800's P.P. in final. AJ has a new Super Skyriver and is on 7099 kc. pretty regularly afternoons, also 3722 kc. for N.C.R. work. NW and DUR are the proud parents of an 8-lb. boy, now six weeks old. NW is working on the Cairo frequency survey. ATG is on 3.9-mc. 'phone Sundays. VD reports a four-way QSO on 7 mc. NH lost his power transformer. FIO is back on the air after a 7-year lay-off; he is on 14 mc. with low power and no overloaded tubes. His motto: "Give your neighbor a chance." BXY is an old-timer and used to report to RJ when he was S.C.M. QU is making a few changes in the transmitter. CHJ reports too late to get in traffic report. ARS, R.M., is busy rebuilding the police transmitter for an increase in power. ARV has been QRL taking the C.P.A. examination, also transmitter trouble. In due fairness to our active O.R.S., several inactive O.R.S. appointments are being cancelled for the present. To hold an appointment is something to really be proud of and every O.R.S. and every section official should be interested in his record of

activity. To take part in organized operating in the section is to get the most enjoyment and satisfaction from our hobby.

Traffic: W5AZB 348 DXA 332 DNE 112 VII 100 EEW 3 (WLMF 90) ZD 89 CPB 76 COK 63 BXA 25 FBQ 7 IA 6. OKLAHOMA—SCM, Carter L. Simpson, W5CEZ—CEZ received advancement in the Naval Reserve. BJG may be obliged to let up on ham activities due to health. AMT took in the football game at Pauls Valley and visited FX while there.

CANADA

MARITIME DIVISION

MARITIME—SCM, A. M. Crowell, VE1DQ—GL, R.M., has open channels for traffic to any part of Canada or U. S. coast to coast. Listen for GL's O.B. every Mon. and Wed. at 7:00 p.m. A.S.T. All stations interested in any traffic appointments please QSO GL for test and recommendation. (NOTE: Appointments can only be made to League members.) IA is using flea-power battery rig on 7 mc. EY is QRL service work. HX is taking signal course with the Army reserves. FT is QRL—not much time for radio—YL? HII IV schedules CE regularly on 3.5 mc. BZ has his rig on 3.5 mc. and is planning crystal. BL is getting out fine on 7 and 14 mc. using single '45. HH sends O.B. Wed. and Sat. 6:30 p.m. schedules GL daily and GS tri-weekly; the OM and second op are taking Army signal course. EP has a new s.s. Superskyriver. AQ and AA have combined rigs for tri-band operation. FQ says the new 3.5-mc. zepp works very FB. HJ has new zepp antenna and is rebuilding entire station. BB is in line for O.R.S. CF, Parrsboro, has an FB 3.8-mc. 'phone, lots of power leaks and bad voltage regulation. CE, Windsor, is trying 28 mc. and hearing lots of DX. EH, Hampton, N. B., is quite active on 3.8-mc. 'phone, has finished his 28-mc. transmitter and is hearing lots of DX. FE, Windsor, is testing on 28 mc. GH operates his FB 'phone on 3.9 and 14 mc., running 135 watts input. DC has new flexible all-band rig and will be on 28 mc. this winter. EQ, Truro, is getting new 7-mc. crystal to double for his 14-mc. 'phone. GK is quite active on 3.5 mc. and is rebuilding to crystal. CD, Antigonish, will soon be on the air again at new QRA. EA schedules VE2BT and is doing lots of work on 28 mc.; he worked W9, 4, 6 dists. using 35 W. input and vertical ant. ER, regular frequency 3690 kc., schedules VE2GD 7:30 p.m. daily on T.L. "I." He ties in with lines "C," "G" and "L" via GL and W11P. DQ just finished new exciter unit and revamped final for quicker band change. The S.C.M. extends best wishes for 1936 and hopes the gang will find many happy ham hours in it.

Traffic: VE1GL 31 HH 10 DC 8 EQ 4 EA 5 ER 31.

ONTARIO DIVISION

ONTARIO—SCM, John V. Perdue, VE3QK—AHJ is newest in Whitby. ACC has oscillating final. AAZ pops rectifiers. Very sorry to report JT has been forced to give up Trunk Line. R.M. and O.R.S. ABW has moved next door to RY. Congrats to QN who has taken an ex-YL. BC has moved to London. SZ was QRL during VE/W contest after being out of work before. NX is very active on 3.9-mc. 'phone. 9AL's new rig will be on the air by Christmas. DU has worked F, FA, G, ON, X, YM and ZS on 28 mc.!! New officers of Ottawa Club are PL, MA, MX and ABH. AKM has new shack, ADF is steamfitting and rebuilding. QE and TO horse-play at radio dept. JU is now in Hamilton. OJ and ZD stick to 56 mc. AEM is still troubled by Klix. VZ sent in nice report. AHS and AHT are newest in Welland. GG is still holding down T.L. in fine shape. SG has taken over T.L. schedules for JT temporarily. MB is getting new high-power rig. GR would like to be in Heaven where he could work more DX (?). Latest reports show VE2DG, VE4QX, VE3QD and VE3DJ in lead for VE/W Contest prizes, all with over 20,000 points. W1BFT leads among W's with over 15,000. SS, PL, LZ, NB, EM, GT and scores more enjoyed the VE/W Contest. WK continues nice East-West schedules. AGG, AGM and AFR got their tickets in Kirkland Lake and promise big doings up north this winter.

Traffic: VE3CG 30 DU 35 SS 2 PL 1 GG 149 SG 19 MB 34 JT 290 GT 9 WK 53 QK 317 AU 1, VE9AL 18.

QUEBEC DIVISION

QUEBEC—SCM, Stan Comach, VE2EE—Old Man Winter gave the gang a taste of his power by bringing down more than a dozen antennae and masts with a dandy sleet storm. The rest of the gang had better take warning and look their poles over. Traffic moves apace. Our new O.R.S., EC, is doing very good work and, with the veteran DG as Trunk Line Station, the routes are clicking like clockwork. BU worked schedule with VE3 with his antenna draped on his roof, and reports were just the same. HI, HT had an unfortunate accident to his eye. Hope it improves, Ralph. AP has opened his shack in the country and EM as a visitor bagged a nice buck, and that's no dollar. FQ, CU and GZ have left us for the north country and are doing well. BG and BE have deserted the 14-mc. band for winter operation on 3.5 mc. GH and FR have been heard on 14-mc. 'phone; AC is still sticking to 28 mc., and the S.C.M. is mighty interested in that band. IE had his 'phone operating on 28 mc., probably one of the first phones on that band. DM has completed his Jones Super-Gainer and likes it immensely. DD is back with us again after spending the summer with his boat and his YL. IQ is getting on well with his new rig. IJ has just got his '03A perking. IY is still working DX with the '45's. The VE-W Contest had quite an attendance, and we believe that the veteran DG topped the list of scorers. Congrats, Doc. AM has a new mike. Congratulations are in order to AX on his recent initiation into the Order of the Benedicts. We believe that BC is taking the plunge soon. AG has recently returned from VK and ZL; he is talking of visiting OA next. HM is operating a portable in the country under the call LM. Our friend Ted Cook, G6UO, is now operating as ZT6AQ and asks the gang to look for him on 14 mc. GO has sailed for a vacation in Bonnie Scotland. GK is back on the ham bands for awhile. EA has been heard on 3.5 mc. The S.C.M. takes this opportunity to thank the boys for their cooperation throughout 1935 and extend to the whole gang Best Wishes for a Prosperous 1936. Dr. Cruikshank, of Nassau, is now operating 2LN while taking post graduate course at McGill.

Traffic: VE2DR 227 DG 194 EC 82 BB 97 JK 57 BU 21 CO 3 EE 6 BG 12 HT 25.

VANALTA DIVISION

ALBERTA—SCM, J. Smalley, Jr., VE4GD—O.R.S. and A.O.P.S. reports are very scarce and two or three stations will have to be dropped to make room for more active stations. LX again leads in traffic. GE says work and radio don't mix. Stop working! The big squawk in the province is where is "Kea Klir"? The FI/HW schedule is in full swing for the winter. CY finds the oscilloscope cuts down his gain. HI, AW has a new 'phone-c.w. rig and is sure QRM at GD. JK is active in between election speeches. BW tried 14-mc. 'phone. Only reports of 28-mc. activity come from LK and PH. Lots of DX is heard on 28 mc. but only American contacts. OD is going strong on 3.9-mc. 'phone. PB also joined the QRM brigade on 3.9 mc. WG, the Hill Bill, still makes 1.75 mc. hum with activity and is talking more and more watts. LA has joined the crystal mike gang, and is he a proud boy. DV is wrestling with a 53 exciter. The gang at Lethbridge there had its annual banquet with 17 hams present. AA has a new mike and receiver and is all set for the winter. OI will be on 3.9-mc. 'phone when the R.L. passes the rig. AF was hunting fossils all summer on the Milk River Ridge and wishes receiving conditions at home were the same as they were there. EO will soon be on 'phone??

Traffic: VE4LX 108 QK 17 GE 14 PH 2.

BRITISH COLUMBIA—SCM, D. R. Vaughan-Smith, VE5EP—The fact that it is reorganization time for B.C. clubs, the VE/W contest and three more W.A.C.'s were the outstanding events of this month. 5FG, HQ and EO were a potent triumvirate in the contest till EO's 50-watter gave up the ghost. Nuthin' daunted the last mentioned, he pressed a poor lil ten into service and with the other two handed in a very FB score. Congratulations to our latest additions to that select group of W.A.C. men; NP, ND and FG all made the grade with ZS2X, bringing the total number of VE5 "wackers" up to 8. HP took a fifteen-day jaunt to Oakland on the briny; meanwhile JL pinched his QRA to Vancouver.

DQ is Victoria Club's new president. GB is doing nice chassis work for the Victoria gang. KL clicked with a PK on 7 mc. and JK did the same on 14-mc. 'phone. OR is looking for someone to QSO on 56 mc.! JC sports a pair of 50T's. AV holds down T.L. "I" assisted by MO. KW reports for first time. EU demonstrates FB QSY with a little wire and a few volts! EO is back in the big berg from trail. DD is rebuilding an FB RK20 'phone rig. GO has set Dec. 1st for the big comeback! FM treats the Island gang with a two-week visit. NG claims her heap is that way! EP is at last getting out with low power. How about a lil more dope for next month, gang? 73.

Traffic: VE5EI 15 KB 1 JK 6 EN 2 EO 24 EU 10 KW 9 AV 80 EP 25 CC 6.

PRAIRIE DIVISION

MANITOBA—SCM, A. J. Simpson, VE4EL—Traffic shows a small increase for this period with honors going to AG of the Trunk Line as usual. More stations are to be heard on 7 and 3.5 mc. now that the 14-mc. band is dying out. RO will be going again shortly with new transmitter. KU is still looking around for a big bottle. MV manages to get on occasionally with his 14-mc. 'phone. TJ is overworking that 50-watt tube of his. DU has forsaken 14 mc. for awhile and is trying 28 mc. Several other local stations have been using the 28-mc. band and find it FB. QY with a pair of 59's suppressor grid modulated is working the West Coast on 28-mc. 'phone. IP is installed at his new QRA and has an RK-20 in the final with suppressor modulation for 'phone work. KX is also all set up at new QRA and is installing an RK-20 so as to get more excitation for his final. GC is only to be heard on the 56-mc. band. MY has quit playing around with modulators and is looking for traffic on 3.5 mc. The local antenna erection gang visited MW and got his new skywire installed. NI thinks his RK-20's just as good as his high-power linear final. QF is going FB with his RK-23 and RK-20 rig and putting out very nice sig; his 65-foot pole blew down and he has 45 feet of it up again. HI, SV is to be heard regularly on the 3.5-mc. band. The M.W.E.A. held the annual general meeting Nov. 15th and new officers were elected. Plans are going ahead for the annual banquet.

Traffic: VE4AG 87 BG 6.

SASKATCHEWAN—SCM, Wilfred Skaife, VE4EL—Glad to see 30% increase in hams reporting this month. Keep up the good work, boys. IG worked eight ZL's and VK's in three hours with new T250 rig. PG got first DX—a K5. OM is experimenting with Reinartz antenna. VQ is active on 3.5 mc. DL has new rig: '47, '46, two '46's. SY is worried about keyclicks. RE is off with receiver trouble. LV is making plenty of QRM on 7 mc. JV is now owner of new PR-16. KA has FB total in VE/W contest. JU is still the lone M.J. 'phone hound. FW is on with 59's while rebuilding RK-20 rig. YC is doing nicely on 3.5 mc., will be on 1.75 mc. shortly and later 'phone. QS, with new rig, 59 Tri-tet to 59, to RK-20, input about 75 watts, worked his first VK. AL joined the benedicts. XM, XL and RM have new t.r.f. receivers. JH has new rig and is going after DX. OR has crystal control. KM has new rig for 14-mc. 'phone. ML worked three VK's and two ZL's. UK tries 1.75-mc. 'phone LX has neat 56-mc. portable transceiver. EB has new transmitter and good quality 'phone. YM had key click trouble. OH and QD QSO on 56 mc. VR is rebuilding. QC plans comeback. UQ gets FB results on his Sunday QSO with 5GI, BD cured B.C.L. QRM with counterpoise on 1.75-mc. 'phone. MU is dusting off the rig. HL is back with FB crystal after summer hibernation. UL is installing crystal. MB finished M.O.P.A. rig à la breadboard and it's sure a swell job. TN is back on 1.75-mc. 'phone after building new super. The S.A.R.C. is trying out ham bulletin, "T9X." Watch for it, gang. PW proves that careful construction gives efficiency with TNT '45's. Ex-3BY, Port Arthur, is now YX, Saskatoon. XB, new ham, is active on 7 mc. and is looking for QSO's. UH burned up transformer but is back with 750 volts on P.P. '10's. PQ is active on three bands and is still chasing elusive DX. YC, UL, RZ and TX hold schedules and feed MH on trunk line. BF tried 3.9-mc. 'phone but went back to good old 14 mc.

Traffic: VE4CM 70 MH 43 UL 30 QS 34 EL 8 YC 3 UQ 2.

● I. A. R. U. NEWS ●

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Wireless Institute of Australia

Conducted by Clinton B. DeSoto

OUTDOORS the season's first snowfall lends verisimilitude to the thought that this is being written for January *QST*—the first issue in what is bound to be a bright New Year for amateur radio. Indoors, events conspire to nurture confidence in the provident brightness of that future. The weekend's football games turned out nearly right. Ten meters continued warm, if not actually sizzling hot; the new receiver is coming along swimmingly, the family's usual fall colds have been averted so far, negotiations for third-party traffic agreements are moving along, the Saturday-night movie was amusing, South Africa promises support at Cairo. . . .

The world is pretty much all right.

Especially the world of amateur radio. Next January 2nd will be the sixth day-after-New Year's that the present purveyor of internationally-interesting items has sat up at this desk surveying the international scene. Each year the view has been broader, more substantial, more promising. The Union has grown from eighteen societies to twenty-five; each bigger, better, and stronger than it was. The number of amateurs throughout the world has increased half again; the prestige of amateur radio has grown a thousand-fold.

This coming year we amateurs of the world embark upon a period of intensive preparation and planning looking toward that focal point of all our politic and organizational activities—Cairo, capital of Egypt, pop. 790,939, February, 1938, where the future of amateur radio will be written. Much depends on what we do this year, and how we do it; and by that we place emphasis not only on Cairo Surveys and Cairo planning on the parts of executive headquarters

and special committees, but on the day-to-day performance of all amateurs in all their activities.

"By their deeds ye shall know them." No more fitting watchword can be adopted by amateur radio during this season of holiday and rebirth. The future of amateur radio looks bright; but its brightness is inevitably limited and determined by its deeds, and particularly is this true during the year to come.

Welcome, 1936! May we live up to your promise!

News:

From all over the world correspondents send us their regular budget of news. In this month's mail-bag comes, from: *Australia*: Con Bischoff radio's, via VK2EL-W1SZ: "VK-ZL contest most important event this autumn. Great interest taken in ten-meter section with result that all continents except South America are in regular communication with Australia. . . . The Postmaster General has approved of selected amateurs being appointed by W.I.A. Divisions as vigilance officers, with a view to cleaning up poor signals and operation in contravention of regulations." That last is a good idea, W.I.A., one found workable in various forms in many countries. We'll be pleased to know how it works out. *Denmark*: H. T. Petersen, OZ7Z, foreign secretary of the E.D.R., writes: "There are 185 licensed amateurs in Denmark, and quite a number of applications have been received by the P.M.G. lately. This is probably a result of the society's new policy, and it is hoped that the 200 mark will be passed soon. New licenses issued

are: OZ3KT, 5DC, 8Z and 9MN. The many recent newcomers have caused the society great trouble as a great number start transmitting without a license, this in spite of the fact that licenses are easy to obtain in this country. It appears that more than 150 unlicensed calls have been used and a great number licensed calls



WHEN K6 HAMS GO TO JAPAN
Left to right: J2GW, K6CQV, J2IX, K6CRU

pirated, so if foreign amateurs are without an answer from Danish amateurs, they shall now know the most possible reason. The Danish QSL bureau does not forward cards to unlicensed amateurs, but the cards are kept in the hope that the cards in future can be forwarded when the amateurs in question get their license. The new council is aware that this state of affairs cannot be tolerated in future. All illegal transmitters will now be traced and when found they will be fined and perhaps their transmitters will be confiscated, which has already happened in some cases. All information which may help the society to trace illegal Danish transmitters will be highly appreciated. The E.D.R. has been working on improvements for Danish amateurs and this has resulted in the following changes in Danish amateur regulations: The first license issued to any person will cost Kr. 20, but if any license is renewed in continuance of an old one the fee is only Kr. 10. This is, of course, a great benefit for the old and regular amateur. Licenses can now be issued to persons under age, when from 16 to 18 years old. In this case the parents or the guardian of the person applying for license must sign the application form, etc." *Estonia*: From Manfred Asson, ESZD we received the following news: "There are very few hams in Estonia, only 11 licenses being issued in the whole time from 1926 till now. The most active amateur and the only owner of a WAC diploma is Mr. Parjel, who is a student of engineering and operates ES7C, a 35-watt c.c. rig in this town. All work at ES7C has exclusively been

done on 14 mc. Other successful hams are ES1C and ES5C, who live in Tallinn and have both worked in 4 continents. Recently appeared a new quite mysterious call ES5R, which is unknown in Estonia and may perhaps be the misspelt call for EI5R. These three stations and my own are the only ones which have had some success in DX work. . . . The apparatus used here is usually very poor. No special short-wave equipment, such as condensers, plug-in coil-forms and transmitting tubes, are available. And then the prices are very high compared with our life standard." *Switzerland*: Rudolph Stuber, HB9T, traffic manager of the U.S.K.A., submits the following activity report: "A total of 55 stations is now licensed in Switzerland. Fourteen of them (25%) are holders of WAC certificates. Personal items: HB9A is working on 7 and 3.5 mc. with a 50-watt Class B modulated 'phone. HB9B has a beam antenna for U.S.A. HB9D will be on the air with 100 watts soon. HB9F, our lady operator, is doing QRP work. HB9G our first WAC man, is just rebuilding. HB9H, outstanding 3.5-mc. 'phone station, has a special broadcast license. HB9J made his application for 'phone WAC; an outstanding 23-mc. station, he has worked W's on 10 meters. HB9K, field day QRP man, works all Europe with 1 watt. HB9M is doing experimental work. HB9N is tempo-



YOU'VE CERTAINLY HEARD AT LEAST ONE OF THESE: OK1AW, OK1BC, OK1KA

rarily QRT. HB9O is also QRT. HB9P is doing experimental 56-mc. work. HB9Q, the well known VK record man, got his diploma at the Zurich High School, as did HB9R. HB9S is rebuilding (RK-28). HB9T works on all bands from 1.7 to 56-mc. HB9U has been appointed instructor in the Air Force for the Wireless Service. HB9V has been doing portable work in the mountains. HB9W, first HB using suppressor-grid modulation, is doing excellent 'phone

(Continued on page 68)



CORRESPONDENCE

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

The Old Man's Back!

Editor, *QST*:

Say, Son, bear with this old hulk a few minutes while he unloads a few sentiments off his aged chest. I have noted the remarks in November *QST* by that Old Squirt, W7DWC. Being obviously an Old Squirt and not a young one, and also having a little way with him that smacks of the old-time good fellowship of amateur radio, I am moved to come up for air and say a word.

