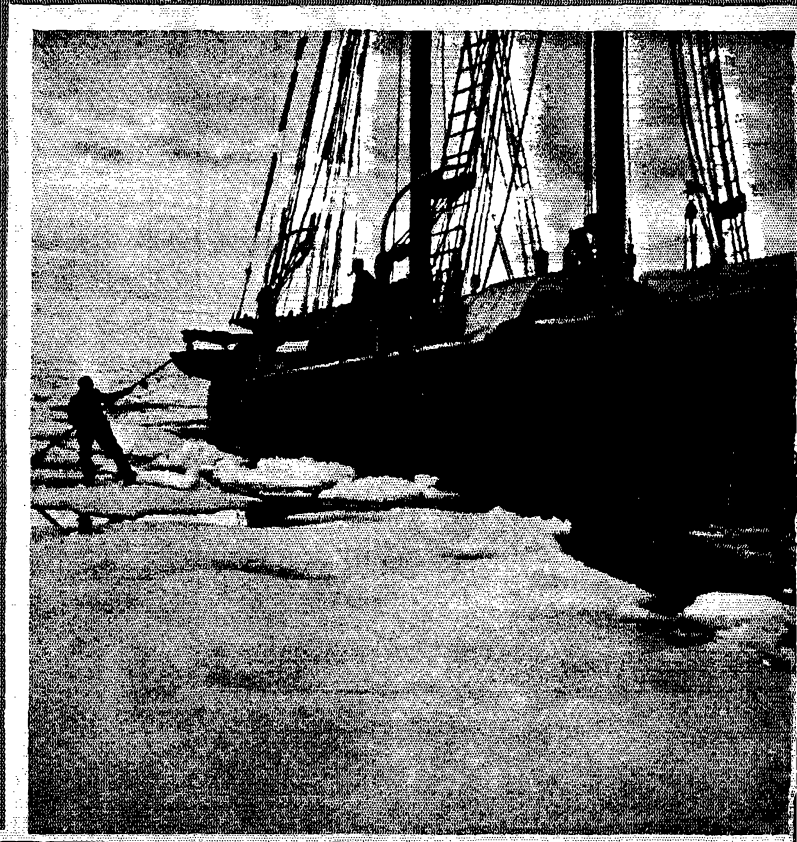


QST

devoted entirely to

amateur radio



December
1934
25 cents

CONTROL-GRID MODULATION

100 WATTS CW
40 WATTS PHONE★

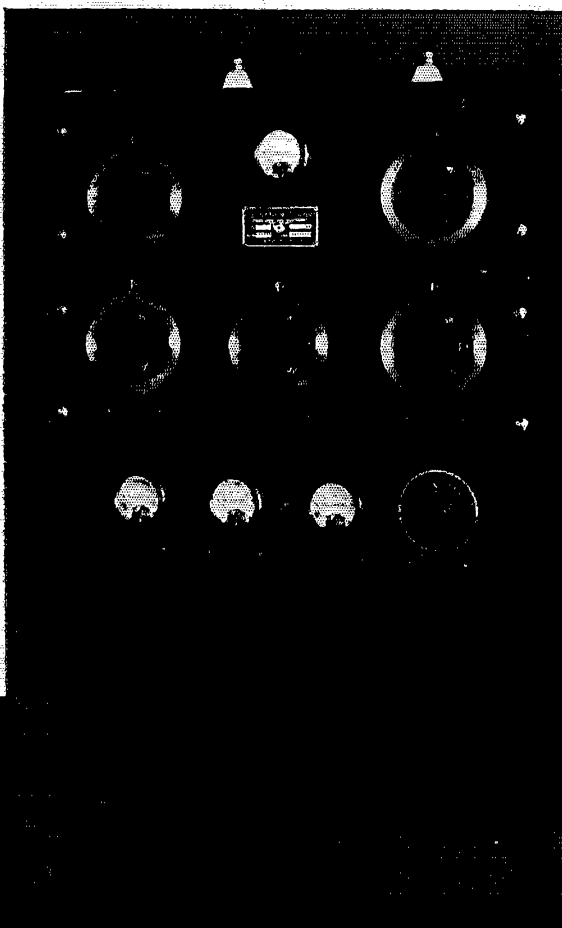
The 1935 model of the Collins 30FX Transmitter employs *control-grid modulation* . . . a development which has been in the Collins Laboratories for several months. Unlike earlier systems of grid modulation, the modulation characteristic is linear, adjustments are simple, and the modulated stage operates at relatively high efficiency. The 30FX is an ideal low cost amateur transmitter.

★ Power ratings applied to Collins transmitters are conservative, being the measured power dissipated in an external load under average conditions. The radiophone ratings are the *carrier* power which is one-fourth the peak power at 100% modulation.

Technical Data

- CARRIER POWER OUTPUT —
100 Watts CW. — 40 Watts Phone ★
- FREQUENCY RANGE —
1500 to 15000 kc.
- FREQUENCY CONTROL —
Direct crystal control
- FINAL AMPLIFIER TUBE —
211 Triode
- NEUTRALIZATION —
Fixed at factory
- BIAS SUPPLY —
Self-contained with panel control. No batteries.
- DIMENSIONS —
27½" high — 19" wide — 10¼" deep

Write for information on this moderately priced transmitter and regarding a wide range of other transmitting and speech equipment



\$500 REWARD!

Sylvania



STARTS
DEC. 4, 1934

CONTEST!

ENDS
FEB. 4, 1935

PRIZES

1st 1-204A tube
2nd 2-860 tubes
3rd 2-852 tubes

4th }
5th } 2-203A
6th } tubes each

7th }
8th } 2-830B
9th } tubes each

10th }
11th } 2-830 tubes
12th } each
13th }

14th }
15th } 2-210 tubes
16th } each
17th }
18th }
19th }
20th }
21st }
22nd }

OBJECT—To gather the greatest possible number of QSL cards from other amateurs who are users of SYLVANIA GRAPHITE ANODE transmitting tubes.

THOSE ELIGIBLE—All licensed amateurs in the United States except Hygrade Sylvania employees. *It is not necessary that you have SYLVANIA transmitting tubes in your own transmitter in order to participate for prizes.*

REQUIREMENTS—The following information must be written on all QSL cards received from SYLVANIA tube users by the Gatherer in order to have them count in the contest.

1. Types of Sylvania tubes used.
2. In what stages used.
3. From whom purchased.
4. When purchased.
5. Time and date of QSO.

TIME LIMITS—Contest starts December 4th at midnight and ends February 4th at midnight. All QSLs must bear postmarks within these limits. Gatherers must send in their bundles of cards so that they will be received at our Clifton Plant on or before February 15th. Packages should be securely wrapped and carefully addressed to Hygrade Sylvania Corporation, Amateur Radio Division, Clifton, N. J.

REGISTRATION—To enter this contest all you have to do is to mail *one of your own* QSL cards direct to our Amateur Radio Division in Clifton, merely stating thereon "I desire to enter the QSL contest." For further details see or write to your nearest Specializing SYLVANIA Distributor.

In case of a tie for any prize—the persons tying will each receive a prize.

HYGRADE SYLVANIA CORPORATION

ELECTRONICS DEPARTMENT
AMATEUR RADIO DIVISION



CLIFTON



NEW JERSEY

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In the above photograph Jackson Burgess is calling your attention to the marked difference in size between the new Burgess Little Six and the standard No. 6. Both have the same electrical capacity.

ANOTHER BURGESS INNOVATION

The Burgess Little Six (No. 4FH)

This new development is one which fulfills many of the needs of the radio amateur who wants portable power for filament service. Its electrical capacity is the full equivalent of the standard Number 6 cell, but its bulk is 30% less, its weight almost 40% less. Its characteristics are tabulated here:

Rated Capacity	40 watt hours*
Rated Voltage	1.5 volts
Size	Over-all height 4.3 inches, width 2.5 inches, depth 2.5 inches
Weight	1 pound, 6 ounces

Like the Number 6 cell, the Burgess Little Six can be made in two styles, one for light duty (telephone type) service and one for heavy duty (filament, ignition, etc., type) service. Let us know the nature of your application — we will supply you with the proper battery.

BURGESS BATTERY COMPANY, FREEPORT, ILL.

*Although capacity will vary depending upon current drain, daily service required, and other factors, 40 watt hours will be obtained in normal usage.

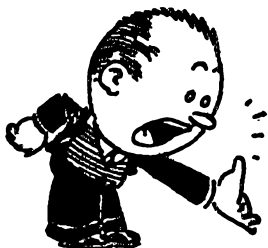
≡ BURGESS ≡

QST

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devoted entirely to

AMATEUR RADIO



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DECEMBER 1934

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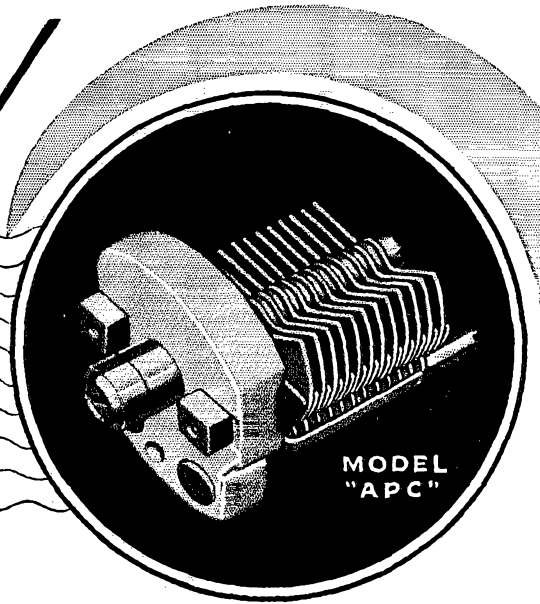
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New!

IT'S AIR TUNED



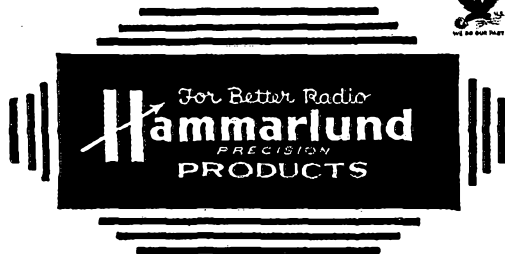
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Q-12

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All appointments in the League's field organization are made by the proper S.C.M., elected by members in each Section listed. Mail your S.C.M. (on the 16th of each month) a postal covering your radio activities for the previous 30 days. Tell him your DX, plans for experimenting, results in 'phone and traffic. He is interested, whether you are an A.R.R.L. member or get your QST at the newsstands; he wants a report from every active ham. If interested and qualified for O.R.S., O.P.S. or other appointments he can tell you about them, too.

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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 noncommercial and no one commercially engaged in the manufacture, sale or rental of radio apparatus is eligible to membership on its board.

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

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

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THE EDITOR'S MILL

FELLOW in here the other day asked us what was the matter with *QST* lately. Seemed to him we didn't publish anything these days except about ultra-high frequencies, which were of no interest because they were no good except for local communication. He wasn't even impressed with regular communication over a hundred miles and wanted to know of what interest is a mere hundred-mile QSO. (Seems this chap hadn't heard the latest rumor, that all this ultra-high frequency stuff is a little private idea of ours to prepare the way to swap off the amateur's "useful" frequencies at the next conference. Hi!)

Well now, OM's, let's look at the situation a moment. In the first place, there is much material in *QST* about other things than the very high frequencies. Only four per cent of our reading pages the past year have dealt with this subject. The more common bands are receiving their usual attention at our hands, both as to 'phone and c.w., transmission and reception, theory and practice, elaborate gear and simple. But it is beyond dispute that at the moment the ultra-high-frequency field is the newest and most interesting one in amateur radio. We amateurs generally, and particularly A.R.R.L. as an organization, have the duty in defense of our own interests, of finding out about this part of our frequency holdings. But looming bigger in our evaluation of the subject is a fact that we all comprehend, that a radio amateur actually enjoys being confronted by a difficult problem, particularly in an unknown field, and finds his greatest stimulus when he gets caught up and perfectly absorbed in a new and pioneering investigation. That's what being a radio amateur means. We believe that no more marvelous opportunity ever existed for the exercise of this instinct, latent in every amateur, than is afforded by the frequencies above, say, 56 megacycles.

For many years the whole radio world regarded these frequencies as quite useless for communication at any distance. Already we have uncovered enough to know that this is not entirely true. We see enough to glimpse the startling possibility that it may be the old story of 200 meters all over again. Or the more recent story of 80 meters and 40 meters. Just the other day we were reading in

an old copy of *QST* an editorial plea that you fellows come on down from the long wavelength of 80 meters and help in the investigation of the shorter wavelength of 40 meters, where we were confident some interesting possibilities resided. We published an illustration showing many amateurs in hopeless congestion in a land labelled 80 meters, and off to one side, on a large roomy island all his own, a single pioneering 40-meter station, being none other than 1XAM, Johnny Reinartz. Honestly, fellows, if you can remember back that far, didn't we have a hard job getting any of you interested in exploring the "shorter" waves? And wasn't it worth while?

With tears in our eyes we're doing the same thing today with respect to 5 meters and below. The problem is different and more difficult and it may not offer the same possibilities for splendid success. But we'll never know until we try, and by trying we will find out. In the process we first of all improve our amateur estate. For example, can you imagine the television people getting our 5-meter band away from us now on the ground that we haven't any interest, activity or occupancy in that region! Moreover, we're pioneering, the amateur's traditional proud occupation. If these waves are good and we don't do our share in discovering that fact, we won't have nearly as good title to them in the future as if we were their developers. That's what we have in mind in referring to a duty to take the initiative and investigate this range which is assigned us. And so, while *QST* will never neglect the more customary frequencies, we are endeavoring to fulfill what we conceive to be our obligation to point the way in this new investigation. And in that work we'd like your coöperation. We wish more of you fellows would take a whirl at 5—and 2½ and 1¼—and when you hear tests going on, jump in and help. In a year or two at most, we prophesy, we're going to have a definite answer for ourselves. Either we're going to know by our own investigations that these waves have no great and permanent interest for our kind of amateur communication or—joyous thought!—they'll be eating out of our hands and we'll be the lads who trained 'em. So up, Electrons, and atom!

K. B. W.

Notes on the Ultra-High-Frequency DX Work

New York—Hartford Contact Established : A Winter's Program
Planned : Stations Needed on 224 Mc.

By Ross A. Hull*

THIS ultra-high-frequency working with directive antennas has brought us a great many more surprises than we would have thought possible in any phase of ham radio to-day. At the time of the first Hartford-Boston contact, almost three months ago, we knew that we would have our hands full checking the behavior of 56-mc. waves over this long indirect route. We are immensely pleased that the coöperation of the Headquarters gang made it possible to keep W1AL on the air every night since that time. No period of test work on the other bands has ever handed us as many unexpected surprises and thrills as has this one.

Our experience of the first few days revealed the probability that transmission conditions would rarely remain constant for more than a few hours at a time. In addition to a marked diurnal effect, with signal strengths dropping to a minimum toward noon, there was also an obvious correlation between transmission conditions and the weather. Signals were soon found to have the habit of climbing to extraordinary heights immediately prior to the arrival of stormy and rainy weather, falling after the storm and returning gradually as conditions again became unsettled. Now that we have almost three months of daily measurements and observations we are undertaking a comprehensive study of the data obtained.

Probably the most striking outcome so far is the discovery of what appears to be a well-defined correlation between signal strength and the relative humidity of the atmosphere. In graph form, this correlation is obvious enough to justify

* Associate Editor, QST.

a preliminary guess that high relative humidity is required to permit the best communication on a long indirect route such as that between Hartford and Boston.

The study, of course, is only just begun and it is obviously futile to attempt any guesswork at this juncture. The program will continue, however, and W1AL, according to our best intentions, is to be kept on the air every night during the winter, all fitted out with recording gadgets of various kinds. We are determined, in short, to get to the bottom of this highly intriguing business.

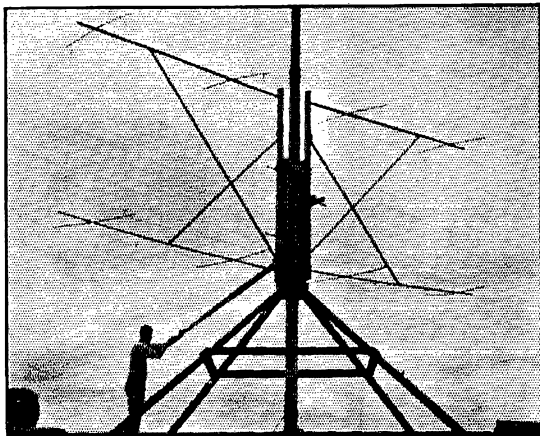
High light of the month has been a stunning three-hour contact with W2CUZ, W2AG and W2JM to the tune of R₆ and R₈ signals. This work was done with the bi-directive antenna at W1AL and, according to reports, the operators concerned were so thrilled over the business as to

be almost speechless (a rare condition). To W2CUZ goes the credit for breaking down the barriers between the first and second districts.

Low spot of the month was a stretch of three days when, for the first time since the beginning of this program, no signals whatever were heard from the Boston area. Fortunately for the morale of AL's operators, the second district contact followed close on the heels of this dead period.

Reports of activity with directive antennas at other stations have been slow in arriving. We

know of at least 20 or 30 stations either possessing directive antennas or about to install them. The number of performance reports, however, are few and far between. W1ZO, with his Hea power transmitter, still seems to lead the parade—putting a better signal out of Boston than stations



AN EXAMPLE OF SPLENDID MECHANICAL DESIGN:
THE DIRECTIONAL ANTENNA AT W1FQV

Located on the Jefferson Physics Building at Harvard University, this antenna was planned to provide a wide range of adjustments. Not only can the rig be rotated readily but both halves of the antenna can be tilted forward or backward. Experiment on 112 and 224 mc. is also to be undertaken at this station. We will be hearing much more about W1FQV in the early future.

using fifty times the power and favored with locations several hundred feet higher. W1FQV, at Harvard University, is just getting under way as this is written. It is already obvious, though, that his antenna is a complete success. Report has it that W2GR's directive antenna at Yonkers, New York, permitted him to break through to Princeton, New Jersey, on the first night and that W3EJJ of Bethlehem, Pennsylvania, had similar success in pushing his signal back to W2JZ and W2EAF. There is no doubt whatever that AL's work is being duplicated and perhaps surpassed in many parts of the country. We need complete details.

We are disappointed to be obliged to state that, at this writing, no extension of the previously recorded 220-mc. DX can be reported. The explanation is simple—no other stations, so far as we are aware, have come on the air. Inter-

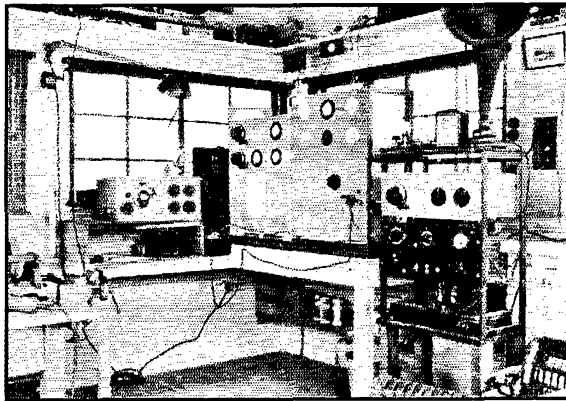
est, particularly in Boston and New York, is running high and present indications are that a considerable group of stations will be active within a few weeks. We still retain our faith in

the possibility of splendid DX on this band and on the 112-mc. band. Things will start to pop very shortly.

In the meantime, WIANA has been collaborating with W1AL in experimental work on parabolic, "Yagi" and other directive antennas and in experiments with various transmitter and receiver circuits. W1AL, these days, fairly swarms with dizzy-looking ultra-high frequency transmitters, ranging all the way from the old oscillator-amp-

lifier type to the latest resonant-line controlled type. We hope to describe some of them in an early issue of *QST*.

There are world's records to be established on 112 and 224 mc. Let's move.



W1XZ: DR. G. W. PICKARD'S STATION AT SEABROOK BEACH, NEW HAMPSHIRE

With the equipment illustrated, Dr. Pickard has been doing signal measurement work on the ultra-high frequencies over indirect paths during the last two years or so. Many contacts have been established with this station from W1AL, the distance being 127 miles and W1XZ being 46 feet above sea level (to the top of the antenna).

International 28-Mc. Contest

AN International 28-mc. Contest to be in progress for one year started October 1, 1934. This will be concluded at midnight, September 30, 1935. It is open to all hams. There are both A.R.R.L. and R.S.G.B. awards. In addition to an R.S.G.B. international trophy and certificates to the leading ten stations wherever they prove to be, the A.R.R.L. will make an award to the highest United States or Canadian operator-experimenter. The A.R.R.L. Award will be inscribed FOR 28-MC. ACHIEVEMENT, October 1, 1934-September 30, 1935.

The League's award will be a bronze charm, engraved as above, and with the call of the winner. A reproduction of this award is shown herewith. One point will be scored for each completed 100 miles of contact. Decision between W/VE competitors will be based on weighted credits. (1) The number of weekly reports to A.R.R.L. on 28-mc. work count 25%. (2) Description of equipment, and development work reported on same, 25%.



(3) The number of points scored (monthly contacts with the same stations will be permitted to count), 50%. All W/VE entries must be received at A.R.R.L. on or before October 15, 1935. Report your results each week to A.R.R.L. to get the full credit under (1) for reports regardless of conditions. Submit scores and log to both A.R.R.L. and R.S.G.B. at the end of the contest to be eligible for all awards. A.R.R.L. can only consider reports sent to its attention before the closing date named. All reports are most welcome.

CONTEST RULES

- I. The contest is open to all licensed radio amateurs.
- II. The contest commenced at 0001 G.T., October 1, 1934. It will close at 2400 G.T., September 30, 1935.
- III. Licensed power must not be exceeded.
- IV. Contacts may be established at any hour and on any day during the contest period.

(Continued on page 104)

W10XDA Back from the North

Schooner "Morrissey" Returns from the Arctic

By Robert Moe, WZUN*

EXPLORATION undoubtedly has benefited to a tremendous extent by the application of high-frequency radio communication.

Captain Bob Bartlett, a veteran of forty-one trips to the Arctic, including the famous Peary North Pole dashes, was among the first to realize the importance of radio in this work. His well-known schooner *Morrissey* has been equipped with short-wave radio ever since 1926, when she made her first trip to Arctic waters under his command. It has been my privilege to accompany Captain Bartlett in the capacity of radio operator on his last two expeditions to the north.

In 1933, operating under the call letters VOQH, the original 500-watt self-excited i.c.w. transmitter was still in use. On that trip we found that the 14-mc. band was most dependable for communication north of the Arctic Circle, both c.w. and 'phone signals coming in with remarkable strength. Reception in the other bands, however, was either unsatisfactory or impossible, no doubt because of the continuous daylight of the Arctic summer. So enthusiastic were we over the results in the 14-mc. band that it was decided that on the 1934 trip 'phone equipment would be taken along.

Therefore, back in New York again, the winter months were devoted to planning and building a medium-power 'phone transmitter to be used on the next Arctic expedition, scheduled for the early summer months of 1934. The task was accomplished, and in the spring the transmitter was installed aboard the *Morrissey*.

RADIO EQUIPMENT

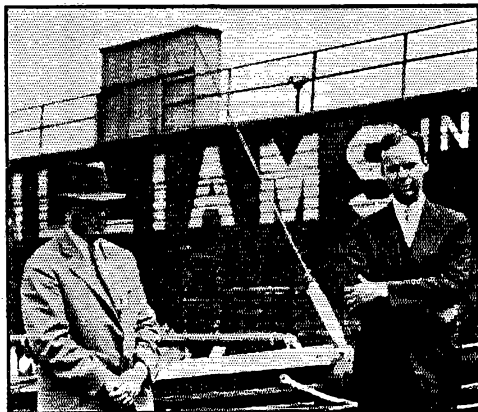
The *Morrissey*, under new registration, had been assigned two licenses, one a regular ship license under the call WHFZ, and the other an experimental license, W10XDA, the latter permitting the use of the following frequencies: 6425, 8655, 12,862.5, 17,310, 23,100 and 27,100 kilocycles. Frequencies above 16,000 kilocycles proved to be undependable so that only the lower three frequencies were used. The great interest in the equipment shown by all stations worked this summer prompts this brief description of the outfit.

The most important problem in a ship installation is the power supply. On the *Morrissey* the power was taken from a 120-volt bank of Exide cells, which drove a Janette rotary converter supplying 115 volts a.c. at 600 watts. This simplified matters considerably, since it permitted the use

* 562 79th Street, Brooklyn, N. Y.

of standard power supply equipment of the type familiar to every amateur. The second important consideration was the necessity for mechanical strength adequate to withstand the engine vibration and shocks from tossing in a heavy sea. To meet this requirement heavy chestnut baseboards, finished with Valspar varnish to keep out moisture, were used, and the framework was constructed of angle aluminum. The panels are made of bakelite.

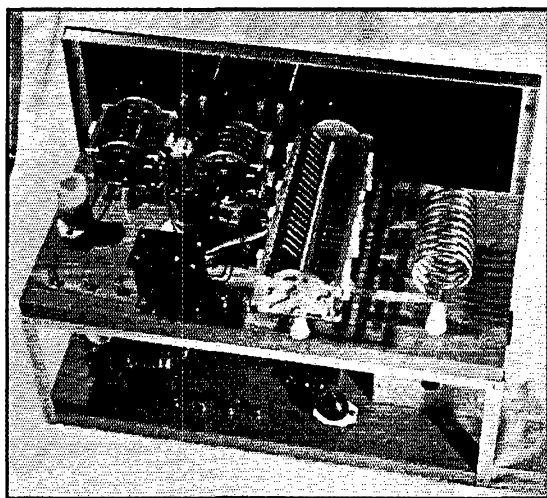
The tube line-up is shown in the r.f. diagram, Fig. 1. A shielded 47 oscillator is followed by a 46 doubler, an 841 r.f. amplifier and a 203-A final modulated amplifier in succession. Modulation is



CAPTAIN BOB BARTLETT AND OPERATOR BOB MOE, SNAPPED JUST BEFORE THE "MORRISSEY" STARTED NORTH

accomplished by graphite-plate 210 tubes in Class B, delivering 60 watts of audio power. A two-stage transformer coupled speech amplifier, using 37's, amplifies the output of the double button microphone, and the driver for the Class-B stage consists of two 45's in push-pull.

The oscillator is shielded to prevent feedback from the final amplifier on the shelf above. A small variable condenser couples the oscillator to the grid of the 46 doubler. Incidentally, it was necessary to use battery bias on the 46 tube to prevent creeping plate current caused by grid emission. This stage is not neutralized and is always used as a doubler; to operate it as a straight r.f. amplifier neutralization would be necessary. Condenser coupling is again used between this



A REAR VIEW OF THE W10XDA TRANSMITTER

The 203-A amplifier is on the upper deck. The oscillator shield and a few of the low-power components can be glimpsed on the lower deck.

stage and the 841 neutralized amplifier. Keying for c.w. work is accomplished by breaking the filament center tap of this tube. Link coupling is used between the plate circuit of the 841 and the grid circuit of the 203-A modulated amplifier.

It was only after careful consideration that the 203-A tube was chosen for the final amplifier. Many possible tube arrangements were considered in the planning of the transmitter, and a 203-A tube finally was decided upon because of its sturdiness and dependability. Using the circuit shown (it was introduced and covered fully in January 1934 *QST*) the 203-A tube operates on frequencies as high as 28 mc.

The filaments of the 37's used in the speech amplifier were heated by a storage battery on the trip, even though an extra filament-transformer winding was available for them. This was necessary because the rotary converter was started up for each transmission, and the indirectly-heated tubes would have taken too long to heat up, thereby causing delay in coming back to a station. The 37 tubes were kept heated all during the station's operating periods.

No shielding is used in the modulator unit. All ground leads are brought to a heavy copper strip which runs the length of the baseboard. Jacks are used for meter readings in the microphone, speech amplifier and driver stages. A milliammeter was connected permanently in the plate supply of the 210 modulator tubes.