First of all, don't let the fellows get the idea that I am no longer watching them. I read my *QST* and I listen in and work many of them every now and again. I am not on every night in the week as I used to be when all you kids needed scolding for your rotten fists and rotten what-not; but I'm on enough to know what is going on.

You chaps need a lot of scolding yet, some of you, with your rotten radio manners and your rotten radio politics. I get so haired up at times that Kitty smells what is coming and beats it for the kitchen and the little wife fears my language will bring the police. I must have started a dozen letters to good old Editor Warner over there in Connecticut; but when the pen gets so hot it makes the ink fizz, I realize my angry passions have arisen, and that even though I wrote the letter on asbestos with a platinum pencil, it would likely set fire to the other mail, and probably Eddy would not dare print it. When a man gets old he gets mad easier, and his language becomes impossibly lurid.

I happened upon W7DWC's letter in *QST* while in a fit of temporary sanity and calm. Maybe I can get through this reply without frothing at the mouth. If I do, it is to W7DWC's credit. He must have pulled off some particularly satisfactory QSO's before he wrote, because he has a fine radiation factor on old-time good radio fellowship. There's no uplift that I can think of that so softens the heart and enables a man to look with tolerance upon the gawdawful specimens of *homo sapiens* we see around us, as having his tubes perk smoothly, successfully and distantly.

Please present my compliments to old W7DWC out there where the Pacific rolls, and tell him I hope the old-time brotherly spirit that shines through his sigs will never grow dim. We need more of his kind in these modern days.

—The Old Man

Secrecy

EDITOR'S NOTE.—A year or so ago there was reprinted in some sections of the amateur press a letter from the F.C.C. at Washington apparently sustaining a western radio inspector in his statement to local amateurs that the secrecy provisions of the Communications Act did not apply to messages handled by amateurs. Feeling confident that that interpretation was incorrect, the League has taken up the matter with the Commission. For the information of members we print the following letter received by General Counsel Segal. This letter indicates that, in the opinion of the law department of the F.C.C., the secrecy provisions *are* to be observed on amateur messages and transmissions unless the transmissions are "for the use of the general public."

FEDERAL COMMUNICATIONS COMMISSION

WASHINGTON, D. C.

October 31, 1935

PAUL M. SEGAL, Esq.,
Shoreham Building,
Washington, D. C.
Dear Sir:

Receipt is acknowledged of your letter of September 25, 1935, addressed to the General Counsel, together with enclosures relating to the interpretation of the secrecy provisions of Section 605 of the Communications Act of 1934, as applied to radio communication transmitted by amateurs.

The proviso in question is as follows:

"Provided, That this section shall not apply to the receiving, divulging, publishing, or utilizing the contents of any radio communication broadcast, or transmitted by amateurs or others for the use of the general public, or relating to ships in distress."

While the section is not free from doubt, it would appear that amateur communication is excepted from the general provisions of Section 605 only when the transmission is "for the use of the general public." The question is not a closed one, however. The Commission has not formally passed upon a matter of this type, and we know of no case in which the courts have construed this provision in the light of the particular question raised in your letter.

Very truly yours,

HERBERT L. PETTEY,
Secretary.

The Cairo Survey

P. O. Hydro, Ontario, Canada

Editor, *QST*:

Once upon a time, in a small democratic country in a far-off land, it was found that less than 20% of the voters cast their ballots during the general election. In order to stir the people out of their apathy and indifference to national affairs the government began spending large sums on nation-wide advertising, asking the voter to exercise his franchise. Nevertheless, after several years the vote only increased to 23.7%. This insensibility on the part of the major portion of the population to the significance of the ballot caused the next government to enact new legislation, to the effect that thereafter whenever or wherever an election for public office of any kind was held, each constituency would be allowed to nominate only *one* candidate for the post; the government then in power would elect the other to oppose him.

It worked this way: Suppose the people of the city of Boston nominated Mr. Jones for a government or municipal office. Immediately after the nomination was declared, the government then in power would nominate an opponent, to run for the same office. This government nominee would *not* be a flesh and blood person at all. The government would simply nominate "Mr. X." to oppose Mr. Jones, and the voters of Boston would be given to understand that Mr. X. represented that portion of the voters *who never take the trouble to vote*. His platform was, "No representation needed." Furthermore, if, after the ballots were all counted, it was found that Mr. Jones had not polled at least 51% of the total votes on the voting lists for Boston, then—ah, here comes the rub!—the government would proclaim that Mr. X. had won the election! In other words Mr. X. (the "ghost" nominee of the government) was voted into power by all the voters who *refrained* from voting. The government then ruled that the voters had, by their very indifference, registered emphatically their collective opinion that they did not need any representation at all.

The reaction which followed had the desired effect. Those sections of the people who had voted demanded that their taxes be reduced and the taxes of non-voters be increased by a like amount, the reduction being a recognition by the government of the interest shown, and the increased burden of taxes falling on the people who could not "find time" to vote. Needless to say, the vote polled at the next election was beyond all expectations.

I am now coming to the lethargic indifference of the average radio amateur to affairs which vitally concern him and his future existence. For instance, if the figures were ever published on how many licensed amateurs ever take the trouble to vote in the election of officers for the A.R.R.L. there is not the slightest doubt but what similar conditions prevail in our own ranks. [The average return in A.R.R.L. elections is in the neighborhood of 50 per cent, or about on a par with governmental elections in general. In certain instances the figure has run to 70 per cent or thereabouts, but this was only when intense local interest prevailed.—*Editor*.] If the vast majority of our organization thinks so little about the future of the A.R.R.L., how many do you suppose have volunteered to serve on the Cairo Frequency Survey? [At the time of writing, about 450 amateurs have volunteered for Cairo Survey work; of these, 57 have turned in reports. Only 10 or 12 have been active for appreciable periods of time.—*Editor*.]

What a striking commentary on the indifference of the average radio ham it is to note the pitiful few who have volunteered and have been at work on the Cairo Survey for several months now. Each day and every day these men are working to compile data and information, and will keep on working until 1937 in the brave hope that their efforts will enable our representatives to put up a better fight for more frequencies for all amateurs at the Cairo Conference in 1937.

Possibly not even *one* amateur in every 1000 has offered his services for this work! Is it not logical, under these circumstances, to assume that 999 hams out of every 1000 don't give one good Continental damn what happens to us at Cairo—or anywhere else?

I might say that quite a few of this handful of men who

are now working on the Cairo Survey are veteran amateurs in the sunset of their days, who, in spite of the fact that their normal existence is pretty well crowded with the responsibilities of business, family, and the mundane affairs which are the inevitable lot of any worthwhile citizen, are yet willing to sacrifice a portion of what precious little is left of their remaining time on earth in an endeavor to secure more frequencies for radio amateurs to use and enjoy after they themselves are dead and gone.

It is such men as these who are the backbone of the A.R.R.L. It is this type of amateur who first turns to the page in *QST* that shows the balance sheet for the preceding quarter. These are the men who fought long and bitterly both for and occasionally against policies of the A.R.R.L.—never satisfied that the men at Hartford were working hard enough for us—and time and time again ruthlessly flung them into almost hopeless conflict against a grasping swarm of commercial radio interests gathered from all quarters of the earth—all bent upon our complete and entire annihilation.

Some of the Cairo Survey workers were pounding brass before thousands of present-day radio amateurs were born, and if you were to visit any one of them you would probably find a gray-haired man, who, after the cares of each working day, has set aside on his schedule pad, the best receptive period of his evening hours for a daily "sked" with "C.S." (Cairo Survey). You will find him sitting with the headphone straps wrapped in soft padding to ease his bald spot, patiently trailing the stuttering "V" and "dot" wheels of the commercial stations between 6000 and 8000 kc., and that section between 4000 and 4500 kc.

Beside him stands several thousand dollars worth of the finest radio transmitting equipment money can buy, the tube array dark and mute. Yet he waits with pencil poised for some machine gun note of an elusive commercial station to slither out its identification call.

With a swift turn of his dial he can put it on one of his own xtal frequencies in the ham band, and find a veritable madhouse of youngsters boisterously yahooping across the continent in gay abandon. . . . Yet, your Cairo Survey man keeps at his job. Why? Well, the answer may sound funny to a lot of people, but I say that it is the real amateur spirit burning fiercely within the man which prompts him to work hard and long with no tangible hope of reward.

The whole complex structure of the A.R.R.L. has been built upon the solid cornerstone of such self-sacrifice and immolation to a cause, and as long as these stones stand, the A.R.R.L. will stand—and not one moment longer.

The grave danger is the ever-mounting superstructure, many stories of which are totally devoid of inspiration and unworthy of such a magnificent foundation. One becomes apprehensive that the men who placed the cornerstones under the A.R.R.L. may be driven to destroy them by defection and in disgust at the repetitive spectacle of frustrated efforts extending over nearly half a life-time. . . .

What are you going to do about this Cairo Survey? Can *QST* say more than they have said about the responsibility that rests upon us and the supreme importance of everybody putting his shoulder to the wheel on this big job? Do you realize that the "Old Guard"—the watch-dogs of your vital interests—can't live forever? That they are dropping by the wayside one by one? Every other list of "Silent Keys" brings the sad news of some old-timer throwing the big switch for the last time. In our last issue, Clair Foster, W6HM, one of the finest amateurs the world has known, was listed inside that black border in the pages of *QST*. Only those who know how bitterly Clair was opposed to the current policies of the A.R.R.L. can fully appreciate the splendid tribute paid him by the man he most violently opposed—K. B. Warner. Two men, with ideas and policies as far apart as the poles in many cases, yet both burning with the same ideal, their eyes on the same goal—your A.R.R.L., and all it stands for! How are we going to replace such men, once gone?

Are you going to load this pitiful handful of men on every occasion until the breaking point comes, galloping gaily through each issue of *QST* for dope on circuits, bargains in the Ham-Ads, and ignoring what the League is doing or trying to do for you? Ever stop long enough to think that if

(Continued on page 50)



WE LIKE to contact the purchasers of our products now and then, to find out what sort of results are being obtained and how they may be improved. Sometimes these visits lead us to make minor changes in our products, and sometimes they become a mutual admiration session. But in a surprising number of cases, we find that our host is passing up a lot of pleasure because he has not studied the instruction book.

For instance, the number of amateurs who do not use their single signal filter is astonishing. The reason is something like this: Suppose the amateur in question has just bought an HRO. Being naturally anxious to try it out, he postpones reading the instruction book and starts in without using the crystal filter. He pulls in a lot of signals he could never hear before and since the selectivity of the receiver is extremely high even without the crystal, these faint signals are readable. Heterodynes and general QRM are pretty bad at times, but he does not like to experiment with the single signal unit in the middle of a QSO for fear of losing the signal. After a few months of this he has drifted into the habit of getting along without the filter, never realizing that modern single signal equipment is almost unbelievably effective on both phone and CW. Often unreadable signals can be brought entirely into the clear, clean and easy to read.

Frankly, this situation has us buffaloes. We cannot give each amateur personal instruction, obviously. We can describe the procedure in the instructions, but nobody reads them. We are quite proud of the single signal filter in the HRO, and we are distressed that so many amateurs have not learned how powerful a tool it is.

We are asked all sorts of questions on these visits, and we are sorry to say that once in a while our snap judgment is pretty far out of line. Fortunately this does not happen often, so we are able to make our occasional corrections by mail. But there are two errors we shall have to correct on this page. The first involves our TRP Pickard Antenna Coupler when used on ten meters. The radiating rods should be 91 inches long, making the over-all length about 186 inches including the coupler. The feeders may be of number 18 wire, spaced 3 inches apart, or of any size and spacing that will provide 630 ohms impedance.

There is another error made many months ago, which has required quite a bit of research to test out. You may remember we became enthusiastic over the possibility of operating two RF tubes in parallel. This results in a number of interesting effects and apparently results in improved signal-to-noise ratio. Circuit noise is not increased much, but effective mutual conductance is doubled. Although plate resistance is cut in half, there is a net gain. The joker comes when the grid circuit is investigated. Unfortunately the input impedance of a vacuum tube is very low at high frequencies (only a few thousand ohms) and connecting two tubes in parallel cuts this impedance in half. This rather completely spoils the image ratio and gain and more than makes up for any improvement in the plate circuit. In fact our laboratory work has caused us to make such a complete right-about-face that we are wondering whether connecting tubes two in series might not be a good idea. (But don't quote us!)

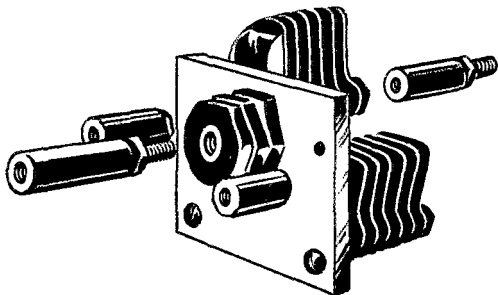
Merry Christmas and Happy New Year!

JAMES MILLEN



(Continued from page 48)

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CONDENSERS

you persist in "letting George do it," his patience might peter out? Could you blame "George" in this instance if the men on the Cairo Survey petitioned the League Directors, claiming that, as long as they (the Cairo Survey men) were the only members willing to work on the Survey, it must be quite obvious that the rest of the members of the League must be perfectly satisfied with the present frequency assignments or they would have volunteered long ago? Their attitude on the question indicates clearly that the majority of the members, are, by their very apathy, voting solidly for "Mr. X."

How would you like it if, the men of the Cairo Survey having volunteered to spare no effort in their allotted task, the said members of the Survey petitioned the Directors of the A.R.R.L. to take the following action: "In the event of A.R.R.L.'s representatives at Cairo being able to secure additional frequencies for the amateurs the Directors of the League will immediately thereafter recommend to the Federal Communications Commission, or other body authorized to assign the new frequencies, that 50% of all such frequencies be assigned exclusively to the members of the Cairo Survey who have at least one full year's work to their credit on the survey, and that some identifying prefix like C.S. (Cairo Survey) be assigned to the call of all such members in recognition of services rendered."

And if that did happen, who could blame them?

I think (I am not sure, though) that it was Lord Nelson before Trafalgar, during the old British Navy press-gang recruiting days, who said, "Remember, gentlemen, when making up the crew, that one volunteer is worth twenty pressed men."

So, dear reader, in conclusion, let me tell you that at this moment two forces are at work within you. One force is the "Mr. X." which is now telling you to turn to the next page. The other is the real amateur spirit which is saying to you "You ought to stand by 'em, old timer." Just lay *QST* down, grab a *QSL* card, and scribble across it: "Put me on that gosh-dinged survey!"—and mail it to Hq. Mr. X.? Nerts to Mr. X.! Gangway!

—"Mike" Caveney, VE3GG

Power Report

10332 So. Vernon, Chicago, Ill.

Editor, *QST*:

I wish to OK the plan that Saul Kron puts forth in his article in this month's *QST* (November).

I always ask for the other fellow's input in watts. Most of the time he gives his whole layout and adds his power as an afterthought.

Why not give it as Kron suggests? I'm going to start using it right now!

—Wm. M. Wood, W9MLF

WA(8)C

112 Webb St., Calumet City, Ill.

Editor, *QST*:

I may be wrong but I'm guessing W2GOQ will be almost mobbed. I guess it's OK, though, as he did say "maybe." But if you don't hear from anyone else, hang W9CF up for a WA(8)C also. If you look on your WAC list you won't find me (as yet), due to inactivity for several years which started just about the time WACers started WACing; however, since resuming activity approximately two years ago W9CF worked the first African ever heard, and the first Asian heard (ZS2F, VS7AI) on 40. VS7AI, who is beyond half-way around, was worked on August 5th; expect confirmation most any day. As to continents 7 and 8, WFAT and WFBT were both worked; also the 1926 VOQ expedition, which I believe went as far north as any (probably farther), gave W9CF a narwhal tusk as first prize (in the days of 2UO).

Not to dampen any hopes but—how many more WA(8)C's are there? . . . Adopted FEH's RST with numbers alone. It's best of all.

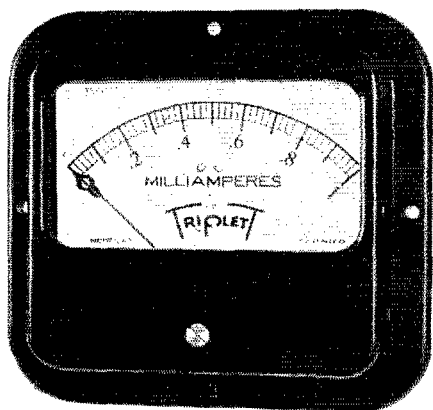
—J. R. Miller, W9CP

EDITOR'S NOTE.—W2GOQ has not been mobbed; whether the competition is too modest or whether there just ain't any is not known. Only other claimant of WA(8)C is W1SZ.

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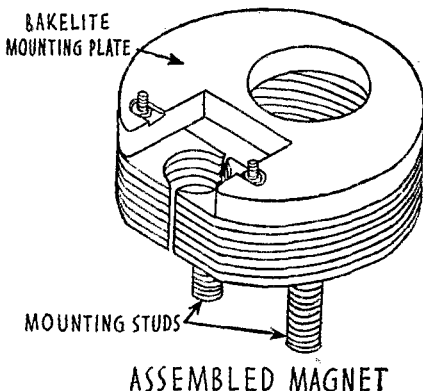
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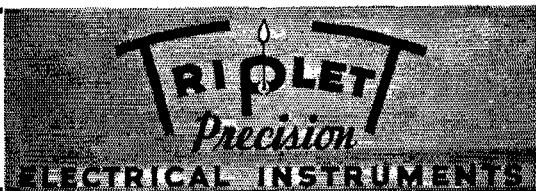
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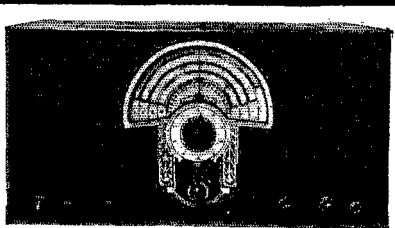


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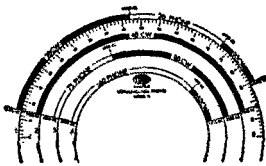
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4547 N. 21st St., Milwaukee, Wisc.

Editor, QST:

I am feeling very optimistic right now, so I am looking for good DX conditions on ten meters for about the next three years. It seems likely that the five-meter band will open up for DX occasionally also during this period. I believe many of the old reliable ten-meter gang are going down to five-meter c.w. shortly. Among those I know to be proceeding in this direction are W6VQ, W8DOB, W8RH and X1AY. W9GHN and myself are getting ready to give the gang someone to work in Milwaukee.

Under present regulations, five is not going to be like ten was in the dead days (not beyond recall, hi!). When ten was dead, it was dead. But five won't be—not with all these dizzy modulated oscillator 'phones, transceivers and radiating superregenerative receivers. At least, not for those of us who live in metropolitan areas. And when the band does open up for DX, just how are we going to work through the above-mentioned QRM generators?

I wonder if it isn't just about time to reverse the original stand on five-meter equipment? No more articles on frequency wobblated transmitters, and receivers that wobble more and radiate about as well. Plus a definite drive to improve the equipment of existing stations.

Also, would it not be possible to bring to the attention of the F.C.C. the fact that long distance work on five meters is expected for the next three years or so, and that investigation and developmental work in this direction will be seriously handicapped by present regulations? If that portion of the band from 58,000 kc. to 59,500 kc. could be restricted to d.c. c.w. only, with 'phone and i.c.w. permitted from 58,500 kc. to 57,000 kc. using only equipment passing all requirements for lower frequency 'phone, then the three megacycles left should be ample for occupancy by stations using present type of five-meter equipment.

Some of us are going out for new records in amateur radio. Will you help?

H. F. Wareing, W9NY

It Takes Two

1017 S. Cedar St., Spokane, Wash.

Editor, QST:

W9JZN's letter entitled "Robot QSO's" seems to be of a type that is often seen in the pages of QST—letters about hams who when contacted can never think of anything to say other than "Ur R9 hr OM Tnx 73." But we should remember that it takes two to make a conversation as well as an argument and many times the fellow we are QSO would really like a good rag-chew but is either waiting for us to start it or is afraid that he would be wasting our time if he mentioned a topic to be discussed.