The output transformer was designed for a

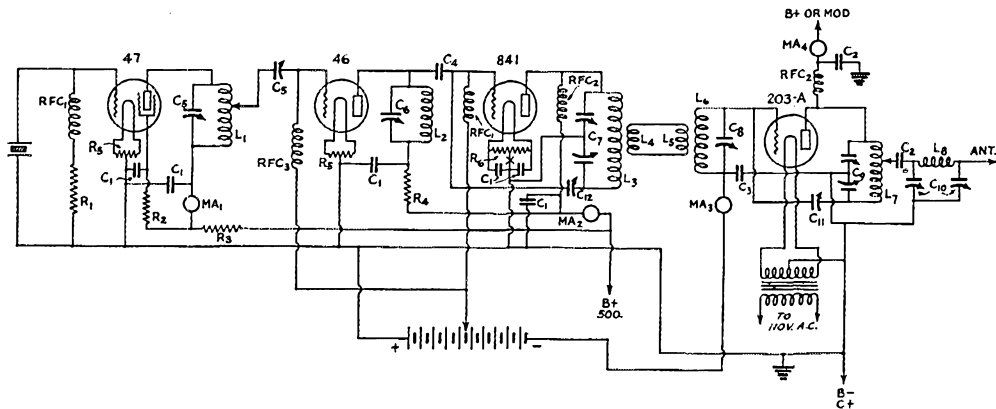


FIG. 1—CIRCUIT DIAGRAM OF THE R.F. PORTION OF THE WHFZ-W10XDA TRANSMITTER

C_1 —.002- μ fd. mica condenser. C_2 —.002- μ fd. mica condenser, 5000-volt rating. C_3 —.004- μ fd. mica condenser. C_4 —100- μ fd. mica condenser. C_5 —100- μ fd. midget condenser (Hammarlund MC-100-S). C_6 —100- μ fd. transmitting condenser (Hammarlund TC-100-A). C_7 —100- μ fd. (each section) split-stator condenser (Hammarlund TCD-100-X). C_8 —50- μ fd. transmitting condenser (Hammarlund TC-50-A). C_9 —Split-stator transmitting condenser, 100- μ fd. each section (Hammarlund TCD-100-A). C_{10} —225- μ fd. transmitting condenser (Hammarlund TC-225-A). C_{11} —30- μ fd. transmitting condenser (Hammarlund TC-30-A). C_{12} —35- μ fd. midget condenser, double-spaced (Hammarlund MC-35-X). R_1 —10,000 ohms. R_2 —50,000 ohms. R_3 —15,000 ohms. R_4 —5000 ohms. R_5 —20 ohms, center-tapped. R_6 —50 ohms, center-tapped. RFC_1 —Receiver-type r.f. choke (Hammarlund CH-X). RFC_2 —Transmitting choke (Hammarlund CH-500). RFC_3 —8-mh. r.f. choke (Hammarlund CH-8). MA_1 —0-50 d.c. milliammeter. MA_2 —0-200 d.c. milliammeter. MA_3 —0-100 d.c. milliammeter. MA_4 —0-300 d.c. milliammeter. X—Key. L_1 —3.5-mc. crystal; 30 turns No. 22 d.c.c., close-wound, tapped 10 turns from bottom. 7-mc. crystal; 16 turns No. 22 d.c.c., close-wound, tapped 6 turns from bottom. L_2 —7 mc.: 11 turns No. 20 d.c.c., spaced diameter of wire. 14 mc.: 7 turns No. 20 d.c.c., spaced diameter of wire. L_3 —7 mc.: 18 turns No. 20 d.c.c., spaced diameter of wire. 14 mc.: 13 turns No. 20 d.c.c., spaced diameter of wire. L_4 —7 mc.: 4 turns No. 20 on same form as L_3 . 14 mc.: 3 turns No. 20 on same form as L_3 . L_5 —7 mc.: 4 turns No. 20 on same form as L_6 . 14 mc.: 4 turns No. 20 on same form as L_6 . L_6 —7 mc.: 13 turns No. 20 d.c.c., spaced diameter of wire. 14 mc.: 6 turns No. 20 d.c.c., spaced diameter of wire. L_7 —7 mc.: 15 turns $\frac{1}{4}$ -inch copper tubing, coil diameter $2\frac{1}{2}$ inches. 14 mc.: 10 turns $\frac{1}{4}$ -inch copper tubing, coil diameter $2\frac{1}{2}$ inches.

All coils except L_7 wound on Hammarlund Isolantite forms, diameter $1\frac{1}{2}$ inches. Crystal oscillator works at half the output frequency. Dimensions of the antenna filter coil, L_8 , depend upon the type of antenna in use. A tapped coil of the type described in February 1934 *QST*, is recommended.

6250-ohm load. This was matched by operating the 203-A tube at 900 volts and 144 milliamperes.

Four power supplies were used, one for the low power r.f. stages, one for the 203-A final, one for the speech amplifier and one for the 210 modulator tubes.

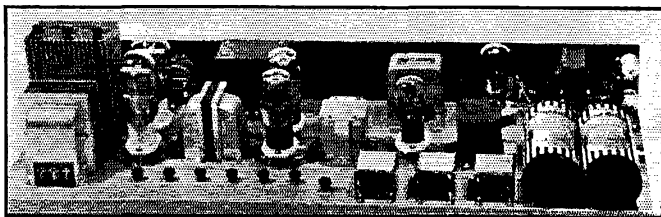
The antenna on the ship was a 60-foot vertical affair, running from the deck to the top of the mainmast, and was coupled to the transmitter through a 9-foot lead and the single-line matching network shown in Fig. 1.

The receiver used was a battery operated Hammarlund Comet Pro, the same receiver as on the previous trip except that this year a crystal filter was installed. During these two years of hard service this receiver has been found to be thoroughly dependable.

Such, then, was the radio equipment carried by the *Morrissey*. The work that had gone into its construction proved to be thoroughly justified, the set performing daily without failure during the entire trip.

THE "MORRISSEY'S" VOYAGE

No doubt many amateurs, while appreciating the opportunity to make contact with an expedition and thus garner some new DX—and perhaps envying the members of an expedition the element of adventure involved in a trip to uninhabited lands far from civilization—wonder just why such trips are undertaken. The Bartlett expedition, which was sponsored by the Academy of Natural Sciences of Philadelphia, had for its purpose the collecting of scientific data and



HAMS WHO HEARD W10XDA'S 'PHONE WILL AGREE THAT THIS MODULATOR DID A GOOD JOB

It uses a pair of graphite-plate 210's in Class B, driven by a pair of 45's. Two 37's are used in the speech amplifier.

specimens of northern birds and mammals. On June 14, 1934, the *Morrissey* left its dock at West Brighton and, stopping only for additional supplies at City Island, headed north along the New England coast on the first leg of its journey. Brigus, Newfoundland, was the first port of call, a few days being spent here to visit Captain Bartlett's mother.

Leaving Brigus, the next stop was at Turnavick, Labrador, the old Bartlett fishing station, where a few things were left for the caretaker. From there the ship went to Hopedale, Labrador, landing Junius Bird, archaeologist, and his wife, who were to spend the summer at this location excavating among old Eskimo winter houses.

From Hopedale the ship headed across Davis Straits for Godhavn, the capital of Greenland, making good time on the run. Progress north from Godhavn along the Greenland coast was greatly impeded by bad ice conditions, the ice finally becoming so bad that we were forced to anchor in a bay on Bloch Island, where we found a small Eskimo village. The enforced stopover offered an excellent opportunity for study of the habits of these interesting people.

A visit to the Peary Monument, which Captain

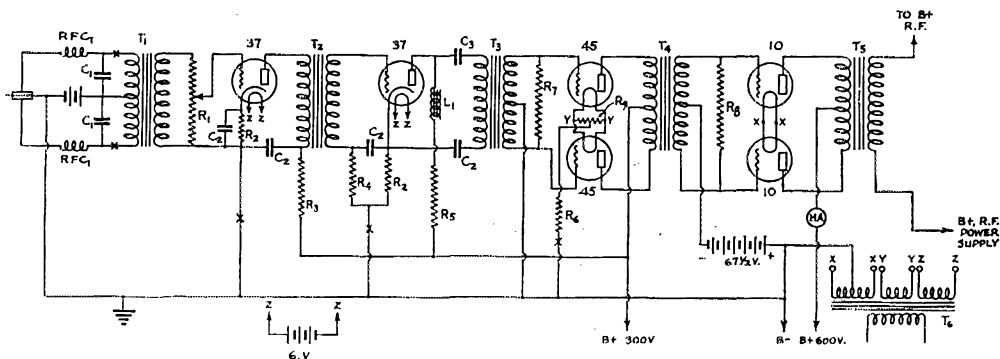


FIG. 2—THE SPEECH AMPLIFIER AND CLASS-B MODULATOR CIRCUIT DIAGRAM

R₁—100,000-ohm volume control (Electrad). R₂—3000 ohms. R₃—75,000 ohms. R₄—50,000 ohms. R₅—5000 ohms. R₆—750 ohms. R₇—200,000 ohms. R₈—20,000 ohms. R₉—20 ohms, center-tapped. R₁₀—50 ohms, center-tapped. C₁—.002 μfd. C₂—2 μfd., 400-volt rating. C₃—.25 μfd., 300-volt. T₁—Double-button microphone transformer (Universal). T₂—Audio transformer (Amertran 2nd Stage Deluxe). T₃—Push-pull input transformer (Amertran 151). T₄—Class-B input transformer, 45's to 10 grids (Collins 715-B). T₅—Class-B output transformer, 10's to 6250-ohm load (Collins 781-B). T₆—Filament transformer, 7.5 and 2.5 volts. RFC₁—R.F. choke (Hammarlund CH-X). L₁—250-henry, 15-ma. choke (Kenyon BC-3000). MA—0-300 d.c. milliammeter. X—Jacks for reading plate currents.

Bartlett had erected in 1932, had been planned, but the ice was so bad that the ship could not get within twenty-five miles of the shore. Nevertheless, even at this distance the monument stood out as a prominent landmark, its metal cap reflecting the rays of the midnight sun.

Continuing north, the *Morrissey* worked her way into Smith Sound, stopping at Hakluyt Island to make photographs of the millions of birds there. When we reached historic old Etah we found it deserted. The ship pushed on into Kane Basin, farther north than the *Morrissey* had ever gone on previous trips. The east coast was blocked with unbroken ice, but the Ellesmere Land side was open and we went on up to Cape Sabine. Here the expedition turned back, as we had no work to do farther north.

Following the ice south along the Ellesmere Land shore, herds of walrus, large numbers of narwhals and several polar bear were found, and several specimens were secured for the Academy. It had also been hoped that a Peary caribou could be obtained in Ellesmere Land and the boat worked into Jones Sound for this purpose, but had ice and open water prevented reaching land. After several attempts aided by dog sledges and boats, the project was given up and the journey south resumed. A stop at a small island at the mouth of Jones Sound resulted in some excellent photographs of Arctic bird life.

On the way south, strong winds off Baffin Land forced the ship to anchor under Cape Raper, but the winds also helped us by moving the ice off the shore and we were able to proceed southward. From there on we saw no more ice and had a fine run to the Labrador coast, stopping at Hopedale to pick up the Birds, and going from there to Turnavick. Hawkes Harbor, a whaling station, was the next stop after Turnavick, and from there we transmitted a program which was picked up at Wayne, N. J., and rebroadcast over the Columbia network. This was the first broadcast from this vicinity, and according to Columbia engineers was one of their most successful rebroadcasts, which certainly speaks well for our 100-watt transmitter.

On the way home we stopped again for a few days in Brigus, enjoying once more the hospitality

of Captain Bartlett's mother and family, and from there went directly to New York, arriving October 2d, the entire trip having taken three and one-half months.

Proper choice of frequency rather than power output would seem to be the answer to reliable communication from the far North, since with our 100 watts there was never a day when it was impossible to get in touch with the outside world. Regular schedules were kept with stations in the vicinity of New York City.

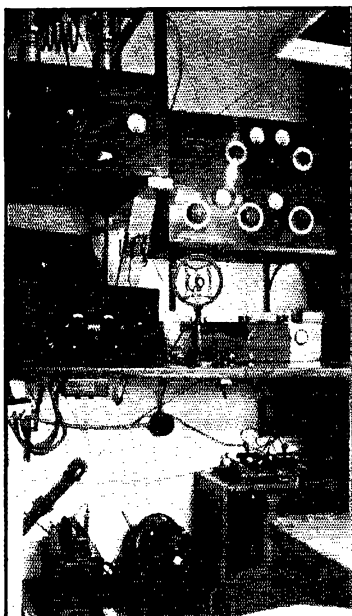
We greatly appreciate the cooperation given us by the boys of WABC at Wayne, N. J., who operate W2GOQ. They kept daily schedules during the entire summer and handled practically all of the traffic to and from the *Morrissey*. The group included Ray Newby, W2GOQ; Jack Tiffany, W3CQN; Al Hingle, W3CDO; Eddy Schreiner, W2AJF; Tom Donohue, W8HW; O. W. Read, W3EFU; Bob Mayberry and Gus Hengel. Frank Millar of W2NV also gave valuable assistance.

We also wish to express our thanks to the following stations, who also handled traffic for us: W1GBE, W2AJD, W2AOE, W2CDL, W2DC, W2EDW, W2FF, W2HFS, W3ZX, W4SI, W8CRA, W8GLY, W9BHM, W9DXJ, W9EIB, W9KF, W9PZ, G2SD, G6LK, G6TT, VO8Z.

A favorite question asked those who have had radio experience north of Arctic Circle is what effect the Aurora Borealis has on radio reception. To this I may answer that as far as my personal observation goes Aurora has no noticeable effect on radio. This opinion may, of course, be considered far from conclusive, as it is the result of observations made during only two summers. These findings have, however, been confirmed by the operator at the Danish Government radio station at Godhavn, Greenland, who has been making year round observations in this direction over a considerable period of time.

Strays

By the way, the cover this month shows the schooner *Morrissey* breaking through ice floes in the vicinity of Ellesmere Land.



PLENTY OF APPARATUS, BUT NOT A GREAT DEAL OF OPERATING SPACE

The radio shack of the "*Morrissey*." The Comet Pro receiver and Class-B modulator are on the table, as is also the microphone. The high-frequency transmitter sits on a shelf above the modulator. On the floor are the filament battery, the a.c. generator, and the box containing the power-supply equipment.

Amateur Radio at the Third C.C.I.R.

By K. B. Warner and James J. Lamb*

NOW let's see, just what is this C.C.I.R.?" We can already hear you asking, so we might as well start at the beginning.

International radio communication is governed by an international treaty called the International Telecommunications Convention. World-wide conferences are held every five years to revise the radio regulations, including frequency assignments; the conferences of Washington and Madrid were of this type, with the next one to be held in Cairo. The international treaty contains a provision setting up an international technical consulting committee, whose duties are to meet in between the main conferences, study technical operating questions and administrative questions of which the solution depends upon technical study, and issue recommendations for standard practice by the administrations and operating agencies of the world. It is this committee which is called the C.C.I.R., from the initials of its name in French. Its first meeting was in The Hague in 1929, its second in Copenhagen in 1931, and this year it held its third meeting in Lisbon, the capital of Portugal.

The meetings of the C.C.I.R. are made up of the experts of the government administrations and private operating companies, and of a few international organizations that have been specially admitted to represent their groups. One of the latter organizations is the International Amateur Radio Union, the world-wide federation of national amateur societies which has chosen the A.R.R.L. to act as its headquarters society. Neither A.R.R.L. nor any other national amateur society would be eligible to sit in the C.C.I.R., as such national enterprises aside from private operating companies are supposedly represented by their government delegation. But in the case of amateur radio, broadcasting, aviation and a few other such services of international scope scarcely capable of being represented adequately by any one administration, special provision has been made and the ranking international societies for these services have been admitted to C.C.I.R. participation in their own names.