In looking over my log book I found that practically every QSO had something written in the remarks column referring to an interesting rag-chew. The average time for each contact was about an hour and a half, and at a speed of about 25 w.p.m. and using break-in, a lot can be said in that time.

Although most of my operating time is taken up with traffic skeds and I work practically the same stations night after night, I get a big kick out of obeying the fat with any station about world subjects or the red-headed YL I used to know. In fact, with a quart of good old "Crème de Formaldehyde" alongside the bug I could gab all night. Hi!

So, fellows, the next time you want a good rag-chew just ask the ham you QSO if he would care for a little confab and then see how quick he comes back and says, "Sure, OM, FBI! Did you ever hear about —???"

—Robert H. Dellar, W7BAK

Briefs

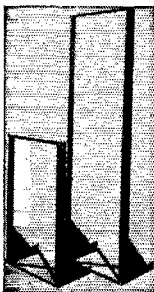
QRR Work With Lighthouse

Amateur radio was the only means of communication with the mainland when the telephone cable to Halfway Rock Lighthouse (9 miles off Portland, Maine) was made

Q S Z RACKS PANELS BASES

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didn't get
December "QST"

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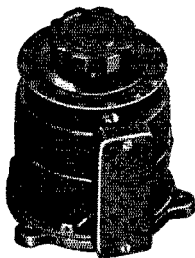
Shipping weight 30 lbs.

Type RBD rack 5' 8" high, 20 1/2" wide, 12" deep, with a complete set of panel mounting holes. **\$7.45**

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Brackets—4" high, 5 3/4" deep, 3/4" bend for mounting; pair 25c; 7 1/2" high, 9 1/2" deep, 1/2" bend for mounting, pair. . . . 35c

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Are the ideal answer to the ORP problem. Type 200 CU delivers 0-135 volts continuously variable at 900 watts from 115-volt line. Price. . . . **\$14.50**

Type 200-B — 0-115 volts at 170 watts. Price **\$10.00**

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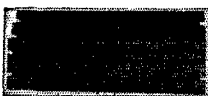
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Now that the 1936 bulletins are available, we are renewing our offer of last year. A thin dime brings to you post paid the latest bulletins of 25 manufacturers of short wave equipment, together with our own B-73 bulletin. Far more information on the latest and best short wave equipment is contained in this assortment than can be found in any mail order catalog. Write for yours today.

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By LEEDS are furnished with black shrivel finish in the standard 19" length, 1/4" thick. Mounting slots are spaced according to Bureau of Standards specifications, insuring freedom from all trouble in mounting or interchanging panels.

Steel	Price	Width	Aluminum	Price
PS-1.....	\$.52	1 3/4"	PA-1.....	\$.74
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PS-3.....	.68	5 1/4"	PA-3.....	1.30
PS-4.....	.71	7"	PA-4.....	1.55
PS-5.....	.95	8 3/4"	PA-5.....	1.90
PS-6.....	1.15	10 1/2"	PA-6.....	2.45
PS-7.....	1.30	12 1/4"	PA-7.....	2.90
PS-8.....	1.50	14"	PA-8.....	3.35
PS-9.....	1.70	15 3/4"	PA-9.....	3.70
PS-10.....	1.90	17 1/2"	PA-10.....	3.95
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Brass panel mounting screws 1/2" long 10/24 thread, 15c per dozen.

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By LEEDS for use with rack panels are now available in a greatly increased variety at lowest prices. Crystalline finished units of 20 gauge steel; each base is finished with a bottom cover plate, so that apparatus underneath the chassis may be kept free from dust and at the same time electro statically and electro magnetically shielded.

8 1/2" x 8 x 2.....	\$.65		
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8 1/2" x 10 x 2.....	.70	10 x 17 x 3.....	1.30
8 x 17 x 2.....	.95	12 x 17 x 2.....	1.30
8 x 17 x 3.....	1.15	12 x 17 x 3.....	1.40
4 x 17 x 2.....	.70		
12 x 17 x 2.....	1.30		
8 x 17 x 3.....	1.15		
10 x 17 x 3.....	1.30		
12 x 17 x 3.....	1.40		

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Triplet No. 1200 multi-range combination volt-ohm, mil-ammeter; AC and DC; only **\$21.24**

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If the "R I" walks in. Have a LEEDS 1-B Freq-Monitor on the operating table. A Freq-meter to comply with the "regs" and an FB Monitor too. **\$19.75**
Price, complete.....
Power supply.....\$6.50

Low Loss VICTRON "G" now in stock

The finest insulator for high frequencies on the market.
6" x 6" x 1/16".....75c
6" x 6" x 3/16".....\$1.35
6" x 6" x 3/8".....\$2.00
Substituting Victron "G" for hard rubber or bakelite on tuning condenser will improve the "Q" of any tuned circuit. Undrilled strips for all Cardwell midway condensers 30c per pair. Strips 6" x 1/2" x 3/4" for larger types 40c per pair.

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inoperative by a severe storm on November 17th-18th. Communication was established by W1GOJ (Falmouth Foreside, Maine) with W1DNA, assistant keeper of the light. Information relayed by W1GOJ to superintendent of lighthouses said the slip at Halfway Rock had been partially destroyed by the pounding waves. The railing and lights on the slip were torn away as giant waves broke over the rock for more than 18 consecutive hours. W1GOJ-W1DNA handled several messages of importance concerning conditions at the Light.

Yacht Kinkajou

K6LQX is now operator on the Yacht *Kinkajou*. He is but 16 years of age and is believed to be one of the youngest, if not the youngest, chief radio operator of a United States licensed ship. The *Kinkajou* is engaged in taking weather observations for future trans-Pacific air lines, and in maintaining "colonies" of boys from Hawaii on Jarvis, Howland and Baker Islands. On her latest voyage, the *Kinkajou* will make headquarters for several months at Suva, Fiji Islands. The work takes the ship far off the steamer lines, making radio communication extremely important.

How to Pass the Amateur Exams

EVERYBODY who grades examination papers encounters an occasional dizzy sidesplitter. The rather monotonous life of the F.C.C. amateur examiners is thus frequently relieved. From their files they have garnered the following choice gems, which we publish with the kind permission of the Commission. Read, you fellows, and learn how readily possible it is to improve upon the *License Manual*.

Q. What are the meanings of SOS, QRT, QRM, Mayday, CQ?

A. Mayday is the high-power holiday.

A... Mayday possibly refers to a semi-political activity indulged in annually by certain political factions.

Q. What class of radio communication holds precedence over all others?

A. The distress signal SOS for steamship, and the word "Maytag" for aircraft are the stop and listen signs of the radio world.

Q. What penalty may be imposed for transmitting a false or fraudulent distress call?

A. The station license shall be provoked.

Q. Why do amateur calls in the United States and its possessions begin with the letters W or K.

A. These letters were given to the United States through the League of Nations.

Q. What is an amateur portable-mobile station?

A. An amateur portable-mobile station is one that is non-existent.

Q. For what purpose may the call signal CQ be used?

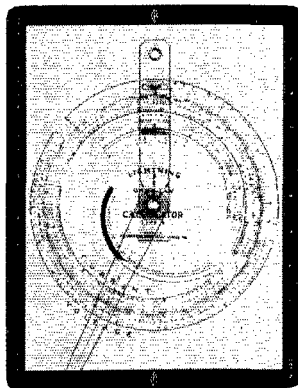
A. When you need help, send CQ and sign your own call letters.

Q. What does the Communications Act of 1934 provide in regard to control of radio stations during a national emergency?

A. It says in case of national emergency a li-

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LIGHTNING CALCULATORS keep you out of mathematical snarls. They make child's-play of calculations which are usually slow, complicated and confusing. They give you the right answer, right away. They are great time savers for engineers, yet so simple that any dumbbell can use them.

LLIGHTNING RADIO CALCULATOR—Type A

For problems involving frequency, inductance and capacity, in design of radio frequency circuits. Direct reading answers for size of coils and condensers for any range between 400 kc. and 150 mc. Price, \$1, postpaid.

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Gives direct reading answers to calculations involving current, resistance, voltage and power with scale for resistance of copper wire and scale for calculating decibel gain or loss. Price, \$1, postpaid.

LLIGHTNING WIRE DATA CALCULATOR—Type C

More information on electrical conductors than you could find in a book full of tables. Price, 50c, postpaid.

LLIGHTNING DECIBEL CALCULATOR—Type D

Gives decibel gain or loss when input and output voltages, currents or power are known. Price, 50c, postpaid.

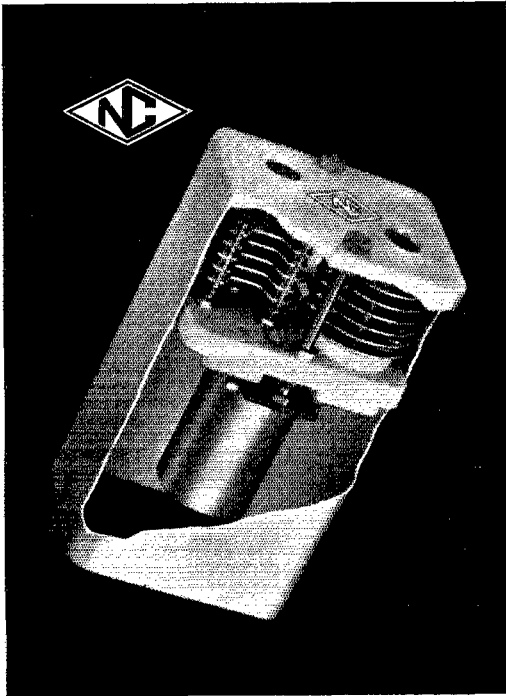
LLIGHTNING PARALLEL RESISTANCE—SERIES CAPACITY CALCULATOR—Type E

Gives direct reading answers for total resistance of two or more resistors connected in parallel, and total capacity of two or more condensers connected in series. Price, 50c, postpaid.

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Permits measurement of any resistor, from 1 ohm to 1 megohm by use of a voltmeter. Makes an ohm-meter of your voltmeter. Price, 50c, postpaid.

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FIXED-TUNED EXCITER TANK

As articles in recent issues of *QST* have pointed out, fixed-tuned exciter tanks provide a convenient means of making rapid frequency shifts in transmitting.

The unit illustrated above combines a low-loss coil form with two independent air-tuned condensers. The entire unit is mounted in a rectangular shield can 5 inches high and 2 inches x $2\frac{3}{8}$ inches in section. The condensers each have a capacity of 25 mmf. and are double spaced for 2000-volt rating. They may be connected in parallel, or in series for push-pull circuits. The design has been made sufficiently flexible to permit operation on all amateur bands, and link coupling or capacity coupling may be used.

Type FXT List Price \$4.50

**NATIONAL COMPANY, INC.
MALDEN, MASS.**

censed operator is allowed to have more power than one kilowatt.

Q. What is a radio amateur?

A. An amateur is a dually licensed person.

Q. What radio communications are not subject to the secrecy provisions of the Communications Act of 1934?

A. Distress signals and privileges from the Government.

Q. Name three Q signals from the international list of abbreviations and give their meanings.

A. QLF—Are you keying with your left foot?

Q. In radiotelephony, what is a gain control?

A. A gain control prohibits the operation of an amateur station for the purpose of profit.

Q. In operating your frequency meter, what is the effect upon frequency when the tuning condenser capacity is increased, and why?

A. The frequency decreased. The frequency is the product of the square root, inverted.

Q. In radiotelephony, what are sidebands?

A. On amateur bands where both code and phone are permitted, there is a space where only code is allowed, only phone is allowed, and where code and phone are allowed. This space set aside for code and phone is known as the side band.

Q. How may plate voltage from a common source be applied to two or more circuits requiring different operating voltages?

A. By using a bleater resistor.

Q. Draw a simple diagram showing shunt plate feed to a vacuum tube oscillator, and briefly explain its operation.

A. Being a woman, I don't know much about diagrams, but can talk about radio to my heart's content. Hi.

Q. What are the undesirable effects of frequency modulation?

A. If continued for any appreciable time, would probably land the person guilty of it in jail if some one didn't shoot him first.

Q. In radiotelephony, what is meant by the carrier?

A. A carrier is the equipment which carries the audio frequency out.

Q. What device converts sound waves into electrical waves?

A. A mikerphone.

Q. Explain how you would determine whether your transmitter was radiating harmonics?

A. Have some one listen on a good receiver outside the range of the transmitter.

1935

Troubles



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OVERCOME

IN

1936

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QST

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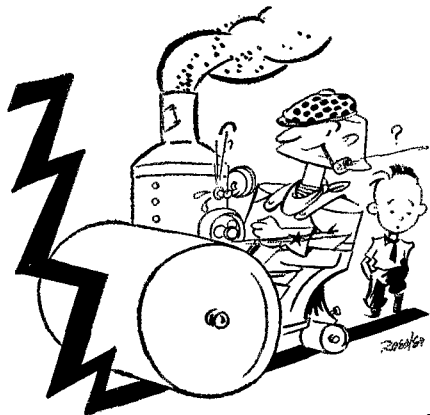
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**RADIOHMS SUPPRESSORS
FIXED RESISTORS**

Strays

From Illinois (W9ONR, O.P.S.) comes word of the "Eighth of a Ton Club," composed of 1.75-mc. hams. W9TLQ is president, tipping the scales at 317 lbs. W9ONR, vice-president, says he weighs only 270 lbs. How about a "featherweight club"?

Mysterious Interference

FOR the latter half of November and first part of December serious but intermittent interference has been reported over a wide range of services and frequencies. A.T.&T., the Airways, R.C.A.C., the Army, Navy and other government and commercial services have all been bothered at different times. The interference hits the amateur bands too, always causing serious trouble.

A sixty cycle modulated signal, not keyed, appears daily between nine AM and nine PM EST on different frequencies between 8 and 25 mc., usually strong around 12,400 to 13,500 kc. The signals appear on three to five frequencies at same time and move a few hundred kilocycles every few minutes! They appear to have no local characteristics. These signals have been heard in England on 14.6 mc. The telephone company is getting reports from India and many remote points to aid in the general search for the source of this difficulty. The signal can be heard on the West Coast but not loud enough there to be bothersome.

The carrier strength varies considerably on the different frequencies logged. The signal is sometimes steady for several minutes but often swings slightly and has characteristics that show inherent instability. Various theories have been advanced and run down without result as to industrial sources. The modulation is usually of the 60 cycle variety but changes to 120 cycles and higher harmonics at times. "Steady", "swinging", "wabbly", "jumping around", "steady on 12,870, signal gone on 13,150 and 13,250 kc.", "sounds like two signals superposed" and other descriptions, characterize the reports. W3ALN, W3EQP, W6LLX, W2WK, VE1ER, W2GRD, W2HTE, W9KEI and VE2DG have thus far reported the characteristics to A.R.R.L.

All readers are requested to please report to A.R.R.L. estimating position, noting time heard, and bearing if possible, also the rate of frequency shifting and fading data. Postal card reports to A.R.R.L. are requested. It is an opportunity to prove what can be done by amateurs! Bearings have been taken, showing that possibly two sources of this peculiar interference exist. A collection of information showing all frequencies on which it can be heard in different localities, and the time of hearing signals, and the time they fade, should prove very helpful, when coordinated.

Washington Radio Club Hamfest

(Continued from page 20)

W1QP, of R.C.A. Mfg. Co. Dr. Woodruff also explained the survey work of the Cairo Committee and pleaded for more cooperation and participation in the surveys. (Write Handy, you fellows!) E. H. Fritschel, W2DC, of the General Electric Company, spoke on the conservation of tube life; and J. W. Wright, of the Naval Radio Research Laboratory, gave a paper on amateur radio from the legal aspect. Chief speaker at the afternoon meeting was Lieut. E. K. Jett, U.S.N. (Rtd.), then the acting Chief Engineer of the F.C.C. In his introductory remarks he praised the public value of amateur radio as a national-defense reserve, for its notable work in emergencies and disasters, and as a training school for the development of the art. He then opened the meeting to questions, and the A.R.R.L. secretary, K. B. Warner, was invited to start the discussion. In response to an inquiry as to how our move to secure more frequencies would be regarded in the F.C.C., Lieut. Jett stated that the Commission attitude of course was unpredictable except that

RME



It took almost a year of constant work . . . NOW IT'S HERE!



Before we could say anything about this fine transmitter, it naturally had to be right. We built it with the one idea in mind —

PERFORMANCE AND SATISFACTION

When you see it, operate it, inspect it, you will agree with us that we have lived up to our established reputation.

The 3R9 has a frequency range from 1700 KC to 30,000 KC. It puts out a healthy signal on 10 meters. A set of three isolantite plug-in coils, changed from the front, by-the-way, affords convenient and rapid shifting to any frequency range.

Telegraph operation is obtained through either the grid block method in the final stage or the crystal stage. For telephony a pair of 841s in Class B audio and a pair of 46s in controlled carrier afford 100% modulation of the full carrier. All equipment is built into this one compact unit.

The power output is conservatively rated at 50 watts from a pair of 801s in the final. Actual output on 160 and 80 meters is nearer 90 watts, depending on power input and efficiency of the antenna system.

All component units are so designed that future increase in power is made available through mere addition of higher powered units.

The cabinet is of the most sturdy construction, black crinkle finished, and of a design hitherto considered prohibitive in cost. 39" high, 19 $\frac{3}{4}$ " wide, 14 $\frac{3}{4}$ " deep, total weight 210 pounds.

The price is so reasonable that you can no longer afford to be without a factory-built, efficiently designed transmitter.

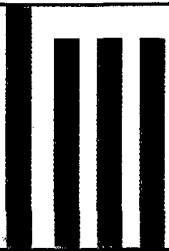
Complete details are contained in Folder T505. We will be pleased to send it to you.



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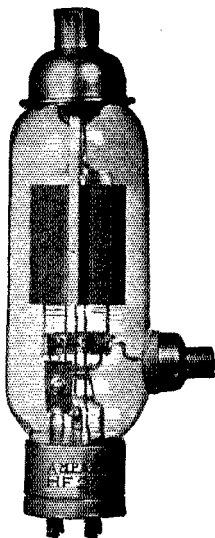


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The tube with the highest ratio of Transconductance to Interelec- trode Capacitance

A design characteristic which is mainly responsible for the extraordinary performance of these tubes at ultra high frequencies. Plate power outputs as high as 400 watts have been obtained from a single tube at five meters.

There are many other brilliant engineering refinements and radical design developments incorporated in the structure of these tubes as well as the entire line of Amperex Carbon Anode Tubes. They are described in an attractive folder containing tube data and characteristics which will be mailed to you on request.

A partial list of Amperex Tubes suitable for Amateur and Experimental work is listed below:

HF200	400 Watt Plate Power Output..	\$24.50
211-H	175 Watt Plate Power Output..	17.50
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211-C	150 Watt Plate Power Output..	17.50
211-D	150 Watt Plate Power Output..	15.00
830-B	50 Watt Plate Power Output..	10.00
801	25 Watt Plate Power Output..	3.25
872-A	Mercury Rectifier	17.50
866	Mercury Rectifier	4.00

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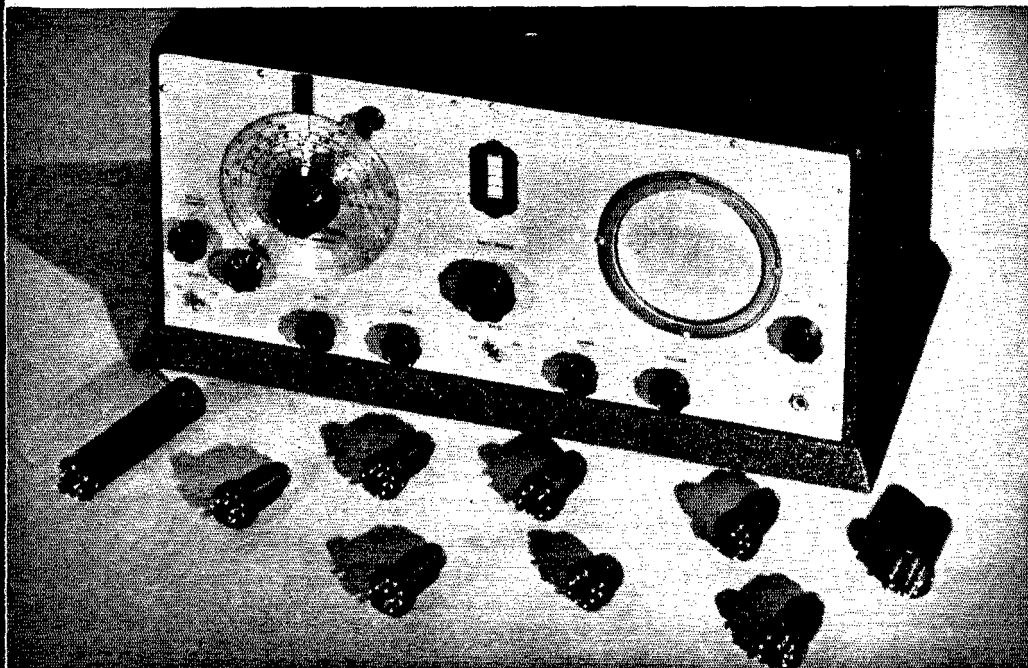
careful consideration would be given our requests—that the conclusion would rest upon the showing we made and that if we felt the need for more frequencies we should endeavor to devise a plan and recommendations and submit them. While he said the matter would be received sympathetically, it was his personal opinion that our chances for ultimate success were very slim. He based this on the fact that high-frequency assignments are growing rapidly, said that it was out of the question to move or eliminate hundreds of foreign and U.S. stations to provide more space for amateurs, and that not much foreign government support could be expected since the bulk of the amateurs are in the United States.² He considered the 14-mc. region similarly crowded with stations performing a valuable service and thought our chances equally slender there. He pointed out that there are 22,000 stations in the fixed service between 1500 and 30,000 kc., not counting mobile, police, aviation, etc., and estimated a total of 30,000 stations in the high-frequency spectrum other than amateur. He dealt, of course, with "notifications," not with the active use of frequencies, although he produced figures showing hundreds of stations already constructed, according to the Berne records. He excited considerable interest by asking amateurs to contemplate the eventual possibility that the Commission may ask them to exchange 1715-1750 kc. for 35 kc. on the other end of that band, so that it would run from 1750 to 2035—to make available a few more channels for the state police service which the Commission now finds very crowded. In giving us this "feeler" he pointed out that the portion 1715-1750 is not in harmonic relation to other amateur bands. A chap in the audience immediately wanted to know whether 2000-2035 would be open to 'phone. Hi! Concerning our 5-meter band and its relation to television, he said that all the commercial u.h.f. services were on an experimental basis only and that final determinations in the matter were not to be expected until about a year hence, when the Commission probably would hold a u.h.f. conference, but he pointed out that our 5-meter band is assigned by the Madrid regulations to amateur and experimental work and therefore is not at this time available for commercial work.

It is worth reporting that the apparatus prizes given away at this hamfest were purchased by the club, partly from the proceeds and partly from its own treasury, and in no case solicited free from manufacturers or dealers. After the drawing, dancing "until a late hour" concluded an enjoyable day. Congratulations are due a committee consisting of W3EHE, the president, W3ZD, the chairman, and W3DK, W3IL, W3EEN, W3CTQ, W3ER, W3BWT, W3CDQ, W3CZE, W3FAC.

K. B. W.

² To amateurs, the real question is not how many stations are assigned to a given band but what they do with their allocations. If they haven't traffic, if they only indulge in "unnecessary signals," if their output is something of which to be ashamed—then their right of occupancy is questionable.

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(Continued from page 18)

clusion of the contest, and another possible 25% based on the number of weekly reports to A.R.R.L.

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—F. E. H.

M.R.A.C.-A.R.R.L. 56-Mc.

International DX Contest! ! !

(Continued from page 27)

afford a check on conditions with operating information that can be passed along to other 56 mc. workers.

A last word. That cup is a honey! Nice place on it for some ham's call, too. Will it be yours?

—F. E. H.

Latest word from W9HRM and W9RH of the M.R.A.C. is to the general effect that "We also intend to ship a case of that Milwaukee famous beer to the first operator that WAC's on 56 mc. W9RH believes that with some 200-watt c.w. signals up on 56 mc. results may be comparable with those achieved on other bands by similar means in our climb upward in developing new territory.

I. A. R. U. News

(Continued from page 46)

work. HB9X works sometimes on 80 meters. HB9Y, our 3.5-mc. star, is temporarily on 7 and 14-mc.; he worked W6 and W7. HB9Z is doing 'phone work on 3.5-mc. HB9AA changed from '10 push-pull to RK-20. HB9AB has two RK-20's in push-pull. HB9AC, our QSL manager, is interested only in DX. HB9AD is doing 'phone work with an RK-20. HB9AE made a trip to the Black Sea observing the HB stations en route. HB9AF established the first 56-mc. contact in the mountains (without direct sight). HB9AG is working some on 'phone, chiefly on 3.5-mc. HB9AH is rebuilding. HB9AI, now working on 14-mc. suffers from screening effect from 120-foot steel mast of the Airport station. HB9AJ is doing QRP 'phone. HB9AK is participating in the VK-ZL contest. HB9AL worked ZL, now

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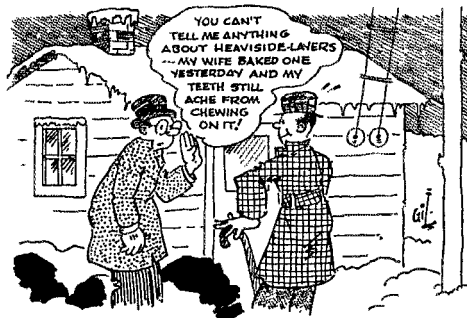
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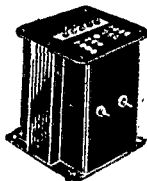


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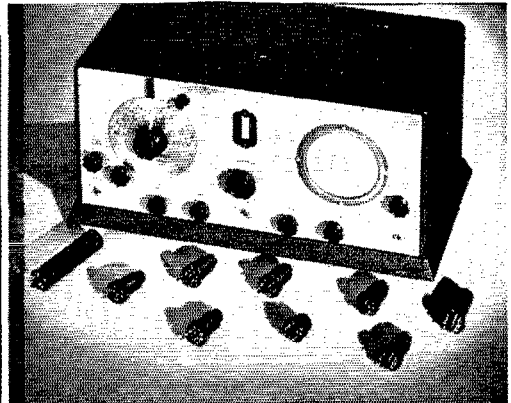
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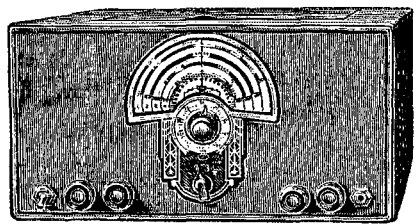
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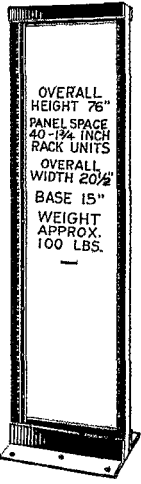
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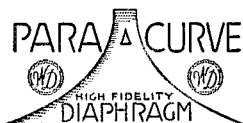
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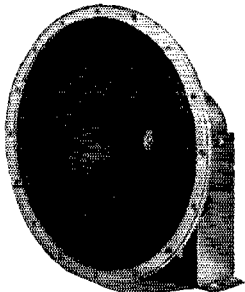
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With the Affiliated Clubs

(Continued from page 28)

by a club member, an exhibit of conjuring, a late supper and distribution of prizes. Forty-three were present, including W. Howard of the Dept. of Marine, Radio Branch, and the secretary of the B.C.A.R.A. Each of the licensed amateurs present in turn gave a brief account of his activities and his station. H. J. Cunningham, ex-9BP, ex-5CE, was the competent master of ceremonies.

Get Acquainted!

Clubs are excellent places to get acquainted with radio amateurs and to participate in interesting discussions on our hobby. At A.R.R.L. headquarters there are recorded the addresses of the several hundred amateur radio clubs affiliated with the League, their places and times of meetings. Why not drop in at your local club and "meet the gang"? Address the Communications Manager (enclosing 3¢ stamp, please) for data on affiliated clubs in your vicinity.

Miscellany

The Holyoke Amateur Radio Club, newly affiliated, has built a shack on a hilltop near Mt. Tom, Holyoke, Mass. Here will be housed the club station, W1JJO. Height above sea level is about 300 feet, a fine location for 56-mc. work. Transmitters are being constructed for 14, 7, 3.5 and 1.75 mcs. . . . The Tri-County Radio Association, Inc., is now located in its new headquarters in the Plainfield (N. J.) City Hall. The chief club project at the moment is the design of a ham super. Technical talks are given every week and special speakers are obtained for the monthly social nights. A very successful Halloween party was held. . . . The Ocean County Radio Association of Lakewood, N. J., meets at the homes of various members. The November 5th meeting was at W2FLO's shack. . . .

—E. L. B.

Allen H. Babcock

(Continued from page 26)

It is our observation from these headquarters that no A.R.R.L. director has ever eclipsed the activity of W6ZD during his tour of duty. A facile correspondent, and with the facilities for doing it, he kept things humming in his division from one end to the other. His correspondence with us was tremendous in volume and we used to say that if we had that many letters to answer from all the other directors, we would have to double the secretarial staff. There was no half-heartedness about W6ZD; he had decided views, and he supported them vigorously. He liked a thing or he didn't, and in either event one could be sure of action when he was around. He gave greatly of his time and energy to the affairs of our League for over eight years, and during his

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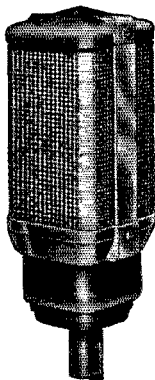
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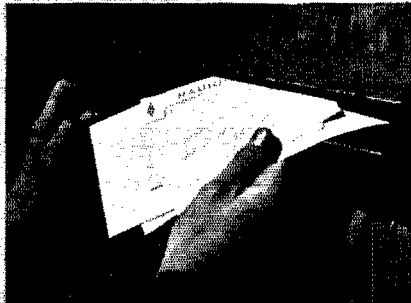
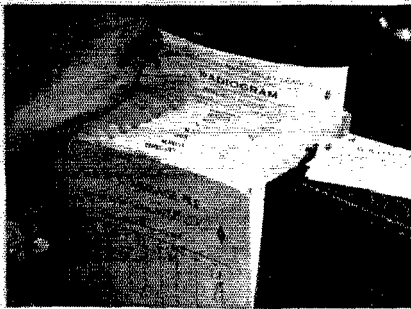
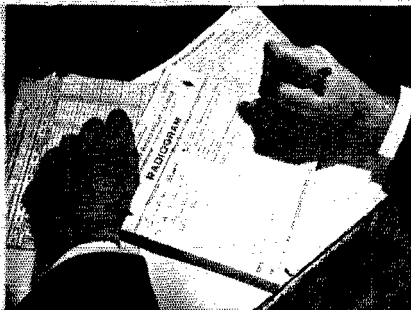
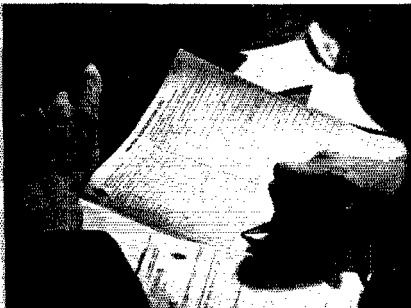
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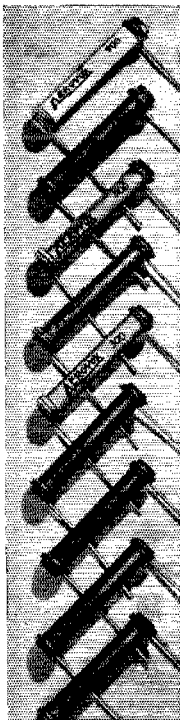
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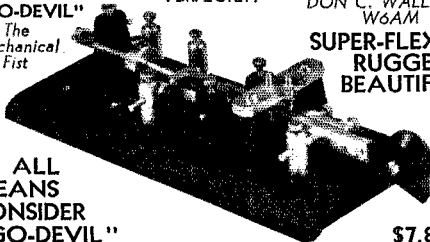
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regime did much to build up the Pacific Division. His many friends and acquaintances regret that the key at W6ZD is now stilled forever.

—K. B. W.

Pocket Superregen Receivers

(Continued from page 25)

physically larger Sickles type 1B81, the tap may be in the center for both ranges.) The only reason that this type of short-wave range was not provided in the receiver of Figs. 1 and 3 is that I did not have a pair of double-pole double-throw switches of standard make small enough to go in the space available in such a position that they

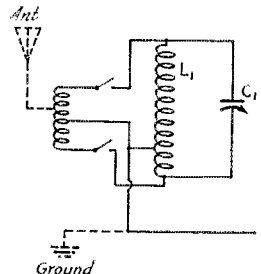


FIG. 9

could be operated through holes in the box; that is, without projecting.

The objection to the method just described for

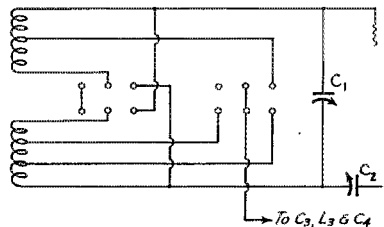


FIG. 10

switching is that regardless of the degree of coupling between the two parts of the loop, the frequency limits of the short-wave range are just twice those of the long-wave range. Various switching schemes are readily worked out for inserting extra inductance in series with the loop when the two halves are in series, and/or inductance in parallel when in parallel, for pushing the ranges farther apart. One such is shown in Fig. 11 where the loop halves and the auxiliary coil are all in series when the switch is open, and all in parallel when it is closed, the system being mid-tapped in both cases. The interesting part about this is that the minimum possible ratio of resulting inductance is 9, and is obtained when the auxiliary inductance is $L + M$, where L is the inductance of half the loop and M is the mutual between halves.

Not having discovered any switching circuit that would allow the bands to be located at will without sacrificing pick-up, I tried winding a loop

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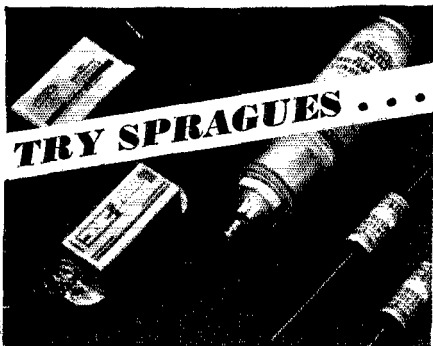
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in unequal parts, knowing that in this way the ratio of series inductance to parallel inductance could be made as much greater than 4 as desired.

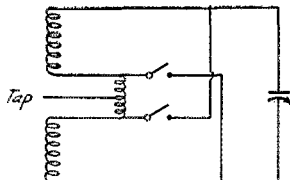


FIG. 11

Much to my consternation, there seemed to be no signal pick-up at all in the parallel position. Fig. 12 shows the arrangement, schematically, e_1 and e_2 being the voltages picked up by the two parts of the loop. Analysis of this circuit shows that at resonance the current is

$$i = \frac{e_1 (Z_2 - Z_m) + e_2 (Z_1 - Z_m)}{r_p (Z_1 + Z_2 - 2Z_m)}$$

where r_p is the parallel resistance of the two loops.

Now if Z_2 is considerably smaller than Z_1 , and the coupling between Z_1 and Z_2 is close (as it is when both are wound around the same edge of a flat box), Z_m may be greater than Z_2 and hence make the term $Z_2 - Z_m$ negative. Since this term is multiplied by the larger voltage, the whole expression may thus be reduced to a very small value. This condition may well be what I ran into. To avoid such a possibility it is obvious from

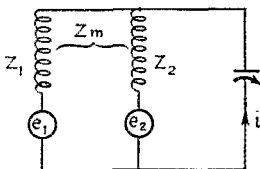


FIG. 12

the expression that we can make one of the pick-up voltages negligible, as was done in the receiver of Fig. 4; or make $Z_1 = Z_2$, as in the receiver of Fig. 5; or make $Z_m = 0$, which is, however, not feasible in a small receiver.

Rocky Mountain Division Convention

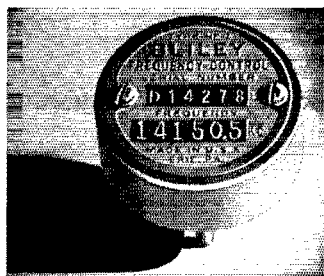
THE Rocky Mountain Division Convention opened at 9 a.m. Saturday, August 31st. Several early comers were at the **Camfield Hotel** for registration. Registration went on all day until 6:30 p.m. as many were unable to arrive earlier. Denver was represented by the greatest number of delegates. Oliver Coburn, W2FKO, New York City; Clinton B. De Soto, W1CBD, Hartford, Connecticut; and Bob Prell, W9EBR, Los Angeles, California, came from the greatest distances. Many amateurs came from Nebraska and Wyoming. Texas was represented by Frank Morgan, W5EIM, of Dalhart; and Oklahoma by L. M. Edwards, W5FJ of Enid.

After registration all were directed to the I.O.O.F. hall where Clinton B. De Soto, repre-

Here's BLILEY'S Big News

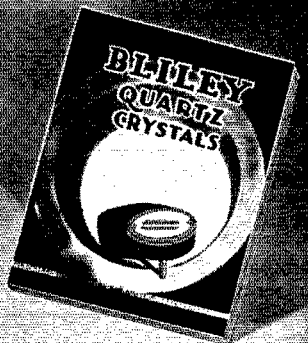
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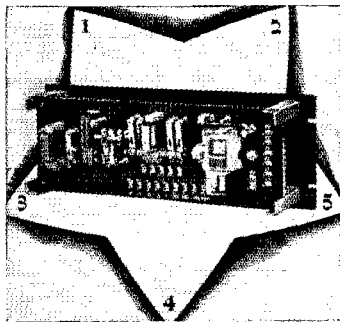
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5
features



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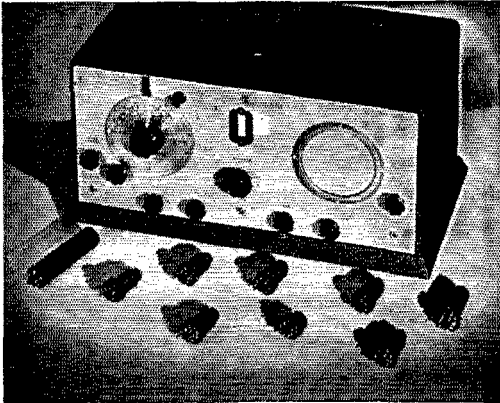
1. Provides a time delay to allow power tubes and rectifiers to attain proper operating temperatures.
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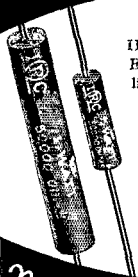
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sentative from A.R.R.L. Headquarters, gave a demonstration of transmitter adjustment by use of the cathode-ray oscilloscope with his portable transmitter. Followed an inspection of exhibits by jobbers and a Dutch lunch at 12:30.

In the afternoon the program began with a technical session presided over by Mr. De Soto, who gave a talk on and a demonstration of "The Mechanics of Modulation." J. P. Veatch, W9CJJ, Denver, discussed peak modulation indicators using the mercury vapor tube, and other devices. Viewing the equipment displays and a general get-together followed the talks.

At 6:15 p.m. a convention photo was taken. The banquet at 6:30 was presided over by Leo Anderson, W9OUI, Denver, a genial and amusing toastmaster. Clint De Soto, the officers of the Greeley Radio Amateurs, and the Greeley Chief of Police Billy Boggs, an interested prospective amateur, were introduced by D. L. Clark, W9NEY, secretary of the Greeley Amateurs, under whose direction the convention was given. Prizes worth \$500 were awarded in the big drawing after the banquet. Everyone present received a prize and every prize was well worth winning. At midnight nineteen amateurs were initiated into the Royal Order of the Wouff Hong.

Sunday morning, September 1st an Army and Navy meeting was held, followed at 10 a.m. by a political session. Denver delegates prevailed and Denver will be the locale of the Tenth Annual Rocky Mountain Convention. It was decided that prizes would no longer be solicited except for A.R.R.L. divisional conventions. After a picnic lunch there was another prize drawing in which those present took part, and with this the convention came to a successful close.

This convention was put on under considerable handicap as both assistance and finances were limited. However, it turned out to be a financial success, a result which is seldom accomplished. Those who aided Dave Clark in putting over this convention were Glen Johnson, W9FQK, president of the Greeley Radio Amateurs; N. W. Sutphin, W9OQL, vice-president; Earl Leonard, W9SWM, treasurer; and Vernon Strait, W9ODS.