The C.C.I.R. does not have the power to make binding regulations, but it does issue opinions on what is technically and economically feasible and makes recommendations which, because they have been carefully studied by the major governments and companies, are so universally regarded as a working standard that they have almost the

practical effect of regulations. It is therefore important for amateur radio to sit in these meetings and participate. Moreover, the C.C.I.R. meetings inevitably, even though unintentionally, lay the groundwork for the technical regulations of the major conferences and so, with Cairo in the offing, it is doubly important for us to participate. Hence it came about that the headquarters of the I.A.R.U. determined to be represented at Lisbon and invited the A.R.R.L. to take advantage of the opportunity created by the admission of the Union. The A.R.R.L. Board of Directors at its last meeting appropriated money for this purpose and authorized the writers to accept the invitation of the Union to be their spokesmen at the Lisbon meeting.

As representatives of the A.R.R.L. we had already participated in the preparatory work of the United States delegation, but we did not go to this conference as part of the American delegation. We were entirely on our own, constituting in fact the delegation of the amateurs. Thus it was that we sailed from New York in middle September and opened up amateur headquarters at the scene of the conference on September 22d, the opening day.

Briefly summarizing the conference: The representatives of twenty-seven administrations, thirty-one commercial companies and three international organizations (including ours) met for two weeks and a half. On the agenda were thirty-five questions, almost altogether of a technical nature, which had received prior international study by means of contributions filed by collaborating administrations and agencies, the studies then being "centralized" and published by the administration which had charge of the subject. The I.A.R.U. had previously filed some technical contributions in its own name, particularly on the question of receiver selectivity where amateur work in recent years has made an important contribution to the art. The work of the conference was divided between five main committees and an editing committee which met in daily session. In this daily work your secretary gave his attention mostly to the questions that seemed to have an administrative or regulatory angle or which were important from the "policy" point of view, while your technical editor represented the amateurs in the technical discussions where it was possible to contribute as a result of amateur technical experience. The work of the conference resulted in the formal adoption of twenty-seven recommendations for the guidance of the radio world. Six questions were declared

* Respectively Secretary-Editor of A.R.R.L. and Technical Editor of QST, joint representatives of the International Amateur Radio Union at the third meeting of the C.C.I.R.

unsolved and requiring further study, while during the conference ten new questions were originated as needing to be studied. These sixteen questions form the initial agenda for the next meeting and we entered the name of I.A.R.U. as a collaborating organization on four of these new studies.

The question of greatest amateur interest at this conference involved our 160-meter band. It related to the organization of the low-powered radiotelephone service for the small fishing trawlers of the North Sea nations.

The initial proposal on this question by the German centralizing administration was strongly regulatory in nature and suggested detailed operating arrangements for the use of the frequencies from 1530 to 3500 kc., omitting all mention of the amateur band 1715-2000 kc. Although this was a European regional problem, we were speaking at this conference in the name of I.A.R.U., not A.R.R.L., and the band is as important to the European amateurs as it is to us in this country. Moreover, we felt very strongly that the C.C.I.R. possessed no right to engage itself in such a regulatory matter and that the establishment of such a precedent would be very dangerous business. Consequently I.A.R.U. determined to oppose the proposed arrangement with all its strength. Some months before the conference and immediately following the publication of the report on this question, I.A.R.U. headquarters addressed itself to all of the member-societies in Europe, explaining the situation and requesting the societies to take up the question individually with their administrations. This was generally done and doubtless assisted materially in the outcome; certainly we found the many letters of advice which we received in Portugal from the European societies very helpful.

When this question first came up for discussion at Lisbon there was an unpremeditated but perfectly beautiful triple play, U.S.A. to I.A.R.U. to Great Britain, which knocked the props right out from under a neatly laid plan to adopt detailed regulations and frequency assignments. For our part, we pointed out the rights of amateurs under the Madrid treaty and questioned the right of the C.C.I.R. to deal with the question in the manner projected. Upon the proposal of the British delegation, which was of the same general point of view, it was decided that the C.C.I.R. would treat only the technical-apparatus aspects of the problem (which concerned us amateurs not at all) while the rest of the question, as to fre-

quency arrangements for the small-boat service, might be handled as a private regional matter between some of the administrators present, if they wished, but altogether outside of the C.C.I.R. Precisely that was done. The C.C.I.R. *avis* (opinion) relates to installation and operating arrangements and doesn't concern us. Representatives of eight European nations who operate such services met privately and drew up a memorandum agreement for the division of frequencies between these countries. This was



THE C.C.I.R. GETS UNDER WAY

A view of part of the main assembly hall at the opening plenary session at Mont' Estoril, near Lisbon.

strictly within their rights, and in fact is encouraged by the Madrid regulations, but their agreement does not have C.C.I.R. endorsement. We did not let the matter go at that, even: We discussed the subject with representatives from these eight countries and filed a memorandum with them calling attention to the amateur rights and the extent to which this band was actually assigned to amateurs in many European countries, and called upon them to recognize the *status quo*. For the most part this was not a hostile group and it included several excellent friends of amateur radio. In fact, how far we amateurs have progressed in recent years and how valuable contact is with government representatives, is well illustrated by the fact that several of the eight representatives participating in this small informal conference actually demanded that the regional agreement take account of the rights of amateurs, refusing to associate themselves with the movement unless it did! The regional agreement that was there drafted and signed does take cognizance of the amateur rights and of the rights of individual governments to assign this band to amateurs, and directly reiterates that amateurs preserve the rights given them in the Madrid regulations. By private conversations we assured ourselves that amateurs in the North Sea nations now assigned this band will continue in its enjoyment. Thus the only topic at

Lisbon directly dealing with amateur frequencies was solved in an entirely satisfactory manner, a conclusion which quite probably would have been less favorable but for our presence and intervention.

Another question which interested us was the revision of the working rules or internal regulations of the C.C.I.R. Our interest was to preserve

proposals, but it wasn't necessary, since the proposals of the United States were at once adopted as the basis for the decision. It was interesting to note, by the way, that our A.R.R.L. system regularly achieves an accuracy higher than some of the European nations proposed as satisfactory!

Then there was a very interesting question about suppressed-side-band broadcasting. The study got nowhere, perhaps largely because of the small amount of experimental data available, and accordingly was continued on the agenda for the next meeting, but at our suggestion was expanded to include a study of suppressed-carrier transmission as well, and also a study of receivers suitable for the reception of such transmissions.

Some alarms have been sounded over the listing on the C.C.I.R. program of the study of allocation of frequencies. It is true that this was the title of one of the subjects, but it was in fact a study of performance characteristics of waves as they might influence the allocation

of frequencies for specific purposes. The study was strictly technical and that portion of it which was finished concerned itself chiefly with curves for field strength at varying distances, and only in the frequencies below 1500 kc. No examination was made of the higher frequencies, where the sky-wave becomes the predominant factor. There was thus nothing whatever in the study that concerned either allocations or amateur frequencies.

It would fill several pages in *QST* to present a list of the subjects examined, the opinions issued, and the unresolved and new questions listed for future study. The complete proceedings of the conference will be published soon and will be available for students of the subject. As we have mentioned before, the topics embraced little of interest to the amateur as such. They dealt with such other subjects as measuring the intensity of signals and noises in the radio transmission medium, the reduction of interference in the shared bands, tolerances of harmonic intensity in the low-frequency range, radio spectrography, means permitting mobile stations to work on the frequency of land stations, synchronization of broadcasting stations, arc transmitters, reduction of parasitic currents in receivers, etc. It seemed to us that many of the opinions issued by the C.C.I.R. were without particular value, being the small remainder of the subject on which agreement could be got after much argument. But it deserves to be said that in the technical contributions filed by the collaborators in advance of the



THE RÊDE DOS EMISSORES PORTUGUESES HONORS PY1DY AND US WITH A DINNER

Many well-known Portuguese hams are in this picture. Seated, left to right: CT1LC, treasurer of R.E.P.; CT1AE, first president of R.E.P.; CT1BX; CT1BE (Mrs. CT1AE), first secretary of the society; CT1ET; Mr. Lamb; CT1OH; CT1BY; CT1CE; Mr. Warner; CT1BB, president of the R.E.P. and toastmaster; PY1DY, distinguished amateur visitor from Brazil and an officer in the Brazilian society; CT1MN. Standing, left to right: CT1FT; CT1YU; CT1EL, secretary of R.E.P.; CT1BU.

the right of international organizations (such as I.A.R.U.) to participate in the C.C.I.R. The new form of the regulations even increases the recognition given such international organizations and they are now definitely established as participants.

Amongst the technical problems, the one in which we took the most active interest probably was the study of receiver selectivity. Amateur work in recent years, particularly the development of the single-signal superheterodyne with variable band-width crystal filter, has been of considerable importance, and in a direction not duplicated by other services. Although the selectivity question was of great importance, there was not time to discuss it at length and the study of it was not completed. Your technical editor served on a sub-committee which drafted definitions of selectivity and sensitivity, and these were included in a recommendation that the study be continued with actual measurements of the selectivity performance of many types of receivers, making use of the so-called "two signal" method of measurement. The I.A.R.U. expects to continue collaboration on this question.

We were interested also in the study relating to the establishment of a system for standard frequency transmissions, a subject in which we have had some experience through the operation of our A.R.R.L. Standard Frequency System. We were prepared on this question to back up the proposals of the United States as against the many other

meeting, there could be gleaned a great deal of valuable material on these subjects which would interest the engineer and student of the art.

It had generally been understood that this was the last C.C.I.R. meeting before the Cairo Conference, except that a brief meeting might be held in Cairo on the eve of the general meeting. However, after much argument at Lisbon it was decided to have the next meeting at Bucharest, Rumania, and it now seems likely that that next meeting will be held in the spring of 1937. (The Cairo Conference is scheduled for January or February of 1938.) The world is divided on the general value of C.C.I.R. meetings. The continental European nations regard the C.C.I.R. as of great value and would even like to see it a continuing organization with a permanent secretariat. Most of the English-speaking nations, on the other hand, seem to query its general value and are opposed to frequent meetings—which is also the point of view of your representatives. The rules provide, however, for meetings at any time at the call of ten or more nations, so it is likely that there will be a fourth meeting in 1937.

Although many of the topics on the Lisbon program had technical interest to us as students of the art, there were few subjects of actual concern to the transmitting amateur. We were not there because this conference was likely to deal with matters affecting our rights. Rather, our presence was an outgrowth of the several preceding international conferences and pursuant to the formal admission of the I.A.R.U. two years ago. We went largely for the purpose of sitting down with the governments and commercial radio companies of the world and showing them that the radio amateur also has the ability to participate in these discussions and to make useful contributions to the work. Our aim, in the absence of questions that vitally concerned us, was to attract favorable notice to the work of amateurs and to widen our sphere of contacts, all to the end that the position of the amateur may be made more secure at the next administrative conference. Our great task of course is the permanent preservation of frequency assignments for amateurs and at the next conference we want not only to retain our existing bands but to widen some of them, particularly the 40-meter band. We know that by our constant presence at these conferences we have brought the nations of the world to the expectation that the transmitting amateur will be represented and spoken for, and to the realization that the amateurs are an increasingly important group in radio for whom adequate provision must be made, the same as for other services. Through our recent participation, and particularly by our presence at the Lisbon meeting, we feel that I.A.R.U. is now solidly fitted into place as part of the international radio picture.

We met the Portuguese amateurs of the Lisbon area, particularly the officials of the *Rêde dos*

Emissores Portugueses—which is the Portuguese section of the I.A.R.U.—and a very splendid bunch of fellows they are! We are deeply indebted to them for their hospitality: They took us around to see their stations; the R.E.P. gave a splendid dinner under the toastmastership of their president, Dr. Alfredo Tovar de Lemos, CT1BB, to us and to PY1DY, who was also visiting in Lisbon; they honored us with membership in their society; and a group of them were down to the pier to see us off when our ship sailed. We found them, as we expected, like the radio amateurs of every other country, a keen and wide-awake group, filled with love for the technique of amateur radio and happy in the good fellowship they found in each other. They have a splendid amateur society, existing in favorable relations with its government, and they enjoy the full Madrid widths of all the amateur bands. Through the kindness of the Portuguese administration we saw a surprising amount of Portugal and its people during our brief stay. We shall always cherish a most delightful memory of that country, and to these charming pictures of a lovely land we add our recollection of the most hospitable reception given us by the hams of the R.E.P.

Strays

W9DHH puts two crystals, one above the other, in one holder in his Tri-tet oscillator and finds it possible to make a quick QSY simply by changing the tuning. They seem to oscillate just as well as when used singly. The crystals should not be too close in frequency, however, otherwise the operation is likely to be erratic.

Transmitting tube distributors of RCA have a swell map of the world available to amateurs. These maps have the western hemisphere located in the center so that you judge distances easily. International prefixes are listed at the bottom of the map. High-frequency assignments are also shown as well as time divisions. These maps make an attractive decoration for that part of the shack wall you can't cover with QSL's.

Fellows who write the Technical Information Service for help with their transmitting and receiving troubles can help us as well simply by dropping us a card to let us know how our suggestions work out. Trouble-shooting by mail often brings up some knotty problems, cases in which it is impossible to do more than try to make an intelligent guess as to the root of the difficulty. Blank silence on the part of the recipient of the advice may indicate that the guess was well founded, but doesn't give us any basis for helping out the next fellow who has a similar problem. If it works, let us know. If it doesn't, we want to know that too.

A Transportable 10-Watt Public Address System

Information that May Be Carried to Speech Amplifiers

By Clinton B. DeSoto, W1CBD*

Did you ever sit in the back row at a hamfest or convention, or have to take standing room along the rear wall at a particularly well-attended club meeting? And then hear only an occasional word of the talks through the heavy attenuation of the crowd in front of you? How you wished then that you could hook up that Class-B modulator sitting proudly in the shack back home, tie it to a good dynamic, and really make something out of those muffled words. Well, here's the answer to the problem—a portable amplifying system that most every radio club (and a lot of individual amateurs with rental or resale ambitions) can build. It will save vocal cords and ease ear strain—and provide an interesting construction job, too.—EDITOR

THE public speaker of olden times, painfully extending the power in his voice from the normal 60 or 120 microwatts to 1 or even 2 milliwatts and finding that still inadequate, wished vainly that he might emit not microwatts but actual watts of power and reach every ear in the auditorium or arena before him with convincing, powerful sound. The modern public speaker does just that. The development during the past six or eight years of public address systems capable of hurling the voice over far greater distances than could be done unaided has completely revolutionized the presentation of entertainment and information.

These powerful amplifiers are the outgrowth of the development of radio. Radio amateurs, therefore, can feel an intrinsic interest in the public address art simply because of its association with their own activities. But quite apart from that, public address systems are of extreme utility to all amateur groups, especially in large clubs, and at hamfests and conventions.