—W9NEY

Considerations in Speech-Amplifier Design

(Continued from page 18)

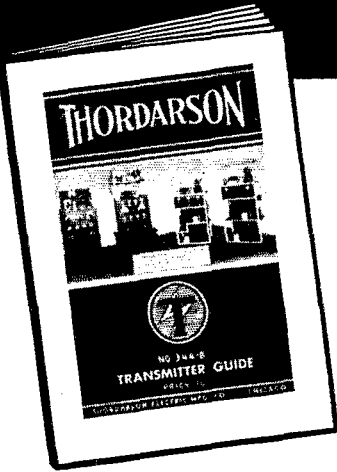
There is a slight deformation of the wave at the point where grid current starts, but the general shape is unchanged. The d.c. resistance of the secondary of the T-7432 transformer is 800 ohms.

Fig. 4 shows the effect of inserting a driver transformer having a 7300-ohm secondary. It should be noted that there is no discontinuity in the straight sides of the wave, which indicates that the transfer of the load from one tube to the other as the cycle reverses is nearly perfect.

Fig. 5 shows the effect of using a single-ended driver tube in place of the push-pull stage. A Type 42 tube, triode connected, replaced the two 76's, and a high-grade transformer designed for the service was used to couple it to the power

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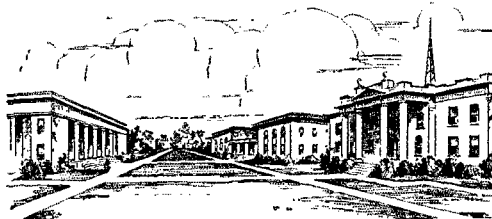
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stage. The output level was 18 watts. On the lower side, the magnetic flux in the core due to the grid current of the power stage was opposing the flux due to the plate current of the driver tube, so that the two were at least partially neutralized. On the upper half of the wave, however, the two were aiding, resulting in the flattening of the top of the wave.

GRID-BIAS REGULATION

Tubes in Class AB do not operate on the linear portion of their plate current-grid voltage curves as they do in the ordinary Class-A system; as the signal on the grids increases, the *average* value of the plate current increases. This increase of average plate current with signal is the reason why the ordinary self-biasing system cannot be used in this type of amplifier. The bias voltage would increase directly with the plate current (since it depends on the voltage drop caused by the plate current through a fixed resistor) and the amplifier would be operating under much higher bias voltages at high output levels than at low ones, hence the maximum undistorted output would be greatly reduced. The bias voltage should therefore be independent of changes in the average value of the plate current.

There are several types of circuits used in commercial amplifiers to secure "fixed bias" for Class-AB amplifiers—some that result in a bias that is "fixed" only in name. The most common circuit—common because it is the most expedient—is one which employs one side of the plate-transformer high-voltage winding to supply a.c. to a half-wave rectifier fixed-bias circuit. This is shown in Fig. 6. It is simple because all that is required of the amplifier power transformer is an extra filament winding for the rectifier tube. This means, however, that an a.c. voltage of approximately 450 volts, in the case of a 42 Class-AB amplifier, is applied to a rectifier system from which a d.c. voltage of much less than 100 volts is required.

Provision is usually made for reducing the d.c. voltage by means of a voltage divider in the filter circuit. This usually takes the form of a high resistance of the order of 15,000 or 20,000 ohms between the plates of the rectifier and the filter choke, and then a potentiometer-type divider on the load side of the choke to allow for adjustment of the voltage. This type of "fixed-bias" supply will operate fairly satisfactorily where grid current does not flow at any output level within rating, as is the case with 2A3's. But in amplifiers employing 42's or 45's in Class-AB, where grid current is a big factor, this type of circuit is not at all satisfactory.

The path for grid current is through the secondary winding of the driver transformer, out the center tap of the winding to the bias circuit, and through that to the cathode. That part of the fixed-bias circuit which is common to the grid-current return path has on the order of 5000 to 15,000 ohms in it, and since the grid current under conditions of high output may be as high as 8 to 12 ma. it is readily apparent that there will

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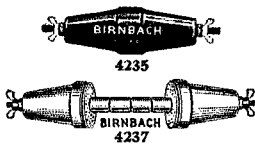
Send for bulletin 103 describing ISOLANTITE holders, "AT" cut crystals, etc.

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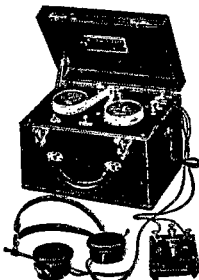
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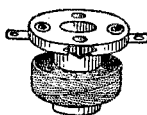


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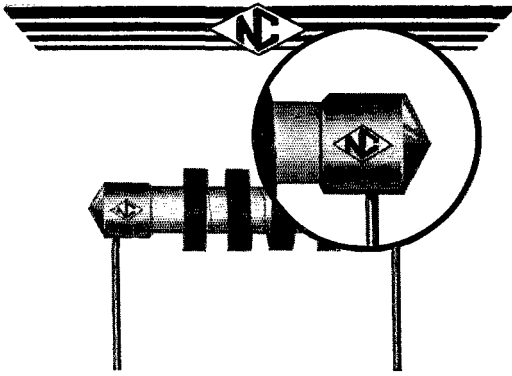
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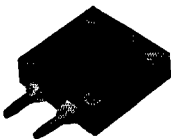


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be a very definite increase in bias voltage between the no-signal condition and that of maximum output. In addition, the driver transformer and Class-AB tubes in rectifying the audio voltage act as a power supply in parallel with the bias supply, and tend to relieve the load on the bias supply at high outputs. Thus any resistance in series with the bias supply makes the regulation

TABLE I
Bias Voltage vs. Output Watts
Bias Circuit Fig. 6

Watts Output	Grid Volts	I_1 ma.	I_2 ma.	I_0 ma.
0	38.0	8.0	8.0	0
3	38.0	8.0	8.0	0
5	38.5	8.0	8.0	0
7	43.1	8.0	9.0	1.0
10	50.5	8.0	10.3	3.0
13	61.0	7.7	13.0	5.4
16	73.5	7.5	15.0	8.3
18	79.5	7.1	16.5	9.6
21.8 (Max)	96.5	7.0	20.0	12.5

TABLE II
Bias Voltage vs. Output Watts
Bias Circuit Fig. 7

Watts Output	Grid Volts	I_1 ma.	I_2 ma.	I_0 ma.
0	38.0	47.0	47.0	0
3	38.0	47.0	47.0	0
5	38.0	47.0	47.0	0
7	38.2	46.0	47.0	1.0
10	38.5	45.8	47.8	2.5
13	39.8	45.2	49.0	4.5
16	41.0	44.5	50.0	6.5
18	42.0	42.0	51.0	8.2
26 (Max.)	46.0	40.0	54.0	15.5

TABLE III
Bias Voltage vs. Output Watts
Self-Bias, 730 ohms—Circuit Fig. 8

Output Watts	Grid Volts	I_0 ma.
0	36.5	0
3	39.0	0
5	41.0	0
7	43.5	0.5
10	51.0	2.6
13	59.0	5.7
16	67.0	8.2
18	72.5	10.0

worse, and the bias voltage increases in almost direct ratio to the power output. Tables I, II, and III show the variation in bias voltage with power output for the three biasing methods given in Figs. 6, 7 and 8. It is interesting to note that the self-biased system has less voltage increase than that of Fig. 8.

It is evident that the bias circuit must afford a low-resistance path for grid current and it might be noted in passing that a low-resistance path through the secondary winding of the driver transformer is just as important, for the same reasons. If the value of this bias supply resistance is to be made smaller and the no-signal bias voltage remain the same a larger current must be taken from the filter circuit. As the circuit in Fig. 8 stands, there is a bleeder current of about 8 or

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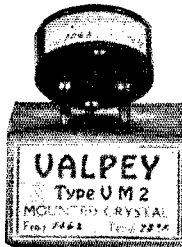
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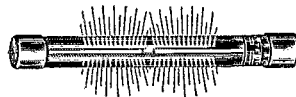


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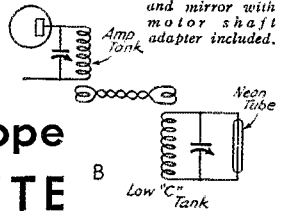


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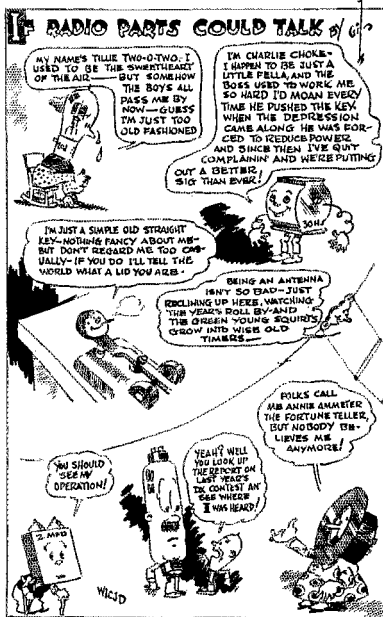
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10 ma. To reduce the value of the resistance the current should be of the order of 50 ma. Now 8 or 10 ma. additional from one side of a high-voltage winding designed to give 150-ma. d.c. will not cause any serious damage, but 50 ma. would mean a much greater power drain, consequent overheating of transformer, and a serious unbalance in the high voltage supply to the main filter. For these reasons such a bias circuit cannot be readily adapted to give satisfactory performance.

The bias supply of Fig. 7 was therefore developed. The high-voltage winding on the power transformer has a tap which gives the right a.c. voltage for the bias rectifier-filter so that a low value of bleeder resistance can be used. The actual value of resistance in use is only about 800 ohms when the bias tap is adjusted on the amplifier—quite different from the thousands of ohms used in the circuit of Fig. 6. Instead of an a.c. voltage of 450 (at 50 ma.) applied to the bias rectifier, the voltage is only about 75 (also at 50 ma.). This means much less wasted power, less heating in the power transformer, and incidentally filter condensers of much lower voltage ratings.

Besides its degenerative effect, varying bias is a source of distortion because of its effect on the driver tubes. The flattening of the peaks of the wave in Fig. 9 results from a combination of these two effects.

While the data discussed apply directly to the amplifier described, the same principles apply to amplifiers using tubes of similar characteristics and should be considered in the design of amplifiers of this type. Undoubtedly those who may have had unsatisfactory results with Class-AB or Class-B amplifiers could trace their troubles to some of the inherent defects pointed out in this article.



What the League Is Doing

(Continued from page 21)

"Commercialism" The suggestion that A.R.R.L. is not truly a "ham" organization is, we believe, demonstrably ridiculous. Approximately two-thirds of our membership consists of licensed amateurs. The great bulk of the remainder of the membership—as determined by accurate surveys—is made up of prospective amateurs or old-timers whose licenses have expired but who still maintain an interest in the game. The percentage of our members who are not either licensed amateurs or who have not been or who do not plan soon to become the same is less than 5%. This small percentage seems to be made up chiefly of professional radio engineers who read our magazine for the information it contains on technical developments. Our Board of Directors is made up of licensed amateurs and is elected only by licensed amateurs since, in principle, only licensed amateurs can vote in A.R.R.L. elections. Our headquarters staff is made up of licensed amateurs. The A.R.R.L. constitution makes ineligible for director any person associated with the manufacturing, sale or rental of radio apparatus or literature; nor does any member of the headquarters staff have any outside radio affiliations, commercial or otherwise.

New Cosmic Phenomenon

(Continued from page 8)

rents flowing in the ionosphere as the charges therein redistribute themselves. The facts we get from radio experiments indicate that this, rather than direct magnetic action of the sun, is the true explanation of terrestrial magnetic disturbances.

By the way, the direct correlation of solar and radio effects with which we are here concerned are daytime phenomena, i.e., on the side of the globe illuminated by the sun. Nighttime radio phenomena are far more variable, depending, like the magnetic disturbances, on more or less turbulent processes of redistribution of the electric charges in the ionosphere.

I want to thank the League for bringing this matter to the attention of amateurs, who can help materially by reporting cases of daytime impairment of signals, particularly if they will check with other amateurs to determine whether the difficulty exists over a considerable area. Reports from amateurs which the A.R.R.L. sent me regarding conditions on October 24th were very helpful.

In conclusion, amateurs will be interested to know that the first known instance of these remarkable daytime fadeouts was the one reported from the A.R.R.L. files, that of November 28, 1934, reported by Mr. F. D. Jenkins, W4SB. I put it in the class of authentic cases because I have just received from Mt. Wilson the news that a solar eruption was observed within a half hour of the time Mr. Jenkins reported.

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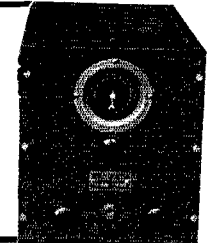
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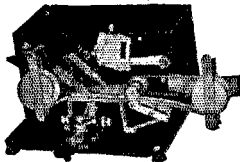
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Transmitters for Ten Meters

(Continued from page 14)

his own pet antenna and coupling system.

The RK18 outfit shown in the remaining photograph is a complete 28-mc. transmitter, working from a 40-meter crystal, and having an output of about 100 watts under normal operating conditions. Making a 46 get down to business is one of the chief points about this set, and since the job was done by W1SZ, we'll borrow a phrase from the 'phone bands and let him "do the honors."

A 28-Mc. Transmitter with Push-Pull RK18's

By C. C. Rodimon, W1SZ

MEMORIES of a simple exciter, built two years ago, that gave satisfactory output on 10 meters caused the present setup to be what it is. Starting out with a garden-variety 59 Tri-tet oscillator from a 40-meter crystal, original plans had called for an oscillating doubler-buffer as intermediate tube, the 46 being selected. The output would have to be sufficient to drive a pair of RK18's as a straight amplifier, which wasn't asking too much of the buffer since the RK18 is one of the easiest triodes to drive.

The first problem was to get the Tri-tet going and get the greatest possible output on 10 meters; after the 59 was wired the next item was that of adjusting the grid circuit of the 46. Originally the 46 was hooked up as a TNT oscillator on 28 mc. Although the fourth harmonic of the crystal in the 59 plate circuit was strong enough to light a neon bulb, locking the TNT 46 to the harmonic proved to be very tricky. Both link and capacitive coupling were tried. The best combination was finally hit on by making an untuned grid coil just too large for oscillation with the 46 plate circuit tuned to 28 mc. This gave plenty of regeneration and the frequency was kept nicely under the control of the oscillator. Final checking showed that better output from the 46 stage resulted when the plate circuit of the 59 was tuned to 14 mc. and capacity-coupled to the untuned grid tank of the 46. With a 5000-ohm grid leak in the RK18 stage the grid current was 25 ma., representing about 130 volts bias.

Originally, the grid circuit of the RK18's was tuned in the regular fashion by a 25- μ fd. variable condenser. However, a better transfer of energy resulted when this tank circuit was made entirely L with spaced turns. The one turn link was loosely coupled for best results. The plate tank and neutralizing circuits on the RK18 stage are perfectly orthodox. It was found, however, that regular Cardwell 852-type neutralizing condensers did not have quite enough capacity for neutralization; this was remedied in short order by removing the hex nut at the rear of the rotor section and decreasing the spacing between rotor plates by putting the thin spacer between the plates and putting the wider spacer at the rear.

IN OPERATION

The voltages specified are those which were found to be best from the standpoint of maximum output obtainable without overloading of any of the components. Not more than 300 volts should be used on the 59, because at higher voltages, the r.f. on the crystal may be excessive. With the layout shown, 450 volts was tried after everything was tuned up properly but the crystal heated very noticeably and the final-stage grid current increase was only about 5%—hardly worth the chance of damaging a crystal. The 46 stage performed best with 400 volts on the plate and 50-55 volts on the screen. The reliable indicator in this stage is the plate current. With the plate circuit fully loaded the plate current should not exceed 35 ma.; when this value is exceeded the plate current starts climbing. The grid-leak bias used in the final stage makes it almost necessary to key in the center-tap, the 46 being in continuous operation. Should greater output be desired it could be secured by using fixed bias on the final and keying the 46; then the screen could be run at 90 volts with the plate current around 60 ma. This means, however, that only c.w. can be used, because holding the key down will cause the grids to get too warm and the plate current will climb.

With the 35 ma. rating not exceeded in the 46 stage the excitation is ample for good efficiency at full tube ratings. The importance of tuning up on low plate voltage cannot be over-emphasized, since the tubes are likely to lose their emission if run out of resonance for anything more than split-second intervals at high voltage. This rig, plus an antenna circuit, was tuned up with 500 volts on the final; not until tuning was completed was the full voltage applied. At 1000 volts and 170 ma. plate current there was no visible coloring on the plates. Under certain conditions, however, it was noticed that one tube would heat up. On the assumption that one tube was getting more excitation than the other the link between 46 and final grids was readjusted by moving the coupling loop from the center of the grid coil towards the grid of the tube showing color. This proved to be effective in giving better balance.

In closing it might be stated that grid and plate circuit wiring in the final amplifier must be symmetrical for best results. For those who judge power by the pencil test it might be said that with the antenna circuit in tune and final loaded to the tube ratings, there is still a half-inch arc at the plates. The no-load plate current at 1000 volts was 60 ma.



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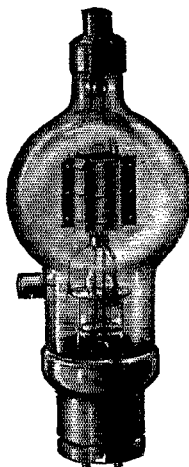
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28-Mc. Activity at All-Time High

(Continued from page 10)

larger than all the four lower-frequency bands put together. For another, DX with low power—W9JZJ, using a self-excited 53 with only 12 watts input, puts an R9 signal on the East Coast and has worked a couple of G's! And W6GAL, getting on with only five watts input, worked stations all over the country. Third, an opportunity for Class-B and C licensees to work some DX on 'phone. A 1000-kc. 'phone band restricted to stable signals is something to think about. Those of us who feel a rather proprietary interest in the band are not keen on seeing a bunch of punk 'phones move in, but the well-operated ones are welcome.

At this time of the year the band closes up tight not long after darkness sets in and does not open until well after daylight in the mornings. When this issue of QST comes out the daylight hours will be least of any period of the year, hence ten-meter operation will have to be restricted to weekends for most of us. However, assuming that we're on the up-grade part of the cycle, conditions should be improving right along until early spring, when it is reasonable to expect a duplication of conditions in October and November. Just the right amount of time to get equipment tuned up and get acquainted with the band, then you're all set for the next blow-up! We feel in our bones that it's coming, but then there have been so many cries of "Wolf" that we don't take any responsibility for it—the bones may just be feeling the cold weather!

In the meantime, we solicit reports on work done on the band, and would like to hear from fellows who are willing to do some real work on ten during the next year, on weekends at least, whether conditions turn out for the better or worse. The regular coöperation of observers in all sections of the country and various parts of the world will be of immense help in determining whether it's the band or just us that falls down at times, and may turn up something of scientific value as well. We recognize that a special type of ham is needed to devote weekends and good operating time to work that often seems profitless, but with the enthusiasm generated by the past few months' good conditions as an accelerator, perhaps there are enough of the type in existence now to do a worthwhile job. Are we right?

The calls heard lists given below are typical of what's been going on during October and November. Scan them and form your own conclusions!

—G. G.