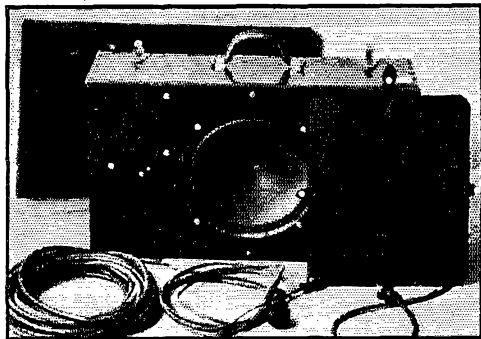
Recognizing this need, we have endeavored to develop in the QST laboratory the sort of amplifier we believe to be most logical and desirable for this purpose. We set out with two conflicting objectives. Having concluded that an output power in the neighborhood of ten watts represented about the most desirable value, we were going to build an amplifier capable of most efficiently producing that output power with good fidelity to the input signal; at the same time, we were going to make the simplest, lightest, least expensive amplifier practicable. We feel that we have achieved both objectives to a considerable extent. The number of parts used has been kept down to the very minimum, in the interests of economy and simplicity; yet those parts which are used are of high quality, to preserve excellent performance. The construction is straight-for-

* Assistant to the Secretary, A.R.R.L.

ward and orthodox. Nevertheless, there is plenty of room for everything. The weight is higher than we originally hoped for—80 lbs. complete with cables and microphone—but even this can be carried for some distance by one person without too great effort.

THE TUBE LINE-UP

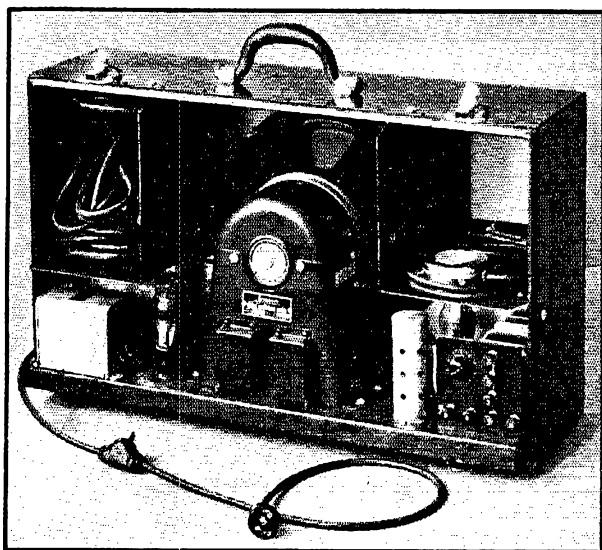
In its final form, the amplifier proper consists of three stages, one a voltage amplifier using a 2A6, the second a high-gain driver using a 53 with its grids and its plates paralleled, and the third a



ONE UNIT, FOUR AUXILIARIES

The carrying case has inside dimensions of 7 by 14 by 24½ inches. The cover is 1¼ inches deep, to accommodate the rest of the chassis width. The speaker cut-out is 10½ inches in diameter.

Class-B power stage capable of 10 watts output using a 53 as a dual triode. The 2A6 is a high-mu triode in conjunction with a pair of diode rectifier plates, ordinarily used in broadcast receivers as a combined second detector and first audio amplifier. In this application, we disregard the diode plates and simply use the triode portion. The 53 is a tube having two sets of high-mu triode ele-



ALL PACKED TO GO

A 30-ft. 3-wire shielded microphone cable and a 15-ft extension cord occupy the left-hand compartment in transit, while the microphone and an auxiliary head amplifier, if used, go in the right.

ments, each somewhat similar in characteristics to those of a 46 with grids tied together. As a Class-B tube, these triodes are in push-pull; as a Class-A tube, in parallel.

A more efficient, and yet simple and trouble-free, tube line-up cannot readily be conceived. Two high- μ high-gain triodes provide a possible total voltage gain of several hundred. The 2A6 has a rated amplification factor of about 100, the Class-A 53 of 35. In practice, approximately half of these values can be realized. Actually, it works out so that an input of about 0.1 volt at the grid of the 2A6 is adequate to secure full 10-watt output from the Class-B 53. Thus the ordinary high quality double-button microphone is more than capable of loading the output stage, and the same is true of the usual condenser, crystal, dynamic or velocity microphone with a head

amplifier. (See Fig. 2.) The sensitivity, then, is sufficiently good for all applications, which would not be the case if an ordinary low- μ triode were used in the first stage; nor is it so excessive as to result in undue feedback, as it would be if a higher-gain screen-grid or pentode tube, with its attendant circuit complexity and operating trouble, had been used.

THE CIRCUIT

With an initial glance at the circuit diagram to familiarize ourselves with the general arrangement, we proceed to a step-by-step examination of the layout.

The input transformer, T_1 , is supplied with two tapped primaries, one (P_1) a high-impedance affair used to couple from the plate circuit of a preceding triode (usually a 55 or 56 used as the second detector of a broadcast tuner), with a 4000-ohm tap for connecting to a high-impedance phonograph pickup. The second

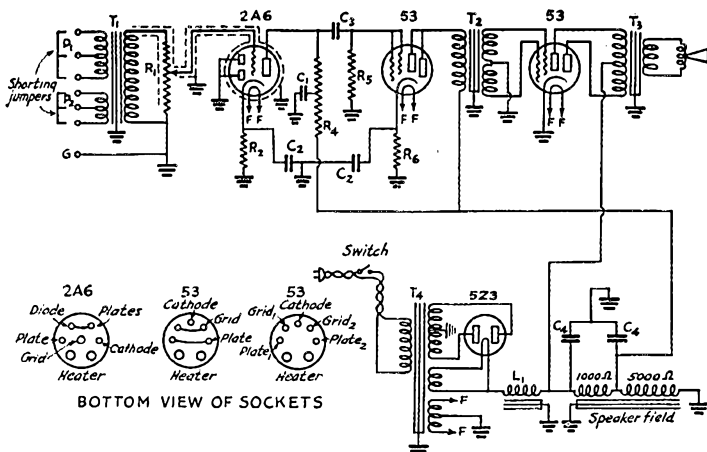


FIG. 1—THE CIRCUIT DIAGRAM

- All grounds indicate connections to the metal chassis.
- T_1 —Input transformer with high (P_1) and low (P_2) impedance primaries. (Kenyon BPR or equivalent.)
- T_2 —Class-B input transformer from 53 driver to two 53 grids. (Kenyon B531 or equivalent.)
- T_3 —Class-B output transformer, 10,000-ohm primary. Supplied with speaker.
- T_4 —Power transformer, with secondaries for: 450 v., 125 ma.; 5 v. 3a.; 2.5 v. 5 a. (Kenyon B53PT or equivalent.)
- L_1 —Input choke, 110 ohms resistance. (Kenyon BC110 or equivalent.)
- R_1 —1-megohm shielded variable resistor. (Electrad R1-206 or equivalent.)
- R_2 —3500-ohm 1-watt.
- R_3 —250,000-ohm 1-watt.
- R_4 —50,000-ohm 1-watt.
- R_5 —500,000-ohm 1-watt.
- R_6 —800-ohm 1-watt.
- C_1 —4- μ fd. 475-v. electrolytic.
- C_2 —Double-section 5- μ fd. 25-v. electrolytic.
- C_3 —0.01- μ fd. 400-v. tubular.
- C_4 —Double-section 8- μ fd. 475-v. electrolytic.
- The speaker is a Jensen Model A-12, with a 10,000-ohm input transformer and a 290-v. 14-watt tapped field coil.

primary (P_2) has a total impedance of about 400 ohms, centertapped. It is used for connecting in a single- or double-button carbon microphone, a low-impedance phonograph pick-up, or a 200- or 500-ohm line. The input panel, at the right rear of the chassis, has binding posts for each of these terminals, as well as one which goes direct to ground for connection to the shielding on transmission lines or microphone cables. This ground must always be used, by the way, or a loud hum pick-up will be noticed. In certain installations it may be found necessary to connect also to an external ground.

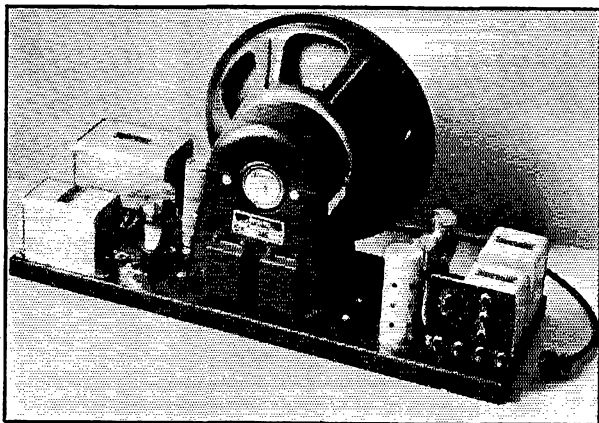
Across the secondary of the input transformer is connected a 1-meg-ohm shielded potentiometer used as a volume-level or gain control, the center terminal of which is connected through a shielded lead to the grid clip of the 2A6. The lead from the high-potential (ungrounded) side of the transformer to this gain control is also shielded, the shielding being carefully soldered to a common ground on the chassis. The case of the gain control must also be grounded, since the panel is of bakelite and this needful precaution is not automatically provided as it would be with a metal panel; otherwise a bad hum will result. The careful isolation of the input circuit is completed by using a tube shield over the 2A6. Thorough shielding is more convenient, less expensive, and usually just as effective as the elaborate decoupling which would otherwise be necessitated to avoid feedback and static or magnetic hum pick-up.

The cathode resistor of the 2A6 is somewhat higher than would be indicated by a consideration of the published tube characteristics; the higher value, however, accomplishes two useful purposes in this particular layout; it increases the total gain slightly and, because of the resultant lower plate current, a further resistance-capacity filter can be inserted in the high voltage supply lead without introducing excessive plate-voltage drop. This plate-circuit filter reduces the residual hum to a practically inaudible value, and further minimizes feedback effects.

THE POWER STAGE

The Class-A 53 feeds into a special Class-B input transformer. The output transformer for the Class-B 53 is a part of the speaker assembly, and is mounted inside the supporting frame of the dynamic unit.

The speaker is a new development, with improved relative loudness efficiency. In this unit a special field coil is used which provides not only the second filter choke, but draws a heavy bleeder current as well. The coil has a total resistance of



THE CHASSIS

Keeping the power supply and amplifier at opposite ends reduces hum pick-up and makes for logical, simple construction. The control panel accommodates input lines from 200 to 10,000 ohms.

6000 ohms, which is shunted across the 300-volt supply. At 1000 ohms there is a tap, from which plate voltage for the two preliminary stages is taken, at 250 volts. The remaining 5000 ohms acts as a bleeder, contributing to the good regulation of the power supply. Thus the total field wattage is 14, which means that a considerable amount of flux is disturbed whenever a signal hits the voice coil. The speaker has an extended frequency characteristic which makes it especially adaptable to the reproduction of both speech and music.

The power supply is well isolated from the amplifier. The first filter choke is a high-inductance, low-resistance affair which, in conjunction with 8- μ f. capacity, adequately filters the supply to the final stage without affecting the regulation appreciably. It might be mentioned here that the total plate current excursions are not great. The idling plate current is in the neighborhood of 90 ma. At full output the total plate current does not exceed 120 ma. Suitable heavy-note response is therefore readily preserved, with the aid of the heavy duty power transformer, the 5Z3 rectifier tube (a type 80 would carry the current, but with more voltage drop), and the low resistance filter system.

CONSTRUCTIONAL

The primary objective in the mechanical design has been the achievement of high quality, efficiency, and utility with a minimum of bulk and weight. The single-unit construction employed is rare in public address systems as powerful as this, orthodox practice being to provide one or two speakers in separate cases. In this system, however, it was felt to be especially desirable to have just one carrying case to hold everything for the applications for which the outfit was intended. The added possibility of feedback through this

(Continued on page 98)

Amateur Radio at the 1934 National Air Races

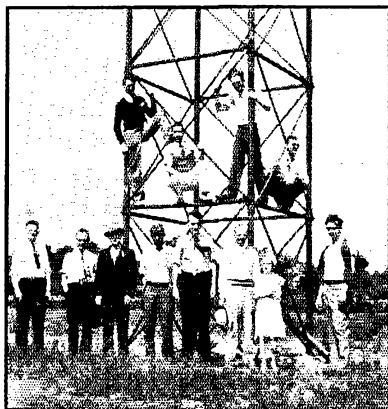
By Joseph H. Pitzer, W8AXV*

ONCE more amateur radio has been called upon to perform a public service and has come through one hundred per cent. Early in June, officials of the 1934 National Air Races began to give consideration to the problem of communication between the pylons and the judges' and timers' stands. Harry A. Tummonds, W8BAH, who had charge of amateur radio operations during the 1929 air races, assured the officials that the problem could be satisfactorily handled by amateur radio. Members of the Lakewood Radio Club and Cleveland Amateur Traffic Association offered to take over the job, and the final organization was composed chiefly of members of those clubs. Following is a list of those who participated and their assigned duties: Harry A. Tummonds, W8BAH, chief of radio communications—in charge; George Noack, assistant to chief; Ted K. Ball, in charge of personnel (grandstand); John Wahl, W8LJQ, service manager; Frank Fix, W8GUL, chief operator at grandstand; Wm. Jacob, W8BNC, assistant operator at grandstand and in charge of technical operations; Joseph Pitzer, W8AXV, chief operator Pylon No. 1; Wilson Brigham, W8BON, assistant operator Pylon No. 1; Kenneth Hybarger, W8AES, Pylon No. 2; Charles Moss, W8MAK, assistant operator Pylon No. 2; James Hill, official photographer.

Each pylon operator was given an opportunity to work one day at the grandstand, and in turn the grandstand operators manned the pylon transmitters one day. This gave each man an opportunity to become acquainted with conditions at the "other end," and also served to break the monotony of being assigned to one location for the entire meet. Three 'phone transmitters, all crystal-control, were in use every day throughout the meet. The transmitter assembled and owned by Frank Fix, W8GUL, was located at the grandstand while the transmitters, constructed by "Red" Doyle, W8BFT, and Joseph Pitzer, W8AXV, were located at Pylons No. 2 and No. 1 respectively. W8GUL's transmitter set-up was a '47 crystal oscillator, '46 buffer and a pair of 46's in the final stage. The speech equipment consisted of a 56, 46 and a pair of 46's in Class B. This transmitter operated in the 3.5-ke. band. 110-volt a.c. being available at the grandstand, W8GUL obtained power from that source. The transmitter which the writer, W8AXV, constructed consisted of a 30 crystal oscillator (1850 kc.) and 30 amplifier modulated by a 33. With 90 volts on the oscillator and 180 volts on the amplifier, no trouble was experienced

by W8AXV in putting a good "sock" into the grandstand. W8BFT used a transmitter consisting of a 12 oscillator, 12 amplifier and modulated with a 42. Approximately the same voltages were applied to this transmitter as that of W8AXV. The pylon transmitters operated on 160 meters, and the grandstand transmitter on 75 meters, in order to work duplex.

The transmitting antenna at the grandstand was strung high above the press boxes. Antennas at the pylons were attached to the pylons themselves and operated as Marconi systems to ground. No end of praise must be given to John Wahl, W8LJQ, for his good work in scaling the 91-foot pylons and attaching the antenna hereto.



THE CREW OF OPERATORS AT THE RACES

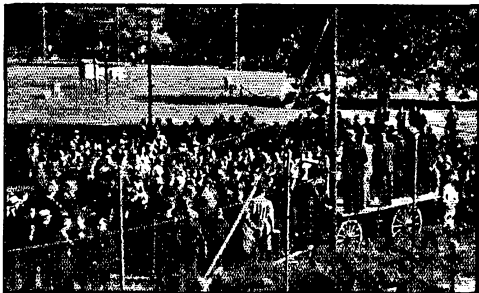
The race program covered a four-day period, and the usual judges' reports of race events and like data were transmitted each day. Our real opportunity to show what we could do in an emergency presented itself on the last day of the program when the Thompson Trophy Race was run off. It was during this race that Doug Davis crashed and met his death. The crash occurred between pylons No. 1 and No. 2, and, being well within sight of pylon No. 2, W8BFT immediately flashed the tragic word to the judges' stand and kept them in touch with first-hand information, while W8AXV moved his portable to the scene of the crash and operated from that point. Local newspapermen used W8AXV to transmit their news copy to the press officials at the grandstand through W8GUL. This news in turn was relayed to the various press associations and newspapers. It is regret-

* 3487 W. 136 St., Cleveland, Ohio.

(Continued on page 102)

Amateur Radio Enjoys a Holiday

AT THE invitation of members of the Lakeside Radio Club of Lake Bluff, Illinois, over 1300 amateurs from 30 states, Canada, Porto Rico, Mexico and Brazil assembled to do homage to the station warming of the club station, W9PZ. Without a doubt this was the largest body of active amateurs ever congregated at one time. W5ZA and family drove continuously for 38 hours to be present. Some took day coaches from both coasts to be in attendance at a mini-



HOW MANY PEAS IN THE JUG?

The transmission poles lead to the antenna field where the main and individual tuning houses may be seen at the foot of three poles. This photo was taken while a spirited group took part in one of the many contests.



MARINES DOLE THEM OUT—ALL HOT

LUCKY WAS HE WHO ARRIVED BY TRAIN—MET BY THE FIRE DEPARTMENT WITH THE CHIEF AT THE WHEEL

mum of expense. Others hitch-hiked; some had to work all day Saturday, but the drive of some 300 miles did not keep them from making their presence known in the small hours of the morning following. On all sides one was impressed by the efforts made to attend the affair and from the expressions seen everyone had the time of his life.

The spirit of amateur radio certainly reached a pinnacle that day at Lake Bluff. The Lakeside Radio Club, with no commercial or political affiliation, no idea of reward, plenty of hard work, free beer and eats, set a sterling example by its playing host to all amateurs at no expense to anyone. The only request made each and every individual was that they have a good time! From all accounts this request was double-checked.

This outing as originally conceived by the dozen members of the Lakeside Radio Club was to extend a cordial invitation to each and every amateur radio operator. There were contests to be entered by all who desired. Hundreds of valuable prizes awaited those who won contests.

To be eligible for prizes one needed only to possess a ham call. No discrimination was shown any individual or group of amateurs. Prizes included seven different receivers, tubes up to and including a 35-kw. bottle (won by W4MU), all manner of chokes, transformers and condensers, resistors, etc. The YL's were remembered with silk hosiery and facial cream, a vacuum cleaner, electric iron and percolator set.

One of the first events of the day was a tennis match between four tennis professionals at the adjoining Shoreacres Country Club. Chick Evans and Jack Westland demonstrated some trick golf shots. Contests of a nature to attract the YF's and YL's in cooperation with the OM's were featured. Hamfesting and greeting the DX men present was the stellar attraction of the day. There was not even time for scheduled talks. Everyone was on his own to enjoy himself as he saw fit. There were no political discussions; the usual amateur heated arguments were conspicuous by their absence.

All young squirts? You should have seen the



mob that gathered at Matty's call to look at men who had started in ham radio with spark. We recall seeing W5ZA of Roswell, N. M., W9ZN, W9AA, Mr. W. J. McGuffage of original 9AC and W9ZA among this group.

The final scheduled event of the evening was a description of the event and talk on amateur radio over the Blue network of NBC by Donald McGibney, news-commentator.

Of particular interest was the club station W9PZ. Entirely built by Wm. P. Hilliard and installed by the club members, transmitters in the shack include 1-kw. c.w. and 'phone transmitters for 20, 40 and 80 meters with a crystal-controlled set under construction for 5 and 10 meters. Included among the receivers are: S.S. receiver with 2 stages of preselection and 2 trap circuits, single or duplex crystal filter; AGSX with special preselector, trap circuit and audio built by National Co. especially for W9PZ, and a

Grunow all-wave console model. At the operating position there is a ray rack which holds the S.S. receiver, a cathode ray oscilloscope and four selector switches for direction selection of the directive antenna which is 600 feet away. We hope to have a complete description of this station in an early issue. For those who didn't see the four aluminum masts 66 feet high we are reproducing a photo which partially shows the masts and tuning houses at the center and corners of the

(Continued on page 102)

A.R.R.L. Copying Bee—December 14th



JUST for some good fun, and to give hams opportunity to try their hand at copying some unusual word combinations, figure groups, and simple punctuation, a copying bee will be scheduled. There may be trick words, or even misspelled words, words sent in no particular sequence. The transmissions will be between 50 and 100 words in length. The sending will be by tape at about 20 to 25 words per minute. It will be a test to *copy what you hear*.

Transmissions will be made by five high-power amateur stations, all using "automatic" equipment. Stations in each time zone will transmit different text. Great care will be taken to make all messages equally difficult. Intentional errors will be inserted; different errors, different words, different word order. It will be worse than useless to try to correct or compare messages. Possibly no one will make perfect "copy." We urge everybody who knows the code at all to take part and send in whatever they get. It will be interesting to see how we all fare in the copying bee. A full report will be given in *QST*.

The schedule of transmissions for Friday night, December 14th, is as follows:

Station	Frequency	E.S.T.	C.S.T.	P.S.T.
W1MK (Hartford)	7150 kcs.	9:15 p.m.	8:15 p.m.	6:15 p.m.
W1MK (Hartford)	3825 kcs.	9:15 p.m.	8:15 p.m.	6:15 p.m.
W9UZ (Chicago)	7183 kcs.	10:15 p.m.	9:15 p.m.	7:15 p.m.
W2AYN/9 (Chicago)	3510.5 kcs.	10:15 p.m.	9:15 p.m.	7:15 p.m.
W6ZF (San Francisco)	7030 kcs.	11:15 p.m.	10:15 p.m.	8:15 p.m.
W6AM (Long Beach)	3720 kcs.	11:15 p.m.	10:15 p.m.	8:15 p.m.

The rules for taking part in the copying bee are very simple.

(1) Any amateur operator, not having access to the tape or transmission copies at the above stations, is eligible.

(2) Only one copy shall count. Mark the *one* copy which you are submitting as your "best."

(3) It is not necessary to submit more than one copy . . . but please report all the above stations heard.

(4) Send in *original* copies. Re-copying messages invariably introduces errors and detracts from credits.

(5) Copies must be mailed within ten days of December 14th to be counted.

A silver loving cup has been selected as a trophy to be presented to the winner of the copying bee. A reproduction of this cup trophy is given herewith. In addition to the cup, a winner in each A.R.R.L. Section will be selected and a further suitable award made.

The stations will each send V's with frequent identification by call signal, for at least ten minutes before the scheduled transmission time. All amateurs are requested to note the frequencies listed and endeavor to cooperate by keeping silence on these and closely adjacent channels during the transmission of the copying bee material, which will start at the time indicated. All set? Remember, *copy what you hear*. Even if you get only part of a transmission, send it in so we can credit you for what you get. Best luck in the copying bee.

— F. E. H.

Increased Sensitivity With the Regenerative Detector

By Rinaldo De Cola*

In this article the author discusses a little-considered angle of reception with oscillating detectors. The information here, in conjunction with that in Robinson's "Regenerative Detectors" in February, 1933, QST, should enable the amateur using the regenerative type of receiver to obtain considerably improved performance.
—EDITOR.

FOR the proper reception of continuous-wave telegraphic signals it is necessary, in addition to the normal detection or rectification of the signal, to use some local source of oscillations of slightly different frequency from that of the received signal to obtain an audible beat. In the short-wave regenerative receiver the oscillating detector fills the rôle admirably from the standpoint of reliability and economy.

The oscillating condition of such a circuit makes for excellent selectivity and very good sensitivity.¹ This arrangement of a single tube acting as both detector and oscillator has, however, certain inherent limitations which it would be desirable to overcome. Briefly, these limita-

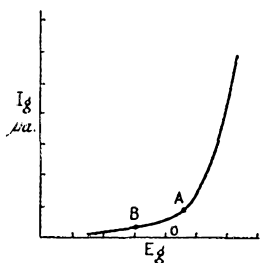


FIG. 1—TYPICAL GRID VOLTAGE—GRID CURRENT CURVE OF A DETECTOR TUBE

The operating point A gives greatest sensitivity; point B is the one generally attained with regenerative detectors.

tions are inability to tune directly upon the frequency of the c.w. signal, and more important, insufficient control over the strength of oscillations from the receiver itself. Both of these cases reduce the sensitivity of such receivers, and they will be more fully discussed in what follows. Because of the universal use of condenser-and-leak (grid) detection, this analysis will be confined to this type of detection, although the same general limitations are prevalent in detectors using "C"-bias (plate) detection.

* 527 Fairfield Ave., Bridgeport, Conn.

¹ Robinson, "Regenerative Detectors," QST, February, 1933.—Ed.

In Fig. 1 is shown the grid voltage-grid current characteristic curve of a typical detector tube. The point where maximum efficiency as a detector

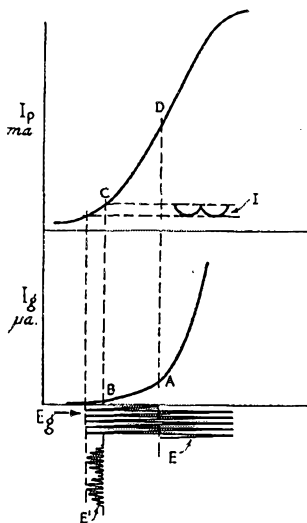


FIG. 2—OPERATION OF THE OSCILLATING DETECTOR WHEN LOCAL OSCILLATIONS ARE TOO VIGOROUS

The strong local oscillation causes the operating point to shift from A, optimum, to B, resulting in lowered sensitivity.

will be realized is approximately at the point of maximum curvature; that is, the point where the curve is changing its direction most rapidly. In Fig. 1 this point is indicated by A. It is generally impossible to operate at this point and still have the tube oscillate, however, because of the rise in the tube plate circuit resistance (caused by reducing the regeneration control) which assumes a value sufficient to stop oscillations. Consequently it is necessary to keep the point of detection to some value near B, where r_p is of a value suitable for sustained oscillation. This variation of r_p and the detection efficiency is entirely dependent upon the setting of the regeneration control.

DETECTION EFFICIENCY AND FEEDBACK AMPLITUDE

Fig. 1 illustrates detection with the tube in a non-oscillating state. For the condition of an oscillating detector, Fig. 2 will show just how detection efficiency is dependent upon the amount of feedback or regeneration. With the tube oscillat-

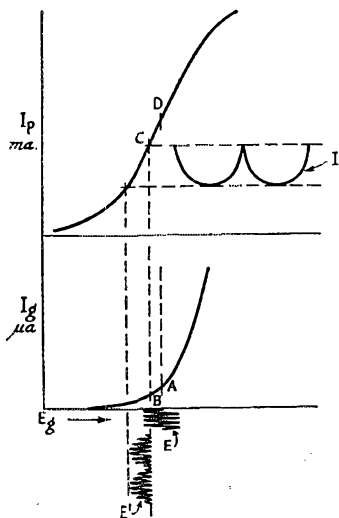


FIG. 3—OSCILLATING DETECTOR UNDER NEARLY IDEAL CONDITIONS

The weak local oscillation causes only a slight shift in the operating point, resulting in greater rectification efficiency in the grid circuit and greater amplification of the rectified signal.

ing vigorously the amount of feedback voltage to the grid is quite large, and is represented by the continuous wave E of Fig. 2. In grid detection the normal grid potential is reduced when an alternating voltage is impressed upon it. Thus in Fig. 2 the voltage E causes the grid to assume an operating point lower than A , which can be represented by point B . Since the curvature at B is considerably less than at A , detection at this point will be poor.

Assume that a receiver is at hand and that detection is at point B because of the oscillating condition of the circuit. If this set were tuned to a c.w. signal there would be a beat between the received signal and the receiver oscillations, which after detection would result in a voltage E' , representing the beat note. The voltage E' , causes amplified variations in the plate current of the tube at the point C , the current variation itself being shown at I . It will be noticed that the plate current decreases, as would be expected.

This decrease in plate current for a given grid voltage is a measure of detection efficiency or sensitivity. The greater the decrease for a given signal the greater the sensitivity. Consequently if the plate current curve in Fig. 2 and C could be made more vertical (since the steepness de-

termines the amplification of the tube) greater plate current variations could be obtained, resulting in greater sensitivity. Thus if the detected grid voltage E' could be impressed at some point near D on the I_p curve, the results would be much better. This desirable condition can be obtained as shown in Fig. 3, which is identical with Fig. 2 except that the magnitude of feedback voltage E has been considerably reduced.

The advantages of reducing E are apparent. The operating point B now lies much closer to A and because of the greater curvature at this point a greater rectified voltage E' is obtained. Also, since point C now lies on the steepest portion of the plate-current curve the rectified voltage E' on the grid gives a much greater change in plate current, resulting in greater amplification. While it is generally quite easy to operate an oscillating detector at B of Fig. 2, the increased efficiency by using B of Fig. 3 cannot be approached, because the receiver stops oscillating before this point can be reached.

This phenomenon is naturally most annoying in the reception of weak signals. As the regeneration control approaches the point where the tube stops oscillating the received signal steadily becomes louder, but just as it seems that the maximum point is being approached the receiver suddenly stops oscillating. During this time the operator is putting the detector tube through the various points of operation indicated in Figs. 2 and 3 but, because of the limitations of the tube

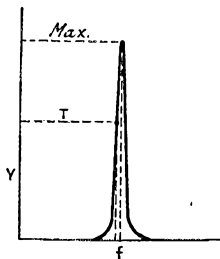


FIG. 4—TYPICAL SELECTIVITY CURVE OF A DETECTOR AT CRITICAL REGENERATION, SHOWING THE LOSS IN SIGNAL STRENGTH CAUSED BY DETUNING FOR BEAT-NOTE RECEPTION

For a beat note of constant frequency, the loss of signal strength will be greater as the frequency to which the circuit is tuned is decreased.

as an oscillator, cannot reach A , the point of maximum detection. This phenomenon usually is misinterpreted, most operators thinking that it is the intensity of the local oscillations which governs the intensity of the signal, whereas in reality it is because the proper points on the detection-amplification characteristics cannot be reached without stopping oscillations. The intensity of the local oscillations plays only a minor rôle; the detector tube operating points are the factors of paramount importance.