28-MC. CALLS HEARD

VK3YP, Malvern, Victoria, Australia

w1cmx w1avv w1sz w1cct w2tp w2dra w2dab w2hr1 w3dph
w3se w3air w4dbx w4ajy w4ef w4cby w4bbp w5bdt w5hqd
w5ctx w5jv w5ehm w5ebt w5hhw w5wg w5vq w6dio w6jju
w6rh w6dhz w6awt w6bnu w6eps w6dob w6cxw w6cem
w6jn w6zh w6ahz w6edv w6ewc w6bay w6cis w6fqy w6fzl
w6kfg w6gei w6kri w7amx w7avv w7bpj w7isu w8era
w8mah w8mwl w9ny w9haq w9tif w9fbj w9gdh w9drd
w9fsg w9dww w9ef w9ghn w9jie w9bpu w9aeh w9bht x1ay
x1aa j2hj j2is j2jk j8ab j3fj vu2tj f8ih g6dh g2yl g6wy
d4arr pa0us on4au on4jb lulap

L. G. Quigg, 4 Enfield St., Mt. Eden, Auckland, C3, New Zealand

w2tp w5afx w5ql w5wg w6aet w6cal w6cis w6dio w6ewc w6ewz w6epz w6grx w6jju w6rhr w6vq w7amx w7avv w9bqm w9fm j2bj j2is lulep x1ay

R. J. Taylor, 68 View Road, Mt. Eden, Auckland, C3, New Zealand

w2tp w4bbp w4ajx w4ajy w4tz w5afx w5atl w5bdt w5ql w5wg w6aet w6awt w6bam w6cis w6cog w6cal w6cxw w6bnu w6dhs w6dio w6egt w6epz w6ewc w6grx w6jju w6jn w6jnr w6kev w6kpr w6rhr w6vq w7amx w7avv w7evv w8era w9drd w9ffq w9hag w9lf w9ny w9spb w9tb w9tj j2hj j2bj j2is j2lk j2lk j3df j3fj lulep x1ay

CO6OM, Tuinucu Cuba (28-mc. 'phones)

wlzx w1aze w1ayg w1gbe w1hr w1hst w1caa w1inc w1fjm w1df w1bnu w1hqv w2hfs w2dyr w2hqb w2tp w2bcr w2fwk w5beq w5afx w5fgy w6bay w6zh w6tdp w7ayq w8fq w8ida w8jfm w8jv w8aga w8big w8ags w9iba w9ltx w9osc w9osd w9drh w9drn w9jie w9ghk w9lf w9bht w9def w9arf ve2ca ve2hs ve3mg

SUIRO, Cario, Egypt (Oct. 26th to Nov. 10th)

g2yl g6yl g6lk g6nf g6cj g5wp g5by g6dh ok1aa ok2ak ok1aw ok2ms ok3wb on4my on4jb on4ac on4au on4ed ym4aa f8ct f8kj f8vs f8gr f8kj f8wq fa8cr fa8ih d4auu d4lmm d4gwf d4ort d4imk d4arr d4kpi oe1er oe6ok oe3wb pa0apx pa0fx pa0az pa0qq at6k zslh zu6p lulep mia ea4ao j2hj u9av w1dxe w1sz w2ber w2dtb w2goq w3tw w4auu w4ajy w4ief w8iwg w8ktw w9hag

W6BEX/K6, K6MSD, W6HOT/K6 (Nov. 9th to 11th)

w1aep w1av w1avv w2bqk w2byf w2fab w2dza w3bph w4agr w4ajy w4bbp w4ef w4elt w4ely w4dgm w5afx w5ddb w5ddq w5jv w5ql w6bam w6bxv w6cis w6dhs w6fgw w6dob w6dio w6ewc w6ecw w6exj w6exq w6gei w6hdy w6hrx w6jn w6kev w6kin w6rhr w6zh w7avl w7avv w7fft w7flu w8bwb w8era w8hgw w8jin w8kpb w8mwl w8nk w8pk w9ags w9abe w9bgj w9bqm w9bw w9fm w9haq w9huv w9ico w9jaq w9jhn w9ld w9mef w9ny w9rso w9tj j1lo j2hj j2is j2lk j8ab lu4aa lu9ax lu9bv ve5jc vk2aa vk2hf vk2kk vk2lz vk2pn vk3bd vk3tp vk3yq vk3yp vk4bb vk4ei vk4gk vk4oy vk5hg vk5pn vk5wj vk6sa zilba z1ldv z1kk; (fones): w1dex w2tp w3bph w5ats w5ddp w6aaa w6etx w6zh w7aed w7avv w7vgh w7dnp w8agu w8bv w9fyy w9gyq w9hj w9hja w9jie w9kfa lu9bv velci

W6JRC on shipboard, Balboa, Canal Zone (Nov. 3rd)

w1ayx w2tp w3atf w3byp w3chh w3evt w4am w4auu w4mr w5afx w5bxn w5ddp w5ql w5wg w6dio w6dob w6ert w6ewc w6gtm w6jn w7amx w8era w8jk w8mah w8mwl w9agv w9gdh w9ny w9ut ve4ob ve4sh lu9ax x1cm; (fones): w6aaa w6agj

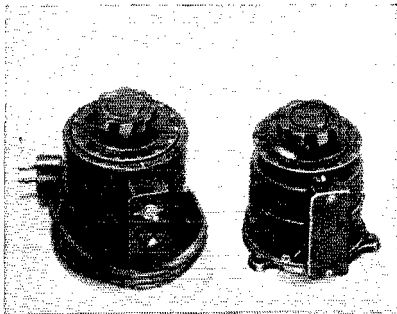
G2YL, Walton-on-the-Hill, Tadworth, Surrey, England (Oct. 17th to Nov. 17th)

w1avv w1zi w1csr w1df w1dxe w1gsh w1ayx w1dag w1fjn w1fpr w1efd w1eca w1sz w1ahi w1aep w2cfw w2ghb w2bcr w2goq w2fhi w2hij w2bqk w2tp w2fdl w2clm w2dtb w2dng w2bpy w2dl0 w2cfd w3cgv w3bwb w3byf w3dbx w3evt w3enb w3fed w4agp w4auu w4ajy w4mr w4tz w4cyu w4bbr w5wg w5ql w5afx w6cal w6grx w6kjp w6dob w6zh w7amx w8era w8mwl w8mah w8pk w8fyc w9apb w9dsc w9drn w9abe w9dqm w9huj w9ny w9lf w9haq w9ij w9ghn w9mcd w9bpu w9gyk w9huv w9fph w9tj w9gbj vk2lz vk3bd vk4bb vk4ei vk4ap vk4gk vk6ea ve3du vu2lj zulsz sulro x1ay xclcg lulep lu6ax lu7az lu9bv lu9ax zslh zule at6k zu6p

X1AY, Mexico City, Mexico (Oct. 1st to Nov. 17th)

d4kpi ea4ao f8ct f8ef f8kj f8oz f8vs f8wk fa8cr fa8ih hb9j g2hg g2pl g2sg g5by g5fv g5la g5sy g5wp g6cj g6dh g6qb j2jk k5aa k6ksi lulep lu9ax lu9bv on4au pa0qq ti3wd ve1ea ve3du ve3iv vk2ls vk3bd vk3bq vk3jj vk3mr vk3yp vk4ap vk4bb vk4ei vk5hg vp5aa z1lar z1lki z1kkz z1saj w1avv w1ahi w1ayx w1bpx w1cfd w1clm w1cqr w1dqr w1dxe w1ehr w1hio w1zb w1zi w2ajy w2ber w2cqx w2dtb w2dza w2fdl w2glj w2goq w2gox w2tp w3afu w3atf w3auc w3bph w3bvz

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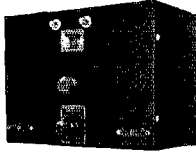
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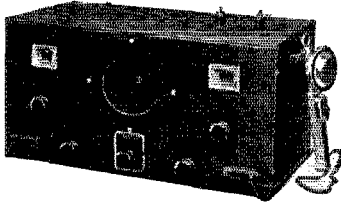
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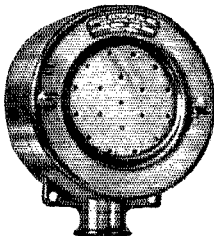
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w3byf w3bz w3chh w3cls w3dlb w3ebk w3ejo w3eto w3far w3fed w3fid w4agk w4agp w4ajy w4akt w4auu w4bmr w4cdo w4ef w4ho w4mr w4tz w5afx w5ell w5aet w5ahz w5as w5awt w5bam w5bpt w5byu w5cal w5cem w5cis w5dio w5djj w5dmm w5dtb w5gear w5epz w5etx w5ewc w5eyc w5fqy w5hgo w5lhh w5ldf w5inp w5itd w5kix w5ljj w5jju w5jn w5jnr w5kbb w5kg w5kjp w5kpr w5rh w5sc w5vq w5yu w5zh w5zq w7amx w7avl w7avv w7cht w7dnp w7flu w7sagk w7sno w7bki w7cgo w7sra w7cte w7dfv w7dpo w7drj w7dye w7dyk w7edr w7fda w7hgw w7itk w7ixs w7ixm w7jax w7jfo w7jin w7kdo w7krv w7ktw w7lda w7lvr w7mah w7mwl w7pk w7abe w7abp w7ago w7ags w7agt w7asv w7bbp w7ces w7dhn w7doz w7drd w7dsc w7ef w7eku w7ffq w7fgc w7fur w7gjb w7gfd w7ghn w7gyk w7haq w7hja w7huv w7ico w7ij w7isu w7jag w7jgs w7jje w7lka w7kpd w7lkt w7lfl w7mcd w7mef w7nbi w7ny w7pya w7rh w7rkr w7rta w7si w7sie w7spb w7th w7tj w7uaz

F8VS, Haravilliers par Marines, France
(Oct. 1st to 25th)

wlav wlavv w1cmx w1csr w1df w1dze w1gsh w1sz w1si w1zb w1ah w1amp w1arb w1fh w1ias w1dza w1fdl w2gjb w2ber w2cfw w2tp w3bph w3byf w3dlb w3evt w3far w3bhw w4agp w4ajy w4auu w4mr w4bbp w4eyu w5afx w5ql w5jfv w5wg w6vq w6cal w8cra w8dyk w8ida w8ajx w8dyc w9ghn w9ny w9spb w9ij w9drn w9lf w9abi zslh zt6k zulk zulsq fa8ih fa8cr fa8gt oh7nc vk2hz vk2lz vk4ap vk4bb vk4ei vk6sa lulep lu3dh x1ay zu6p vs6ah

F8OZ, Belle-Eglise par Bornel, France
(Oct. 10th to Nov. 15th)

wlavv w1df w1chr w1av w1sz w1cmx w1nar w1ias w1csr w1gsh w1wv w1dze w1zi w1aur w1fd w1hdv w1sep w1fpr w2dza w2fdl w2go w2ew w2bqk w2ber w2fhi w2byf w2dtb w2fr w3bph w3amp w3dlb w3byf w3fed w3ebk w3fe w3air w3dbx w3boj w3bvw w3evt w3gbx w4agp w4enx w4ajy w4auu w4mr w4ef w4by w5afx w8kpx w8cra w8lda w8fda w8jhp w8ags w8azd w8ins w8jax w8mah w8fy w8mok w8pk w8ktw w9ny w9ce w9spb w9rpe w9ixs w9lf w9ico w9gid w9gyk x1ay d4arr d4aar ea4ao vk6sd vk4bb vk6sa vk4ei vk3bd vk2lz vk4gk pa0az ok2ak oklaw fa8cr fa8gt on4au lulep lu9bv lu9ax zslh zt6k oh5nq zulsq zu6p oeler vu2lj g5fv g6lk g6fv g5by g6j g6dh g2yl

E15F, Dublin, Irish Free State
(Nov. 14th to 17th)

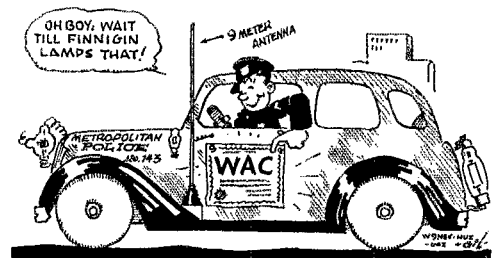
w1ah w1csr w1df w1dze w1sz w1zd w2ber w2bqk w2dtb w2go w3air w3awh w3byf w3fed w5eme w5ql w8dsu w8ktw w8mwl w8pk w9huv w9kpd w9ny

W9HUV, Lafayette, Ind.
(Week of Nov. 15th)

f8kj f8ct f8rj f8vs f8wk g6dh g5by g6nf g2pl g6lk g6ay g6qb g5la g6cj g5sy g6cl e15f ea4ao on4ad x1ay x1am x1ag x1aa lu9bv lu9ax lulep lulch d4ltn d4arr d4gwf z1kk vk3yp vk3bd vk4bb ok1bc ok2ak oklaw oklaa pa0pn pa0un pa0az cm8ck cm2fg cm2fx pa0xm zslh zt6k zszj zu6p

W9NY, Milwaukee, Wis.
(Nov. 1st to Dec. 1st)

cm2az cm2xf d4arr d4gwf d4jhy d4ltn ea4ao ea4av e1dh e15f f8ct f8kj f8oz f8rj f8wk fa8ih g2ao g2hg g2pl g2ux g2yl g5by g5fv g5la g5wp g6ci g6cl g6dh g6as g6gj g6lk g6nf g6qb g6wy g6yl g6vq g6zv j2hj j2kj j2lk k4dhn k6ksi lulep lu9ax lu9bv oa4j oklaa oklaw pa0az pa0fx pa0qy pa0sd sm6vl vp5ac vp5pz vk2hz vk2lz vk3bd vk3kx vk3mr vk3yp vk4bb vk4ei vk4gk vk5hg vk5wj x1aa x1am x1ay x1cm x2c ym4aa z1zq zslh zu6p



Standard Frequency Transmissions

Date	Schedule	Station	Date	Schedule	Station
Jan. 3	A	W6XK	Feb. 7	B	W9XAN
Jan. 10	B	W9XAN		B	W6XK
	B	W6XK	Feb. 12	C	W9XAN
Jan. 15	C	W9XAN	Feb. 14	B	W9XAN
Jan. 17	B	W9XAN		A	W6XK
	A	W6XK	Feb. 19	BB	W9XAN
Jan. 22	BB	W9XAN	Feb. 21	BB	W6XK
Jan. 24	BB	W6XK		A	W9XAN
	A	W9XAN	Feb. 22	BX	W6XK
Jan. 25	BX	W6XK	Feb. 23	C	W6XK
Jan. 26	C	W6XK	Feb. 28	A	W6XK
Jan. 31	A	W6XK			

STANDARD FREQUENCY SCHEDULES

Time (p.m.)	Sched. and Freq. (kc.)		Time (p.m.)	Sched. and Freq. (kc.)	
	A	B		BB	C
8:00	3500	7000	4:00	7000	14,000
8:08	3600	7100	4:08	7100	14,100
8:16	3700	7200	4:16	7200	14,200
8:24	3800	7300	4:24	7300	14,300
8:32	3900		4:32		14,400
8:40	4000				

Time (a.m.)	Sched. & Freq. (kc.)	
	BX	
6:00	7000	
6:08	7100	
6:16	7200	
6:24	7300	

The time specified in the schedules is local standard time at the transmitting station. W9XAN uses Central Standard Time, and W6XK, Pacific Standard Time.

TRANSMITTING PROCEDURE

The time allotted to each transmission is 8 minutes divided as follows:

2 minutes—QST QST QST de (station call letters).
3 minutes—Characteristic letter of station followed by call letters and statement of frequency. The characteristic letter of W9XAN is "O"; and that of W6XK is "M."

1 minute—Statement of frequency in kilocycles and announcement of next frequency.

2 minutes—Time allowed to change to next frequency.

W9XAN: Elgin Observatory, Elgin National Watch Company, Elgin, Ill., Frank D. Urie in charge.

W6XK: Don Lee Broadcasting System, Los Angeles, Calif., Harold Perry in charge.

Schedules for WWV

EACH Tuesday, Wednesday and Friday (except legal holidays), the National Bureau of Standards station WWV will transmit on three frequencies as follows: noon to 1:00 p.m. E.S.T., 15,000 kc.; 1:15 to 2:15 p.m., 10,000 kc.; 2:30 to 3:30 p.m., 5000 kc. On each Tuesday and Friday the emissions are continuous unmodulated waves (c.w.); and on each Wednesday they are modulated by an audio frequency. The audio frequency is in general 1000 cycles per second.

A.R.R.L. QSL Bureau

FOR the convenience of its members, the League maintains a QSL-card forwarding system which operates through volunteer "District QSL Managers" in each of the nine U. S. and five Canadian districts. In order to secure such foreign cards as may be received for you, send your district manager a standard No. 8 stamped envelope. If you have reason to expect a considerable number of cards, put on an extra stamp so that it has a total of six-cents postage. Your own name and address go in the customary place on the face, and your station call should be printed



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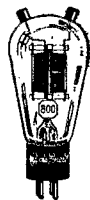
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885.....	2.00
906.....	18.00
954.....	5.80
955.....	3.75

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3 amps., 7 1/2 V. 3 amps. C.T.
Only \$2.43 each

H. DUTY FILTER CHOKE
12 H 250 MA.....\$1.89

WHAT'S A MUGAWUG?
New Mac-Key \$7.95
Speed-x bug \$5.70

RK-20.....NOW \$15.00 Net

NATIONAL
HRO ^{NET} \$167.70

NORTHERN OHIO LABORATORIES
2073 WEST 85th STREET, CLEVELAND, OHIO

RCA ACR-136
NET \$69.50

MICHIGAN HAMS Save Parcel Post & Express Charges BUY AT HOME

BLILEY LD-2 PRECISION CRYSTALS

Within 0.1% of your desired frequency, only \$4.80

Standard "X" cut in holder, only \$3.90

VIBROPLEX JR. KEY

Exact duplicate of famous Vibroplex in junior size: \$10.00

Complete stock of signal keys

JOHNSON Q ANTENNA

This antenna has proved its worth on every band. Our stock is complete.

Genuine

CARDWELL Condensers

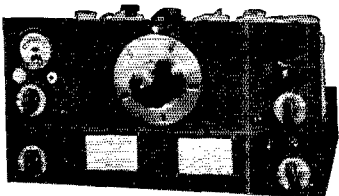
Complete stock of this famous line always on hand at regular ham prices.

Latest

RECEIVER SPECIALS

All 1936 Models ready to go!
RCA — ACR 136..... Net \$69.50
PR-16..... Net \$95.70
Crystal model..... Net \$101.70
RME-69 "SSS"..... Net \$118.80

RADIO SPECIALTIES — Michigan's Radio Amateur Headquarters since 1928 — announces a NEW mail order service for Michigan hams! Complete stock, immediate shipment. Why pay heavy parcel post or express charges over long distances? Buy in Michigan from **RADIO SPECIALTIES!**



Exclusive Michigan Distributors for **National HRO**
Your Net \$167.70

Only Michigan Jobber handling this famous line

ALL MODELS NATIONAL CABINETS

Plain; ideal for portables or that 56 mc. transceiver:

C-SRR...\$2.10
C-SW3...\$3.30
C-PSK...\$3.60

NEW 1936 CATALOG

just off the press. Write for your copy today. Every amateur need at the lowest net prices.

NEW G.E.

Pyranol-treated transmitting Condensers. All capacities in stock.

TRIMM HEADSETS

Developed especially for the hams. Weighs only 4 ounces. 24,000 ohms impedance.

ONLY \$5.88

Other models from \$1.80 up

New REDUCED PRICES On RCA TUBES

RCA-852..... Now \$16.40
RCA-866..... Now \$ 2.25
RCA-800..... Now \$10.00
RCA-801..... Now \$ 4.50
RCA-802..... Now \$ 3.90
RCA-803..... Now \$38.50
RCA-866A..... Now \$ 5.00
RCA-954..... Now \$ 5.80
RCA-955..... Now \$ 3.75

All metal tubes in stock



171 E. JEFFERSON, DETROIT, MICH.

Where to buy it

A directory of suppliers who carry in stock the products of these dependable manufacturers.

ASTATIC
Crystal Microphones and Pickups
 ASTATIC MICROPHONE LABORATORY, Inc. YOUNGSTOWN, O.
Pioneer Manufacturers of Quality Crystal Products

- CHICAGO, ILL.** 833 West Jackson Blvd.
 Allied Radio Corporation
- CHICAGO, ILL.** 601 W. Randolph St.
 Pioneer Automotive Supply Co.
- CHICAGO, ILL.** 901-911 W. Jackson Blvd.
 Wholesale Radio Service Company, Inc.
- KANSAS CITY, MO.** 1012-14 McGee St.
 Burstein-Applebee Company
- MINNEAPOLIS, MINN.** 1124-26 Harmon Place
 Lew Bonn Company

Super SKYRIDER

 the hallicrafters

- CHICAGO, ILLINOIS** 415 S. Dearborn Street
 Chicago Radio Apparatus Company
- CHICAGO, ILLINOIS** 520 S. State Street
 Midwest Radio Mart
- CHICAGO, ILLINOIS** 226 W. Madison Street
 Newark Electric Company
- CHICAGO, ILL.** 901-911 W. Jackson Blvd.
 Wholesale Radio Service Company, Inc.
- FARGO, N. D.** 123 Broadway
 Dakota Electric Supply Company
- KANSAS CITY, MO.** 1012 McGee Street
 Burstein-Applebee Company
- MINNEAPOLIS, MINN.** 1124-26 Harmon Place
 Lew Bonn Company
- OMAHA, NEBRASKA** 2855 Farnam St.
 Radio Accessories Company
- ST. LOUIS, MO.** 927 Pine Street
 Gordon Radio Company
- CHICAGO, ILLINOIS** 19 S. Wells St.
 Hinds & Edgerton

E.F. JOHNSON COMPANY
 MANUFACTURERS OF

 TRANSMITTING RADIO EQUIPMENT
 WASECA, MINN.
 U.S.A.