AUTODYNE VS. HETERODYNE RECEPTION

As has been pointed out previously,¹ this system is further limited because for c.w. signals the receiver must always be tuned slightly off the frequency of the station being received. Because of the oscillating condition of the tube—which really means a condition where the losses or resistance in the grid circuit have been completely neutralized or reduced to zero—the selectivity of this circuit is very high.² With such sharp tun-

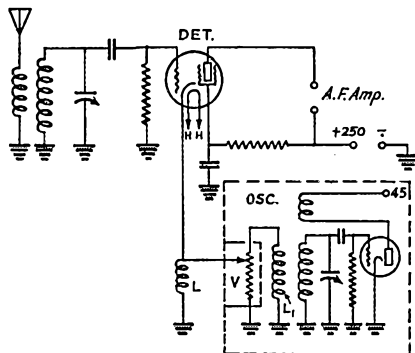


FIG. 5—SUGGESTED CIRCUIT FOR REGENERATIVE BUT NON-OSCILLATING DETECTOR WITH SEPARATE HETERODYNE OSCILLATOR

The control *V* permits adjustment of the strength of the locally-generated beat frequency so that the optimum detection conditions of Fig. 3 can be realized.

ing the full intensity of the signal is not impressed upon the grid, resulting in a further loss of signal strength. This point is illustrated in Fig. 4. The curve shown in this figure corresponds to the selectivity of the oscillating tube circuit, and the point *T* indicates a point 1000 cycles (the beat note) from the actual frequency of the station. The difference in height between point *T* and max. measured along the line *Y*, which represents voltage, will give the value of voltage lost because of the selectivity of the tuner.

Many radio amateurs who possess monitors have noticed that if the monitor is adjusted to a frequency near that of a station to which the receiver is exactly tuned (with the detector regenerating but not oscillating) much better reception is made possible. This will not work equally well in every case, since the effect depends upon the strength of the signal from the monitor. For best results this signal should be comparatively weak, as has already been shown.

The use of an external or separate oscillator, with means provided for varying the output voltage, is desirable, for not only can the full signal voltage be applied to the detector grid, but in addition the best operating point of the

detector tube can actually be utilized. In all cases the detector should be of the regenerative type, although never actually oscillating.

Such a system makes an excellent all-round receiver, in spite of the necessity for using a separate oscillator. For instance, take the case of strong local signals which block the detector tube and prevent it from oscillating. The use of a separate oscillator makes this blocking impossible, since none of the signal voltage is impressed upon the oscillator, with the result that the strongest signals can be heterodyned. Also, when local stations are operating on a frequency near that of a weaker station which it is desired to receive, the local signal usually stops oscillations in the detector tube, making it impossible even to hear the weaker one unless a separate oscillator is used.

A schematic diagram of an experimental receiver of this type is shown in Fig. 5. There is nothing really new about it except the control *V*, which varies the oscillator voltage delivered to the detector tube. A good value for *V* is about 10,000 ohms. Coils *L* and *L'* are five turns each wound on a one inch form. All other circuit constants are identical to those normally used in short-wave receivers.

Polish Section Announces DX Contest

P. Z. K. Sponsor Competition — December 2d-16th

THE Polish society of the I. A. R. U. is sponsoring a DX contest between Polish amateurs and the rest of the world. Starting at 0001 G.T. on December 2d, the contest ends at 2400 G.T., December 16th. Polish competitors will send one group containing a cipher and four characters to each amateur worked and the group must be copied without error for credit. This group number must be confirmed on a QSL card to be addressed to the station worked. At the conclusion of the contest all these cards should be sent to the Polish QSL Bureau, P. Z. K., Lwow, Bielowskiego 6, Poland. All cards must be there by May 31, 1935.

The points for each QSO for Polish and foreign competitors will count as follows:

- 1 point: All European countries (except those mentioned below).
- 2 points: Portugal, Ireland and Malta.
- 3 Azores, Canary Islands, Algeria, Tunis, Morocco, Egypt, Tripoli, Syria, Siberia, Armenia, Turkestan, Iraq, Palestine, Transjordan, Asiatic Turkey, Sahara, Faroe Islands.
- 4 points: The rest of the African continent (except the Union of South Africa, Angola,

(Continued on page 78)

¹ Lamb, "What's Wrong With Our C.W. Receivers?" *QST*, June, 1932.—Ed.

² Robinson, "Regenerative Detectors," *QST*, February, 1933.—Ed.

What the League Is Doing

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

Election Results In the Central, Hudson, New England, Northwestern and West Gulf Divisions of the League, balloting is now taking place to elect a division director for 1935-1936 and, in all these divisions except the West Gulf, an alternate director as well.

When the Executive Committee met to examine the nominations for this year's elections, it found that in some of the divisions there was but a single nomination for a qualified candidate. Our by-laws provide that in these cases the Executive Committee must declare the single candidate elected, without the need for balloting by the membership. Several elections of this nature are now to be reported:

In the Roanoke Division there was but one nomination for director, for Professor H. L. Caveness, W4DW, who now holds the office. Professor Caveness accordingly has been declared reelected as Roanoke Director for the 1935-1936 term. Similarly there was but one nomination in this division for alternate director, and Mr. J. Frank Key, W3ZA, of Buena Vista, Virginia, has become the alternate director for the same term.

The same circumstances prevailed in the Rocky Mountain Division nominations and Mr. Russell J. Andrews, W9AAB, the present director, has been declared reelected for the new term. There was but one nomination for alternate director from this division, which has resulted in proclaiming the election of Mr. Lewis D. Stearns, W6BTX, of Salt Lake City, as the alternate director.

In the West Gulf Division, although the membership is balloting between three candidates for director, there was but one nomination for alternate, and Mr. David H. Calk, W5BHO, of Houston, Texas, is the alternate director for 1935-1936.

For the results of the elections by balloting, listen for the special broadcasts from W1MK commencing the night of December 20th.

Election Notice To all A.R.R.L. Members residing in the Southeastern Division:

You are hereby notified that J. C. Hagler, Jr., has resigned as A.R.R.L. Director from the Southeastern Division, his resignation to become effective upon election of a successor. You are also notified that a special election for A.R.R.L. Director is about to be held in the Southeastern Division to fill the remainder of the 1934-1935 term left vacant by this resigna-

tion. Your attention is invited to Section 1 of Article IV of the Constitution, providing for the government of A.R.R.L. affairs by a Board of Directors; Section 2 of Article IV defining their eligibility; and By-Laws 10, and 12 to 20, inclusive, providing for their nomination and election. Copy of the Constitution and By-Laws will be mailed any member upon request.

The election will take place during the period between December 15, 1934, and February 1, 1935, on ballots which will be mailed from Headquarters in the first week of that period. The ballots will list the names of all eligible candidates nominated for the position by A.R.R.L. Southeastern Division members.

Nominating petitions are hereby solicited. Ten or more A.R.R.L. members of the Southeastern Division have the right to nominate any member of the League in that division as a candidate for director therefrom. The following nominating form is suggested:

(Place and date)

Executive Committee
American Radio Relay League
West Hartford, Conn.

Gentlemen:

We, the undersigned members of the A.R.R.L. residing in the Southeastern Division, hereby nominate of as a candidate for director from this division for the remainder of the 1934-1935 term.

(Signatures and addresses)

The signers must be League members in good standing. The nominee must be a League member in good standing and must be without commercial radio connections: he may not be commercially engaged in the manufacture, selling or renting of radio apparatus or literature. His complete name and address should be given. All such petitions must be filed at the headquarters office of the League in West Hartford, Conn., by noon of December 15, 1934. There is no limit to the number of petitions that may be filed, but no member shall append his signature to more than one petition.

This election is the constitutional opportunity for members to put the man of their choice in office as the representative of their division. They are urged to take the initiative and file nominating petitions immediately.

For the Board of Directors:

A. L. BUDLONG,
Acting Secretary

October 1, 1934

(Continued on page 74)

Band Switching for the Transmitter

A Five-Band Transmitter Without Plug-in Coils

By D. A. Griffin, W2AOE*

IF EVERY amateur could rub the fabled lamp of Aladdin and have the equally fabulous genie appear in a crash of static to do his bidding, how terrific the QRM would become! Without a doubt a miniature Rocky Point would appear in every aspiring Marconi's back yard. Certainly we could expect a row of push buttons, conveniently located alongside the diversity receiver, controlling a kilowatt rig on each band. Inasmuch as the lamp has been lost for, lo, these many years, and because "R.F.C." loans are not granted if we attempt to put up our QSL cards as collateral, QRM from such amateur stations will not be a very decisive factor in the future picture.

Unquestionably, every ham would delight in operating such an installation, but space and financial limitations preclude the possibility of such a layout to a vast majority of us. In the past our transmitters, like Topsy, have "just grown" into multi-stage affairs requiring a basketful of plug-in coils and the services of an engineer to reneutralize, trim antennas, and add or subtract buffer or doubler stages in order to shift from one band to another.

The writer for one has become heartily sick of this type of transmitter with its attendant troubles when a frequency shift is in order. Some new apparatus and some very old ideas employed by every commercial company make it possible to present something in transmitters that is new

to the amateur. No coils to shift, no neutralization, no clip adjustments, yet operation with full-power output is possible on all four of the popular bands merely by turning a few switches and tuning the various stages to resonance. Absolutely no back of panel adjustments are required. While the fractional-second service obtained in the aforementioned "dream station" is impossible, with a little practice shifts from band to band from the oscillator to the antenna tuning can be made in a fraction of a minute.

BAND SWITCHING CIRCUIT

Referring to the circuit diagram, Fig. 1, we find a 47 oscillator, conventional in the grid circuit except for a tap switch which makes possible the selection of one of three crystals. The plate circuit is old stuff to operators of commercial transmitters, even if a bit unusual-looking to the amateur. Coil L_1 in combination with C_1 resonates in 3.5-mc. band. If the switch is thrown so that C_2 is connected across the coil, the circuit becomes a high- C 1.7-mc. tank. When the switch is thrown to the tap short-circuiting half the coil, the circuit resonates on the 7-mc. band. If suitable crystals are provided for 1.7-mc., 3.5-mc., and 7-mc. bands, six operating frequencies are available on four bands (assuming the final stage works always as a straight amplifier) merely by turning the two switches to the proper taps and tuning C_1 to resonance.

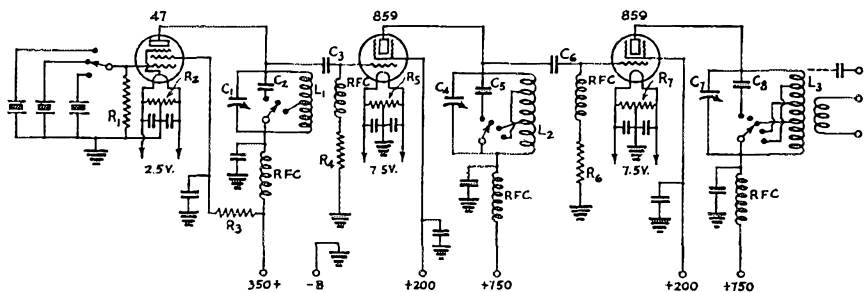


FIG. 1—BAND-SWITCHING TRANSMITTER CIRCUIT

The same circuit diagram could be used with other screen grid tubes, such as the 865 and 860, with suitable changes in applied voltages.

- C_1, C_4 —150- μ fd. variable, midget size.
- C_2, C_5, C_8 —350- μ fd. fixed.
- C_3, C_6 —100- μ fd. fixed.
- C_7 —150- μ fd. variable, double-spaced.
- R_1 —20,000 ohms, 2-watt.
- R_2 —20 ohms, center-tapped.
- R_3 —50,000 ohms, 20-watt.
- R_4 —20,000 ohms, 10-watt.

- R_5, R_7 —75 ohms, center-tapped.
- R_6 —10,000 ohms, 10-watt.
- RFC—Short-wave chokes.

- L_1, L_2, L_3 —21 turns No. 14 or No. 12 bare copper wire, wound on General Radio Type 677-U forms, 2½ inch diameter. 7-mc. tap 11 turns from plate end; 14-mc. tap 5 turns from plate end; 28-mc. tap, 2 turns from plate end.

*Leeds, 45 Vesey Street, New York City.

The advent of inexpensive screen-grid tubes is one of the chief reasons for the development of the transmitter. Of course, tetrodes cost more than triodes of equivalent power rating. However, there is practically no difference in the cost of a neutralized triode stage and a stage of this type using 859's because only one fixed coil form is



THE THREE-STAGE BAND SWITCHING TRANSMITTER WITH TUBES REMOVED

The set is built for mounting in a relay rack, hence the absence of a panel. Bakelite shafts are used to bring the switch and variable-condenser controls out through the rack panel.

The crystal oscillator is at the right, buffer in the center, and amplifier at the left.

required instead of three or four, and no neutralizing condenser is needed.

Tetrodes of this type are hi-mu affairs requiring a very small amount of excitation power, so conventional capacity coupling is used between the oscillator and the first 859 buffer-doubler. Another decided advantage is the fact that lack of bias does not cause the plate current to rise excessively. This makes the use of grid-leak bias possible throughout. The switch in the plate circuit, which normally tunes to 3.5 mc., provides condenser padding for 1.7 mc. while the two taps on the coil make it possible to tune the circuit to 7 mc. and 14 mc. as well. The padding condensers are of the flint-glass dielectric type capable of carrying large r.f. currents efficiently. The third stage is essentially the same as the second except that an additional tap on the coil makes it possible to use the last tube as a 28-mc. doubler. Inasmuch as the buffer and final stages do not require neutralization, it is easy to see that operation is possible with a wide variety of combinations. That is, both 859 stages may be used as buffers or doublers on five bands. If a single tube is used in the final stage operating as a straight amplifier, the output is 30 watts on all bands. If the stage is used as a doubler, 15 watts output can be obtained except on 28 mc. where approximately 8 watts can be secured. Of course, two tubes may be used in parallel in the final amplifier with a corresponding increase in output.

While theoretical-minded amateurs may feel dubious about the losses occasioned by the short-circuited turns, it might be well first to point out that the best test of all is that it works—and works well. If apparatus of quality is employed

and the switches are well made so that the "short circuits" really are short circuits, the losses run between 1% and 2% per stage, according to commercial people. These losses are not additive insofar as the output is concerned. That is, if the final stage is properly excited as a Class-C amplifier, we do not particularly care about the efficiency of the stages ahead so long as they are not overloaded. And we can cross off the small loss in the final stage in favor of the enormously increased flexibility of the unit over conventional transmitters.