- CHICAGO, ILLINOIS** 226 W. Madison Street
 Newark Electric Company
- CHICAGO, ILL.** 520 S. State Street
 Midwest Radio Mart
- CHICAGO, ILL.** 901-911 W. Jackson Blvd.
 Wholesale Radio Service Company, Inc.
- DETROIT, MICHIGAN** 129 Selden Avenue
 Radio Distributing Company
- GRAND RAPIDS, MICH.** 235 Market Street, S. W.
 Radio Distributing Company
- LA CROSSE, WIS.** 131 South 6th St.
 SOS Radio Supply Co.
- MOLINE, ILL.** 1420 5th Ave.
 Bengston's Radio Store
- WINNIPEG, CAN.** 310 Ross Ave.
 Electrical Supplies, Ltd.

NATIONAL
 **RADIO PRODUCTS** 
 NATIONAL COMPANY, INC., MALDEN, MASS.

- BUTLER, MISSOURI** 211-215 N. Main Street
 Henry Radio Shop
- CHICAGO, ILLINOIS** 520 S. State Street
 Midwest Radio Mart
- CHICAGO, ILLINOIS** 833 W. Jackson Blvd.
 Allied Radio Corporation
- CHICAGO, ILLINOIS** 415 S. Dearborn Street
 Chicago Radio Apparatus Company
- CHICAGO, ILLINOIS** 226 W. Madison Street
 Newark Electric Company
- CHICAGO, ILL.** 901-911 W. Jackson Blvd.
 Wholesale Radio Service Company, Inc.
- CINCINNATI, OHIO** 633 Walnut Street
 Steinberg's, Inc.
- CLEVELAND, OHIO** 2073 West 85 Street
 Northern Ohio Laboratories

Where to buy it

A directory of suppliers who carry in stock the products of these dependable manufacturers.

DAYTON, OHIO	Burns Radio Company	140 E. 3rd Street	CLEVELAND, OHIO	Northern Ohio Laboratories	2073 West 85 Street
DES MOINES, IOWA	Iowa Radio Corporation	1212 Grand Avenue	CLEVELAND, OHIO	Cleveland Distributing Co.	1301 Superior Avenue
DETROIT, MICHIGAN	Radio Specialties Company	171 E. Jefferson Ave.	DETROIT, MICHIGAN	Radio Distributing Company	129 Selden Avenue
GRAND RAPIDS, MICH.	Radio Distributing Company	235 Market Street, S. W.	DETROIT, MICH.	Radio Specialties Co.	171 E. Jefferson Ave.
INDIANAPOLIS, IND.	State Distributing Company	316 N. Illinois Street	FLINT, MICH.	Shand Radio Specialties	203 W. Kearsley St.
KANSAS CITY, MO.	Burstein-Applebee Company	1012 McGee Street	GRAND RAPIDS, MICH.	Radio Distributing Co.	235 Market Street, S. W.
KANSAS CITY, MO.	Radio Laboratories	1515 Grand Avenue	KANSAS CITY, MO.	Burstein-Applebee Company	1012 McGee St.
MILWAUKEE, WIS.	Radio Parts Company	332 W. State Street	PEORIA, ILL.	Klaus Radio & Electric Company	707 Main Street
MINNEAPOLIS, MINN.	Lew Bonn Company	1124-26 Harmon Place			
OMAHA, NEB.	Radio Accessories Company	2855 Farnham Street			
PEORIA, ILLINOIS	Klaus Radio & Electric Company	707 Main Street			
ST. LOUIS, MO.	Walter Ashe Radio Company	1100 Pine Street			
WINNIPEG, CAN.	Electrical Supplies, Ltd.	310 Ross Ave.			



CHICAGO, ILL.	Midwest Radio Mart	520 S. State Street	CHICAGO, ILL.	Newark Electric Company	226 W. Madison Street
CHICAGO, ILL.	Newark Electric Company	226 W. Madison Street	CHICAGO, ILLINOIS	Allied Radio Corporation	833 W. Jackson Blvd.
CHICAGO, ILLINOIS	Allied Radio Corporation	833 W. Jackson Blvd.	CHICAGO, ILLINOIS	Chicago Radio Apparatus Company	415 S. Dearborn Street
CHICAGO, ILLINOIS	Chicago Radio Apparatus Company	415 S. Dearborn Street	CHICAGO, ILL.	Wholesale Radio Service Company, Inc.	901-911 W. Jackson Blvd.
CHICAGO, ILL.	Wholesale Radio Service Company, Inc.	901-911 W. Jackson Blvd.	CINCINNATI, OHIO	Steinberg's, Inc.	633 Walnut St.
CINCINNATI, OHIO	Steinberg's, Inc.	633 Walnut St.	CINCINNATI, OHIO	Krauss Radio Stores, Inc.	111 East 5th Street
CINCINNATI, OHIO	Krauss Radio Stores, Inc.	111 East 5th Street	CLEVELAND, OHIO	Northern Ohio Laboratories	2073 West 85 Street
CLEVELAND, OHIO	Northern Ohio Laboratories	2073 West 85 Street	CLEVELAND, OHIO	Goldhamer, Inc.	610 Huron Road
CLEVELAND, OHIO	Goldhamer, Inc.	610 Huron Road	COLUMBUS, OHIO	Hughes-Peters Electric Corp.	178 N. 3rd Street
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DAYTON, OHIO Burns Radio Company 140 E. 3rd Street

DES MOINES, IOWA Iowa Radio Corporation 1212 Grand Avenue

DETROIT, MICHIGAN Aitken Radio Corp. 1326 E. Congress Street

DETROIT, MICHIGAN Radio Distributing Company 129 Selden Avenue

DETROIT, MICH. Radio Specialties Co. 171 E. Jefferson Ave.

FARGO, N. D. Dakota Electric Supply Company 123 Broadway

GRAND RAPIDS, MICH. Radio Distributing Company 235 Market Street, S. W.

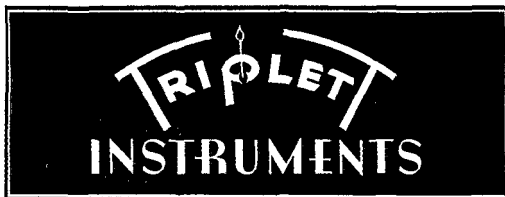
MINNEAPOLIS, MINN. Lew Bonn Company 1124-26 Harmon Place

PEORIA, ILL. Klaus Radio & Electric Company 707 Main Street

YOUNGSTOWN, OHIO Ross Radio Company 325 West Federal Street

DETROIT, MICH. Radio Specialties Co. 171 E. Jefferson Ave.

ST. PAUL, MINN. R. R. & G. W. Bauman Co. 2168 Ann Arbor St.



CHICAGO, ILL. Newark Electric Company 226 W. Madison Street

CHICAGO, ILL. Midwest Radio Mart 520 S. State Street

CHICAGO, ILL. Wholesale Radio Service Company, Inc. 901-911 W. Jackson Blvd.

CINCINNATI, OHIO Steinberg's, Inc. 633 Walnut Street

CLEVELAND, OHIO Goldhamer, Inc. 610 Huron Road

DETROIT, MICH. Aitken Radio Corp. 1326 E. Congress Street

DETROIT, MICH. Rissi Bros. 5027 Hamilton Ave.

FARGO, N. D. Dakota Electric Supply Co. 123 Broadway

LA CROSSE, WIS. SOS Radio Supply Co. 131 South 6th Street



CHICAGO, ILL. Midwest Radio Mart 520 S. State Street

CHICAGO, ILL. Newark Electric Company 226 W. Madison Street

CHICAGO, ILL. Allied Radio Corp. 833 W. Jackson Blvd.

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DETROIT, MICH. Rissi Bros. 5027 Hamilton Ave.



CHICAGO, ILL. Newark Electric Co. 226 W. Madison St.

CHICAGO, ILL. Midwest Radio Mart 520 S. State St.

DETROIT, MICH. Radio Specialties Co. 171 E. Jefferson Ave.

FLINT, MICH. Wilke and Sessions 711 W. Dayton St.

BOUND VOLUME XIX of QST (1935 Series)

WE have now a limited number of copies of Bound Volume XIX of QST. Vol. XIX comprises the entire 1935 series of QST. This volume is made up of two books or sections, each containing six issues of QST. This volume is handsomely bound in red cloth and with gold imprint. The complete volume is priced at \$5.00, postpaid.

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QST

38 LaSalle Road
West Hartford, Connecticut

prominently in the upper left-hand corner. When you receive cards, you should immediately furnish your QSL manager with another such envelope to replace the used one.

- W1—J. T. Steiger, W1BGY, 35 Call Street, Willimansett, Mass.
- W2—H. W. Yahnel, W2SN, Lake Ave., Helmetta, N. J.
- W3—R. E. Macomber, W3CZE, 418 10th St., N. W., Washington, D. C.
- W4—B. W. Benning, W4CBY, 520 Whiteford Ave., Atlanta, Ga.
- W5—E. H. Treadaway, W5DKR, 2749 Myrtle St., New Orleans, La.
- W6—D. Cason Mast, W6KHV, 423 East E Street, Ontario, Calif.
- W7—L. Q. Kelly, W7BPC, 4919 So. Prospect St., Tacoma, Wash.
- W8—F. W. Allen, W8GER, 324 Richmond Ave., Dayton, Ohio
- W9—George Dammann, W9JO, 319 Sherman Ave., Evanston, Ill.
- VE1—J. E. Roue, VE1FB, 84 Spring Garden Rd., Halifax, N. S.
- VE2—W. H. Oke, VE2AH, 5184 Mountain Sights Ave., N. D. G., Montreal, P. Q.
- VE3—Bert Knowles, VE3QB, Lanark, Ont.
- VE4—Dr. J. J. Dobry, VE4DR, Killam, Alberta.
- VE5—E. H. Cooper, VE5EC, 2024 Carnarvon St., Victoria, B. C.
- K4—F. McCown, K4RJ, Family Court 7, San-turce, Puerto Rico.
- K7—Frank P. Barnes, K7DVF, Box 297, Wrangell, Alaska



TOBE AMATEUR KITS

In Stock

The finest low-cost communication Receiver on the market. Complete Kit... **\$41.40**

Wright De Coster 8" Speaker in Metal Cabinet... **\$4.90**

Complete Kit RCA Tubes... **\$3.32**

M. & H. SPORTING GOODS CO.

512 Market Street, Philadelphia



"HAMS" A Real Low-Loss . . . Leak Proof . . . Moisture Proof . . . Excellent Power Factor Condenser. Truly a remarkable Engineering achievement accomplished after many expensive and painstaking experiments. Really a precision unit at even a lower price than most ordinary condensers. Available in 2% capacity tolerance and 5000 Volt construction. Write for catalog sheet and color Chart.

AMAZING QSL OFFER—SEE HAM-ADS

See your nearest Jobber or write direct to:
FILTERMATIC MANUFACTURING CO.
Tacony, Philadelphia, Penna.

Silent Keys

It is with deep regret that we record the passing of these amateurs:

- Clark P. Anderson, W9SMP, Akeley, Minn.
- Allen H. Babcock, W6ZD, Inverness, Calif.
- Simon Delbert, ex-3ZM, Media, Pa.
- Dr. L. M. Hunter, ex-5SM-5XAB-5AW, Little Rock, Ark.
- Edward J. McCloskey, W8DCO, Beaver, Pa.
- C. J. McClure, W7NE, Leavenworth, Wash.
- Charles B. Moore, W8FJP, Ada, Ohio.
- I. A. B. More, ZL3CN, Upper Riccarton, N. Z.
- James Musil, W9MEU, Berwyn, Ill.
- G. F. Norris, ZL3GF, Sumner, N. Z.
- W. A. Parks, W3ZW, Washington, D. C.
- Arthur V. Roscoe, W1IGH, Malden, Mass.
- Morton W. Stearns, W2AB, New York City.
- Forrest M. Wogoman, W9JQN, Libertyville, Ill.
- Joe H. Yates, W7DOQ, Luther, Mont.

HAM-ADS

(1) Advertising shall pertain to radio and shall be of nature of interest to radio amateurs or experimenters in their pursuit of the art.

(2) No display of any character will be accepted, nor can any special typographical arrangement, such as all or part capital letters be used which would tend to make one advertisement stand out from the others.

(3) The Ham-Ad rate is 15¢ per word, except as noted in paragraph (6) below.

(4) Remittance in full must accompany copy. No cash or contract discount or agency commission will be allowed.

(5) Closing date for Ham-Ads is the 25th of the second month preceding publication date.

(6) A special rate of 7¢ per word will apply to advertising which, in our judgment, is obviously non-commercial in nature and is placed and signed by a member of the American Radio Relay League. Thus, advertising of bona fide surplus equipment owned, used and for sale by an individual or apparatus offered for exchange or advertising inquiring for special equipment, if by a member of the American Radio Relay League takes the 7¢ rate. An attempt to deal in apparatus in quantity for profit, even if by an individual, is commercial and takes the 15¢ rate. Provisions of paragraphs (1), (2), (4) and (5) apply to all advertising in this column regardless of which rate may apply.

Having made no investigation of the advertisers in the classified columns, the publishers of *QST* are unable to vouch for their integrity or for the grade or character of the products advertised.

QUARTZ—direct importers from Brazil of best quality pure quartz suitable for making piezo-electric crystals. Diamond Drill Carbon Co., 719 World Bldg., New York City.

METER and microphone repairs. Low prices. Estimates free. Quick repair service—broadcasting equipment, all electrical instruments. Sound Engineering Corp., 2200 Kinzie, Chicago.

RADIO engineering, broadcasting, aviation and police radio, servicing, marine and Morse telegraphy taught thoroughly. All expenses low. Catalog free. Dodge's Institute, Byrd St., Valparaiso, Ind.

ENGRAVING instrument panels exclusively since 1925. A. L. Woody, 189 West Madison St., Chicago, Ill.

NATIONAL—Hammarlund, Patterson used sets, 60% off list. W3DQ, 405 Delaware Ave., Wilmington, Del.

QSLs, W2SN, Helmetta, N. J.

.00035 variable condensers, 3 for \$1. W8RW, Bluffton, Ohio.

GENERAL Electric Dynamotors 24/750 volts 200 mills \$25, two machines for 1500 volts \$40. Westinghouse 27 1/2/350 \$10. 6-15 volts 500 watts \$10. 1/4 KW 500 cycle 110-220 volts with exciters \$10. Henry Kienzie, 215 Hart Blvd., Staten Island, New York.

TELEPLEXES, Omnigraphs, Vibroplexes, meters, receivers. Bought, sold, traded. Ryan Radio Co., Hannibal, Mo.

SELL 2-204 A. Graphite plate new \$20 each; 2-360 Screen Grid new \$12 each; 2-852 new \$10 each. All are R.C.A. and guaranteed. E. Erdoss, W2ECH, 926 Wendell Av., Schenectady, N. Y.

FBXA tubes, 20, 40, 80, 160 band spread; \$40. Power supply, speaker, \$5. Transmitting equipment. W2GKX.

QSL's—your QRA on the map with something really new. Samples. W8NWW, Deposit, New York.

SACRIFICE—200 watt rack panel phone-c.w. transmitter. Lewis Crosby, 75 Hawes Ave. Ext., Melrose, Mass.

QSL cards, two color, cartoons, message blanks, stationery, snappy service. Write for free samples to-day. W1BEF, 16 Stockbridge Ave., Lowell, Mass.

WALNUT cased multiple-Meters; 0-1-1-10-100-1,000 volts, 0-001-1-1-1-10 amperes, d.c. 0-10-100-1,000 volts a.c. 50,000-5,000,000 ohms. Write Schooley Engineering Company, Ferril, Iowa.

SELL or trade. 600 watt a.c. Delco engine-generator, also transmitting equipment. List or photos for stamp. W5EFV, Ayla, Okla.

CUSTOM building and rebuilding of high performance radio equipment. Consult us before starting that the new outfit. Write for information on our air wound coils. Barker & Williamson, Ardmore, Pa.

RADIO relay racks made to order. F. F. Shrier, 130 Westfield Ave., Ansonia, Conn.

"T-9" 40 meter crystals as low as \$1.50. See November or December ham-ads, "Eidson's", Temple, Texas.

NEON oscilloscope tube as per October *QST*, \$1.50 postpaid with complete instructions. Neon glow tubes for R.F. 50¢. Commercial Laboratories, Dept. 47, Omaha, Nebraska, (W9AQO).

MOTOR generator: 2 horsepower 1-phase motor with direct connected 500 volt, one ampere and 16 volt thirty-five ampere generators, complete with switchboard, \$145.00. Motors, generators, converters. Queen City Electric, 1734 Grand Avenue, Chicago.

ARTISTIC QSLs. T. Vachovetz, Elmsford, N. Y.

FOR sale: National FB-7, powerpack, speaker, ten coils. Worked 22 foreign countries, including Australia. Write for particulars. Faulkner, W2IKZ, Flushing, N. Y.

SUPERHET—9-tube—complete with tubes, cabinet, one set 40 meter coils \$32. W8GFP.

BARGAIN—complete Lincoln SW33 including beat oscillator, perfect condition \$45. Write W8LHE, 1157 Prospect Avenue, Toledo, O.

800 High Grade QSL cards \$1. 2143 Indiana Ave., Columbus, Ohio.

OSCILLOSCOPE neon tube, \$4., as described in Oct. '35 *QST*, page 48. Cathode ray results. W6CQH.

QSLs—samples and prices on request. Write W2AEY.

CRYSTALS 1" sq. X cut 80-160 meters \$1.40, 40 meters \$2.50. Within 3 Kc. of desired freq. Guaranteed the very best. The Ransom Lab., North Syracuse, N. Y.

CRYSTALS: Zero cut. Guaranteed to compensate at near zero without oven control. Your approximate frequency, 80 or 160 meters \$1.85. Ordinary zero cuts \$1.35 postpaid. Blanks 65¢. Plug-in holders 75¢ dozen \$6. Fisher Laboratory, 4522 Norwood Street, San Diego, California.

QSLs by Maleco! Finest at any price! Maleco, 1612 Eastern Parkway, Brooklyn, New York.

SELL or swap 210 final transmitter, 750 and 400 volt supplies, good superhet. Metal chassis construction throughout. W2EDK, 10002 209 St., Bellaire, Long Island.

PANELS engraved, at reasonable prices. Submit rough sketch for quotation. R. L. Bennett, 24 N. Sixth Street, Philadelphia, Penna.

RECEIVERS—new and used, sold and traded in. Hammarlunds, Nationals, RME69, Skyriider. Schwarz Radio Service, 15 Lawrence Ave., Dumont, N. J.

BEST offer takes two Westinghouse dynamotors with hanger 27 1/2/350 v. 50 mills. Will work on 32 volt Delco. Newton Gose, Dixie, Wash.

QSLs, The finest obtainable, at the lowest price. Two color, 75¢ per hundred. Free samples. W2FJE, 145 Lafayette Avenue, Brooklyn, N. Y.

FOR sale—general radio crystal oven. Complete. Relay rack mounted W8ANT

FOR sale—Weston meters. Model 267. Like new. All ranges. W8ANT

EIMAC tubes in stock. Order from W8ANT

FOR sale—used 852's—860's—42A's—204A's—212D's—RK20's—861's—849's. All in good condition. W8ANT

NEW 866's—\$1.50—866A's \$1.85—801's \$3.50—800's \$6.50. W8ANT

FOR sale—Sargent receivers—15 to 550 meters band spreading—preselection—complete with speaker \$59.50. W8ANT

FOR sale—RCA—UP1016 transformer—Vibroplex key. W8ANT

FOR sale—new and used radio equipment at reasonable prices. Your used equipment accepted in trade. W8ANT, Jos. N. Davies, Box 602, R. R. 9, North Bend Road, Mt. Airy, Cincinnati, Ohio.

FOR sale. Six 750 volt, 150 watt generators, \$11. each. Also a few other generators and motors. Wilmot Auto Supply Company, 1970 Wilmot St., Chicago.

THERMOCOUPLE ammeters repaired \$2.50. W9GIN, 412 Argyle Bldg., Kansas City, Mo.

W9ADN crystals. Temperature coefficient—.000007—"B"—40-80—\$3.75; 80AT—.00001—\$2.50—.000002—\$4. Where you get individual attention.

CRACKLE enamels. Radio Specialties, 385 Madison, Brooklyn, N. Y.

TRADE—High grade amateur and commercial equipment, parts, A cut crystals, new broadcast receivers; for Graflex series two, Leica, Contax or other high grade cameras. No junk wanted and no junk offered. Herb Hollister, W9DRD, Merriam, Kansas.

QSLs, 75¢ a 100, postpaid. W9DGH.

COMPLETE station for sale. 500 watt c.w. rack job, FB7A, Preselector, power supply, coils and dynamic speaker. Bug and extra equipment. Stamp for photo and description. W8GWA.

VIBROPLEXES, rebuilt \$5-\$7, guaranteed. Large base bugs \$9. Lydeard, 28 Circuit, Roxbury, Mass.

TRANSFORMERS—1200 watt 1200-2200-3200 each side \$23. Quotations given. Frank Greben—W9CES, 1533 S. Sawyer Ave., Chicago, Ill.

MOTOR generator 110 or 220 a.c. to 1500 d.c. 350 watt. First reasonable offer takes. W8GFZ, Shakerheights, Ohio.

SURPLUS crystals—"AT" \$3. X or Y \$1. Will swap. W9CWG. SELL RCA 852, \$10. RCA 860, \$9. WE276A \$8. (4) 2 mfd 2000 volt Pyranol condensers \$2.50 each. Ted Valpey, WIATP. Box 492, Holliston, Mass.

SELL FBXA, 5897 supply, 4 sets coils, tubes, cash \$25. C. Lucas, 648 No. Marshall St., Phila., Pa.

MOTOR-generator, bargain. Crocker-Wheeler 110 d.c. to 600 volts d.c., 830 mila. Complete with automatic starter. Bargain \$30. Louis Menier, 563 West 184th Street, New York.

W2GNK selling complete station; 200 watt xtal xmitter, etc. Write 82 West 45th St., Bayonne, New Jersey.

FOR sale or trade 1KW watercooled tube. W6CVV

QSL's—150 two colors for #1. W3PJ, Elmer, N. J.

RADIO operating and servicing taught in short practical shop courses with personal instruction on actual equipment. Complete studio, large modern B.C. transmitter. Qualify for amateur, first class radiophone or second class radiotelegraph government license. Also public address, sound and television in well equipped shops and laboratories. Special course in electric refrigeration and air conditioning. New live field combining excellently with radio. Send for free book with full details. Coyne Electrical & Radio School, Dept. 18-5K, 500 So. Paulina St., Chicago, Ill.

PHONE station complete. First offer takes it. Reg. Roberts, Webyrn, Sask. Can.

QSL's, free samples. Printer, Corwith, Iowa.

QSLs, SWTs, modern, neat. Quality stock. Priced right. Samples? Stamps. W8ESN, Toledo, Ohio.

CUSTOMBUILDERS offers you a new service. Any radio equipment built to your specifications! Write for details—no obligation. Custombuilders, Dept. B, 113 West 57th, New York City.

SELL—fifteen Jewell meters, high voltage Cardwells, 3 power supplies. All parts cheap. McShaffrey, Monessen, Pa.

SELL, trade: AGSX slightly used with 20-40-80-160 band spread and standard B coils, power pack, dynamic speaker, full complement of tubes, \$150. Interested in thorough-bred English Setter dogs, good guns, Graflex camera or Bell and Howell movie. Capt. Frost, Selfridge Field, Mt. Clemens, Mich.

SELL new HRO, broadcast coils, National power pack, Jensen speaker in cabinet, first \$150. Write for list transmitter parts. W3ASK, Shenandoah, Va.

CRYSTALS?? Bileyle! Hipower! See advertisements. Order from W8DED.

QSLs! No cheap, trashy QSLs! Samples? (stamp) W8DED, Holland, Mich.

CALLBOOKS (December) \$1.25 from W8DED

CLASS B transformers—Universal for two or four 46s, 210s, 800s, RK18s, etc., \$7.75 pair postpaid. 70 watts audio from 46s, 100 watts from 10s. Write for details. W8UD, Douglas, Mich.

GUARANTEED crystals, 80-160 meter, X or Y cut. Exact specified frequency, 1" square, \$2.75. Within seven kilocycles, approximately 1" square, \$1.75. Within 15 kilocycles, less than 1", \$1.35. Blanks, odds and ends, five for \$1. William Threm, W8FN, 4021 Davis Ave., Cheviot, Ohio.

AUTOMOBILE call letter plates 85¢ pair. W9AIN

SELL—trade Gross transmitter, Super Skyrider, superhet converter, dynatron, 212D's, 852 Radiophone transmitter. W8IV, Argyle, New York.

CRYSTALS:—unconditionally guaranteed. "V" cuts within five kilocycles, 1715-4000. Ten cycle drift, \$2.25; Four cycle drift \$3.25. "X" cut: 160M, \$2.25; 80M, \$1.95; 40M, \$2.75. Holders. GR plugs. \$1. Catalog. Ham Crystals, 1104 Lincoln Place, Brooklyn, N. Y.

TIME payments to Connecticut hams on receivers, parts, tubes. New Haven and Hartford stores. Hatry & Young.

CRYSTALS \$1. postpaid. Y cut guaranteed. No jump oscillators. Approximately 1" square. 80-160 meter bands. Herbert Addington, 2252 North LeClaire Avenue, Chicago.

SELL—transmitters, modulator units, power equipment, public address, etc. Cash or terms. Wanted Fox units. 315 South 4th St., Blackwell, Okla.

INTRODUCTORY offer. One order to an individual. Send \$1. and call letters for 100 two color modern QSL cards (not filled with advertising—send for sample) and six F.M.C. porcelain case mica low loss transmitting and receiving condensers. Any capacity up to .006 mfd. 5% capacity tolerance 2,000 volt test. Actually a \$7.50 value for \$1. Capacity color chart included. Filtermatic Mfg. Co., Tacony, Phila., Pa.

CALLBOOKS—new prefixes, thousands of late W, VE and new DX calls, in the winter 1935 Radio Amateur Call Book. Send postpaid \$1.25, or a whole year (four issues) for \$4. (In foreign countries \$1.35 and \$4.35.) W9FO—610 S. Dearborn, Chicago.

1000W General Electric transformers, 1100-2200-4400 each side center on 110. Sold hams eight years. \$13.50. Dawson, 5740 Woodrow, Detroit.

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FOR sale—three Western Electric Cathode Ray tubes. Write Colonial Radio Corporation, Buffalo, N. Y.

SELL Super Sky-Rider, \$40; 100 watt '03-A, \$5; 1000-1500 xfomer; chokes, 866's, 281's, fil. xfomers. Write for list. W4ABV, Box 834, Vero Beach, Fla.

MAKE yours the snappiest station in town—built on the new all-welded relay racks, chassis, panels. Powered by QST engineered variable voltage transformers, reactors. Rectifier Engineering Service, 4837 Rockwood Road, Cleveland, Ohio.

SELLING my ham equipment. Write W. T. Haley, Ulysses, Kans.

SALE FB7, W2DSK.

FOR sale 1.79 MFD 2800V a.c. General Electric condensers oil filled. Used up to 4000V d.c. Only \$10. Guaranteed weight 30 lbs. W8DKA, L. M. Augustus.

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SELL Gross Eagle receiver, \$8. Bernie Hayes, Belmont, N. Y.

QSLs that are different. Radio Headquarters, Ft. Wayne, Ind.

RECONDITIONED used Weston meters. Appearance, performance like new. Guaranteed. Model 301 any range to 500 milliamperes, \$3.25. Model 476 a.c. volts, \$3.75. Bakelite cases \$5.00 extra. 425 rf ammeters, \$6.50. Limited quantities. W2EDW.



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Transformers and Chokes
for all Receiver and Trans-
mitter Purposes.
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The new Shure Model 74B "Spheroid" NON-DIRECTIONAL Crystal Microphone picks up equally well from every angle! From every side . . . from above or below . . . you get true Wide-Range response to 10,000 cycles.

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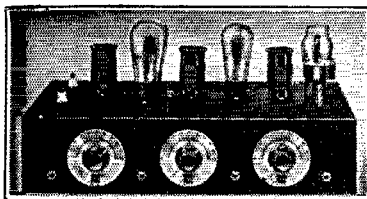
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Quoted from QST’s advertising rate card.

Every conceivable need of a radio amateur can be supplied by the advertisers in QST. And you will know the product has the approval of the League’s technical staff.

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GROSS C C TRANSMITTER—OUTPUT 25-30 WATTS

The "CW-25" transmitter kit due to its low cost makes it possible for anyone to own a modern crystal controlled station. A schematic hook-up and parts layout sheet as well as tuning instructions are furnished, thus enabling the most inexperienced operator to wire and put the set on the air, for real results. The "CW-25" is supplied with a shrivel finished sturdy metal chassis under which all parts are mounted, making the wiring and components dust-proof. A plug-in crystal holder is furnished with the kit. Only one milliammeter is required for tuning the transmitter and each stage is provided with a jack for this purpose. The "CW-25" uses one

'47 as crystal oscillator, one '46 as buffer or doubler and two '46's in the amplifier stage, set of three coils supplied with kit for 20, 40, 80 or 160 band. Additional coils 75c each. **\$14.95**
Complete kit, less tubes and crystal.....

P-25 POWER SUPPLY—for CW-25 transmitter with matching chassis— **\$11**
450 volts at 200 MA, choke input—complete kit, less tube.....

THORDARSON CASED TRANSFORMER

600 volts each side of C.T. 200 MA 2½ V. 10 amps. C.T., 5 V. 3 amps. 7½ V. 3 amps. C.T.....

\$2.45

THORD. CHOKE 12 H 250 MA..... \$1.95
THORD. 15 H 250 MA CHOKES..... \$2.95

MAC-KEY Semi-Automatic and Straight Junior Model..... \$7.95

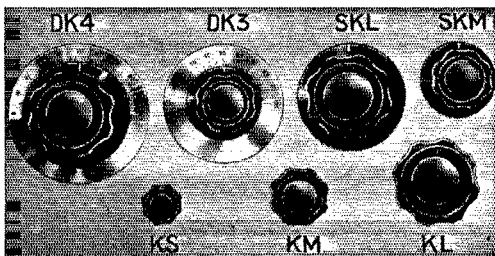
The "EAGLE" Three-Tube Short-Wave Receiver



"Band Spread" over any portion of the tuning range — only finest material used thruout. Employs one '32 R.F., one '32 detector and one '33 Pentode Audio — 15 to 200 meters — four coils, supplied. The "EAGLE" is economical — two dry cells will operate the filaments.

"Eagle" completely wired and tested..... **\$11.95**
Three tubes tested in your receiver..... **\$3.00**

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These are the trimmings you have noticed of late on the finest equipment, now available at these prices. Dial plates made of circular finished solid nickel silver (not plated brass or aluminum). Fluted knobs are finest quality genuine bakelite.

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DK-4. 4" Dial and Knob..... \$8.85

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Compact, cased, with standoff insulators
Working Voltage

1000 V. 1500 V. 2000 V.

1 mfd..... \$1.10 \$1.45 \$1.75
2 mfd..... 1.45 2.00 2.45

Cased Combination Filament Transformers

2½ V. C.T. 10 amps. for 866's.
10 V. C.T. 7 amps. for '50's or '52's.
10,000 Volt Insulation..... \$3.25

GUARANTEED TUBES ISOLANTITE TOPS

800 Carbon Plate..... \$5.35
866-A 10,000 volts inverse Peak... 1.85
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NEW!! HOYT BAKELITE CASE HOT WIRE ANTENNA METER

3¾" Across Flange, Mounts through 2½" hole. Scale Length 1¾".
Ranges: 0/1.5; 0/3; 0/5 Amps. \$3.50

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8½" x 1¼" with Mounting Brackets
500 ohm to 100,000 ohm, Spec. \$1.49
(State Ohmage desired)

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Complete with 9 Metal Tubes... \$79.50
Same as above. With Crystal... \$9.50
See Technical Article P. 36 Aug. QST.

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Performance — Ruggedness —
Power — Price

50-T Output 75 to 250 watts... \$13.50
150-T Output 150 to 450 watts... 24.50

GROSS CASED POWER TRANSFORMERS

650 v. ea. side C.T. 350 ma. fila. 2-7½ v C.T. and 1-5 v will give 500 v with choke input using 83 or 5Z3 tubes. You can run your entire R.F. and class B off this trans..... \$5.50
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850-1350-1500 v. ea. side of C.T. 400 watts. \$8.75

(The ideal job to give 750-1000-1250 v D.C. with choke input)

850-1350-1500 v. ea. side of C.T. 550 ma..... \$12.50
1500-2000 v. ea. side of C.T. 800 watts. \$11.70

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2½ v 8 a — 2½ v 3 a — 5 v 3 a... \$1.29
2½ v 4 a — 7½ v 2½ a — 7½ v 2½ a... \$1.29
2½ v 4 a — 5 v 3 a — 7½ v 2½ a... 1.29
5 v 3 a — 7½ v 2½ a — 7½ v 2½ a... 1.29
2½ v 6 a — CT (midiget)..... .74
5 v 3 a — CT (midiget)..... .74
6.3 v 1.5 a — CT (midiget)..... .69
7½ v 3 a — CT (midiget)..... .89

GROSS CASED INPUT SWINGING CHOKES

5/25 H, 200 MA, DC Res. 140 R... \$2.50
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5/25 H, 500 MA, DC Res. 70 R... 6.50

GROSSCASED SMOOTHING CHOKES

12 H, 200 MA, DC Res. 140 R... \$2.50
12 H, 300 MA, DC Res. 105 R... 3.75
12 H, 500 MA, DC Res. 70 R... 6.50

FILAMENT TRANSFORMERS shielded in metal cases, center tapped secondaries

2.5 Volt 10 amperes for 866's..... \$2.25
10 to 12 Volts at 8 amperes..... 2.25

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BC3-40-80 M Mounted Crystals. 3.95
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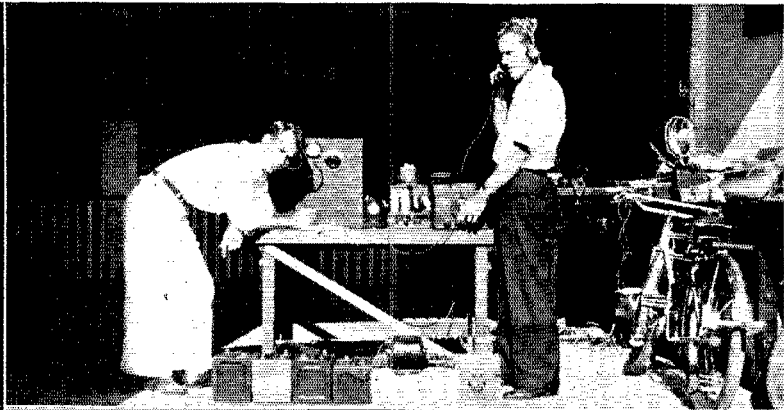
866 Heavy Duty..... \$1.65
825 Carbon Plate 40 Watts 750 V... 4.95
203-A Carbon Plate..... 12.50
203-B Metal Plate..... 7.50
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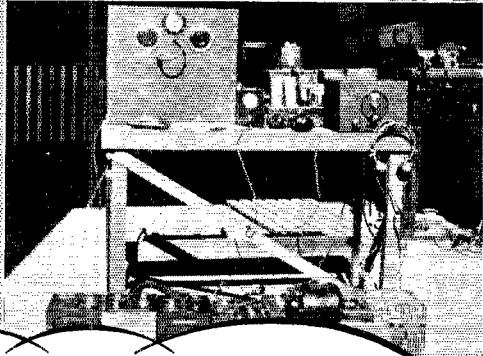
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ABOVE: W4AKI, holding receiver, and W4EB (F. P. Duckett), with W4AKI equipment used during Hurricane.

RIGHT: A closer view of the equipment W4AKI used during the Hurricane.

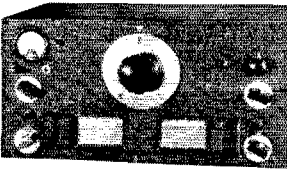


What W4AKI Says of BURGESS BATTERIES after Hurricane

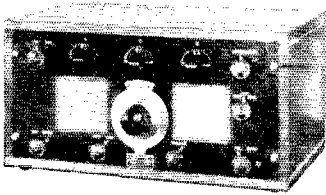
W4AKI (F. E. Bassett, Jr., of Miami, Fla.) wrote: "During the recent Florida hurricane we were on the air from the Florida Keys constantly for 55 hours. We sent 160 messages, totaling more than 8,000 words, and made contacts with stations as far north as New York City. When we were back in Miami, we suddenly realized that the BURGESS Batteries we had been using had given us excellent performance in the face of having been wet, then baked, then wet again—and they are still as good as new except for looks."

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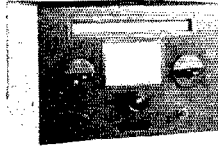
≡ BURGESS ≡



HRO, Jan. 1935



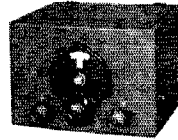
AGS, July 1932



FB7, Feb. 1933



SRR, April 1933



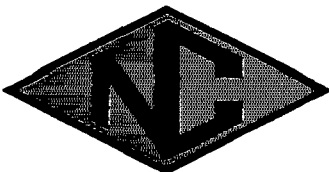
SW3, Aug. 1931

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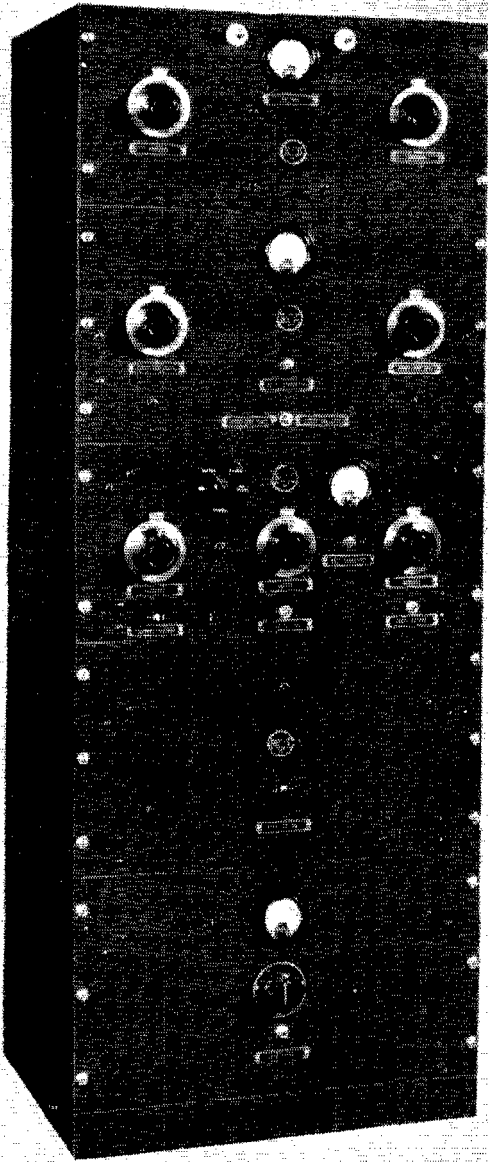
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NATIONAL COMPANY

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by
RCA



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ACT-200. 260 watts output on C.W., 200 watts carrier on phone. \$475.00. The ACT-40 (not shown), is a 40-watt C.W. and phone transmitter at \$235.00. Prices are net to amateurs, f. o. b. factory, with one set of coils but less tubes, crystals, microphone, and other accessories.



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