TRANSMITTER LAYOUT

The photographs show the transmitter used by the writer to excite an 860 amplifier. The base is made of 20-gauge steel, 17 by 10 by 2 inches, and can be fastened to an 8 $\frac{3}{4}$ by 19 inch panel for mounting on a standard rack. The baffle shields necessary to prevent interaction and consequent self-oscillation are 10 inches deep and 6 $\frac{1}{2}$ inches high, having a half-inch lip at the bottom so that they may be easily fastened to the base. Closed-circuit jacks are provided in the three plate circuits so the plate current can readily be measured.

The switches were a problem, in that none fitting the requirements—fairly small size and high efficiency—were commercially available.

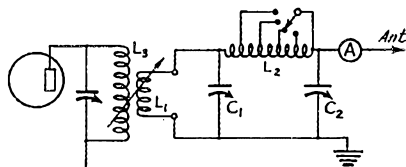


FIG. 2—ANTENNA-COUPLER CIRCUIT

C_1 , C_2 —300- μ fd. variable, receiver spacing (double-spaced for 'phone).

L_1 —2 turns inside final amplifier plate coil.

L_2 —30 turns No. 12 bare copper wire, wound on G.R. Type 677-Y form, 4-inch diameter, tapped at 5th, 10th, 15th and 20th turns.

Accordingly, they were home-made from vintage 1922 two-leaf switch blades and taps, the assembly being made on small sheets of Mycalex 3 by 3 by $\frac{1}{8}$ inches.

Six General Radio pin jacks are mounted on the side of the base for the crystal holders, the "hot" side jacks being insulated from the chassis with washers. The knob at the left of the crystal switch in the front view was originally used to vary the screen voltage on the first buffer. No advantage resulted from the use of this control in the experimental work, and it has accordingly been omitted from the diagram. The coupling condensers and grid chokes are mounted in the preceding stage in each case so that grid-plate coupling is minimized. Very short grid leads are brought through the baffle shields by means of Birnbach lead-through insulators. All of the switch leads should be short and direct and should be made with the

(Continued on page 96)

With the Affiliated Clubs

THE following amateur radio clubs are the most recent additions to the A.R.R.L. "Affiliated Club" group. Both were affiliated on November 2, 1934:

The Nashville Amateur Radio Club, Nashville, Tennessee.

The 73 Radio Club of Franklin County, Wilton, Maine.

Your affiliated brothers greet you, OMs!

With zero weather fast approaching we find club groups getting in the winter fuel supply, making necessary repairs to club shacks, checking up on transmitting and receiving gear, antenna facilities and the like in anticipation of a "rip-snorting" radio season. There's nothing like being prepared. With the season of hard weather and attendant storms in the offing it behooves all amateur societies to make sure their community is guaranteed communication in case of emergency. How is the emergency rig at your club?

Houston Amateur Radio Club

Fifteen years is a long time. The Houston (Texas) Amateur Radio Club celebrated the fifteenth anniversary of the founding of the Houston Radio Club by a special party on September 27th. The affair also marked the first anniversary of the H.A.R.C. being in its new quarters at Sam Houston Hall. About seventy-five members and visitors were present. Among these was Mr. Alfred Daniels, one of the first Houstonians to become interested in radio. Another real old timer present was Mr. Lloyd B. Quinby, who gave a talk on amateur radio, more or less a complete history of the game. Mr. Quinby proved his status as an "old timer" by displaying an A.R.R.L. membership certificate dated 1919!

Chair Warmers Club

Lives there a ham with knowledge so small that he hasn't heard of the Chair Warmers Club? We rather doubt it. Walt Colpus, W8BRS, Secretary, 23 Henderson Street, Pontiac, Michigan, writes that the C.W.C. is eager to get in touch with all shut-in, blind and physically handicapped amateurs, for whom the club was organized. Drop a line to W8BRS and you will receive a twelve page illustrated booklet telling about the Chair Warmers Club.

Bluefield Amateur Radio Club

The Bluefield (W. Va.) Amateur Radio Club is heading for 100% A.R.R.L. memberships within the club. Here is how they do it, quoted

from a communication from the secretary, C. L. Andrews:

"Where it was necessary, the club lent the money to its members for the purpose of renewing their League memberships, allowing them to repay it in 'easy installments.' We also adopted the plan of assessing each member a small amount monthly so that a year from now every club member will have paid-up membership in the A.R.R.L. for the following year. These dues will be considered as a part of the regular club dues. A member who fails to keep up his payments for A.R.R.L. membership will be dropped from the club. In this manner we have insured the club against ever being without the percentage of A.R.R.L. memberships required for affiliation, and at the same time have made the keeping up of League memberships simple and 'painless.' We are revising our constitution so that the number of unlicensed members in the club will never be more than forty percent of the total membership."

Richmond Short-Wave Club

The Richmond (Va.) Short-Wave Club is holding a DX contest for members from November 15th to December 15th. Airline distances as shown on a flat map will be used and each contact will count as follows: 0-1000 miles, one point; 1000-5000, two points; 5000-10,000, three points; 10,000 and up, five points. Some type of card verification must be presented for each contact. Score for any one contact is found by multiplying the points claimed for the contact by a "band multiplier": 1.75 mc., multiply by five; 3.5 mc., by four; 7 mc., by two; 14 mc., by one; 28 mc., by five; 56 mc., by ten. The final score is multiplied by a "power factor" ("power" being the input to final stage): Less than 50 watts, multiply by ten; 50-100 watts, by five; 100-250 watts, by two; over 250 watts, keep original score. The contest is between "operators" not "stations." Individual scores of each operator at "more than one operator" stations must be presented. Any station worked may count once only in the contest. Other clubs may find some helpful suggestions in these rules laid down by the Richmond Short Wave Club for a DX contest.

Modesto Club Awards Wouff-Hong Trophy

The Modesto (Calif.) Amateur Radio Club has awarded its Wouff-Hong Trophy for the year ending October 1, 1934, to W6FYT, station of Mr. W. H. Jones, Ontario, California. This yearly award is made by the Modesto club to the

"best station in the Sixth District" competing in a contest covering (1) DX miles per watt, (2) Traffic handled, (3) Operating ability, and (4) Percentage of homemade apparatus. The DX record of W6FYT is an enviable one and includes the feat of Working All Continents in 48 minutes!

San Angelo Radio Club

In an attempt to increase its membership the San Angelo (Texas) Radio Club conducted a membership contest, running for thirty days. Club members over thirty days delinquent in dues could not participate. To be eligible for first prize a contestant was required to have at least five paid applications, for second prize at least three paid applications, and for third prize at least one paid application. Mimeographed application blanks were furnished all participants.

The Mike and Key Club

A system of bartering has been inaugurated for members of the Mike and Key Club of Baltimore, Maryland. Interested members notify the secretary, who keeps a list of the apparatus to be sold or exchanged. This is a good suggestion for other organizations to follow; it creates considerable interest. The first fall meeting of the Mike and Key Club was held October 2nd, at its new headquarters, the New Howard Hotel, Baltimore. Thirty-eight new members were enrolled!

Central New York Radio Club

There is a feeling of satisfaction in having a hobby that we can tell the world about with pride! And we *should* tell the world about amateur radio at every opportunity. Had you attended the New York State Fair this year, September 1st-8th, you would have seen a mighty fine display and above it you would have seen a large sign reading "Amateur Radio Exhibit." This was made possible through the initiative of the Central New York Radio Club of Syracuse. Not only was it an exhibit; it contained also a complete, modern, workable 1.75-mc. amateur radiophone signing W8FXX portable. Unlike many exhibit stations W8FXX really worked them! As a bit of a novelty W8FXX was rebroadcast through W8CYT on 14 mc. 'phone and several west coast stations were contacted as well as LA1G. 56-mc. work was not lacking and mobile contacts were maintained all over the grounds. In a building other than the one that housed W8FXX was a 7-mc. rig operating under call W8HWM BT 8. This was used in connection with the main exhibit to relay traffic and to act as an auxiliary should W8FXX break down. In addition to modern equipment the booth carried a display of equipment of 1913-1924 vintage. To show visitors what amateurs were

doing a large map, with strings running from various countries to QSL cards received by local amateurs, showed the numerous countries worked. A poster proclaimed the need of amateur radio in times of disaster. Foreign QSL cards from over seventy countries in all continents adorned the wall. Much good can be accomplished by amateur radio exhibits when they are properly conducted. They afford an opportunity for the general public to get a better understanding of what "ham radio" is all about. Well done, C.N.Y.R.A.

Providence Radio Association, Inc.

Two 80-foot steel towers formerly used by a broadcasting station are one incentive that led the Providence (R. I.) Radio Association to move its quarters! What club would pass up the



THESE MEN NEED NO INTRODUCTION

Left to right: Eddie Rickenbacker; Comdr. Frank M. Hawk; W1LJL, member Garden City (L. I.) Radio Club; Elliot Roosevelt.

opportunity to use two nice masts like that? A club transmitter is under construction, parts for which have been donated by members. The club conducts code classes two nights per week. A club bulletin is being considered, and the P.R.A. is anxious to receive sample copies of other club publications. The biggest news of the month from Providence is that the P.R.A.'s annual hamfest will be held Saturday, January 19, 1935. All amateurs are invited. An all-day session is scheduled with contests, technical discussions, dinner and prizes. Reservations for individuals or club groups can be arranged by writing directly to the Providence Radio Association, Inc., 3 Valley Street, Providence, R. I. W1GTN, W1ARK, W1BIT, W1BC and W1CAB are in charge of the hamfest.

(Continued on page 84)

Staging a 56-Mc. Hidden Transmitter Hunt

An Idea for Hamfests and Clubs

By John Hogen, W3BRX*

THE Amateur Radio Association of North Jersey conducted a hunt for a 56-mc. hidden transmitter in early August. While none of the contestants was actually successful in finding the hidden transmitter, the event aroused sufficient enthusiasm to warrant sponsorship of another hunt on a somewhat larger scale.

Accordingly, a second affair was staged in September. The preparatory work consisted of finding a location for the h.t. (hidden transmitter) which would not be too difficult to approach with a car and yet would be fairly well hidden. Such a location was found on the estate of Mr. E. J. Edwards, on a hill 600 feet high, south of Grand View Park near Paterson, N. J. Mr. Edwards kindly offered his premises for the event.

The committee next prepared envelopes containing the following advice and instruction:

INSTRUCTIONS FOR CONTESTANTS

56-Mc. Hidden Transmitter Hunt

1. Be sure gas tank is full.
2. Check water in radiator (hills!).
3. Light lunch is advised.
4. Hidden transmitter will start transmissions at 9:15 a.m. EDST, rain or shine, and will be off the air at 12:30 p.m. EDST. A 1000-cycle tone will be emitted between transmissions.



THE HIDDEN TRANSMITTER

Messrs. C. W. Van Duyn, W3AKT and C. H. Young, W3CZL—both of the Bell Telephone Labs.—obviously have an eye for comfort.

5. Proceed to your starting point given below and find token. Contestant must present token to be eligible for prize. Your token is on telegraph

* 40 Riveredge Rd., Mountain View, N. J.

or power company pole #MTC 42F located in Montville, beyond paper mill near end of macadam road.

6. A first and second prize will be offered.

7. At 1:00 p.m. EDST, please meet at D. L. & W. R. R. station at Lincoln Park, N. J., for discussion and "rasberries."



THE WINNING CREW

Charles Atwater, W2JN, is taking (or pretending to take) a bearing with the horizontal antenna.

The token referred to consisted of a card on which was written: "This is your token." This was secured to a power line pole at the contestant's starting point. Incidentally these power line poles are very conveniently numbered.

With favorable weather prevailing on the chosen morning, W3CZL, W3AKT, and W2GFZ—provided with lunch, camp chairs, etc.—made themselves comfortable at the h.t. site. At 8:30 a.m. a third member of the committee handed out the instructions to the contestants as they arrived at a point previously agreed upon, and instructed them to "get going" before opening the envelopes. This was to prevent comparing notes and thus perhaps gaining an idea of the general location of the h.t.

At 9:15 a.m. the transmitter was started up and, later announcements had been made, the 1000-cycle tone was put on the air with station announcements made every 15 minutes.

At 10:15 a.m., W2JN and his assistant, R. D. Compton, broke in upon peace and quiet of the h.t. site. They had used a rotating full-wave doublet to obtain bi-directional bearings and an inclined half-wave antenna to determine from

(Continued on page 92)

Practice vs. Theory in Antenna Performance

A Discussion of the Effect of Metal Masts on the Field Pattern

By Edward W. Sanders, W3AKU*

THE theoretical radiation patterns produced by vertical and horizontal transmitting antennas of the Hertzian type are familiar to most amateurs. The vertical type will radiate equally well in all directions in the horizontal plane, while the horizontal radiates most strongly in a direction at right angles to its axis. Fig. 1 illustrates the symmetrical pattern created by a vertical antenna; its omnidirectional characteristics are apparent. The pattern of a horizontal radiator also is shown in Fig. 1; it is evident that this type has a decided bi-directional effect, and that there is theoretically little or no radiation along the line of the axis of the antenna.

In the course of some experiments by the author with various types of antennas it was noticed that there was considerable disagreement between theory and practice in the operation of the horizontal system. While the antenna radiated strongly to the north and south, which was according to theory, there was almost as strong a radiation towards the east and west. If a recognized theory does not agree with practice the

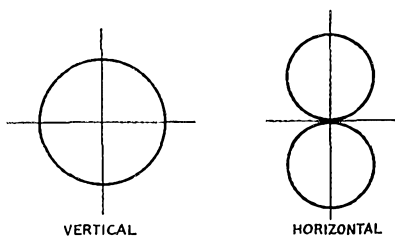


FIG. 1—THEORETICAL RADIATION PATTERNS OF VERTICAL AND HORIZONTAL HALF-WAVE HERTZIAN ANTENNAS IN FREE SPACE

The direction line or axis of the horizontal antenna is assumed to be from left to right.

fault is in many cases traceable to the observer's overlooking some important factor in the problem; such was the case here. In order to uncover the disturbing quantities let us examine the apparatus used.

EQUIPMENT

Since the transmitter itself could have no directional effect we shall skip over that part of the apparatus with just a pause to remark that it had an output of approximately fifty watts, crystal-controlled. The experiments all took place in the 14-mc. amateur band. The antenna was fed with

* 4029 Ormond St., Philadelphia, Pa.

a transmission line of negligible radiation characteristics. The flat-top was suspended by steel poles at a height of eighteen feet above a three-story building and was cut for one-half wavelength. There were no other antennas or metallic structures within a reasonable distance of the transmitting antenna. On looking over the installation it occurred to the author that the steel

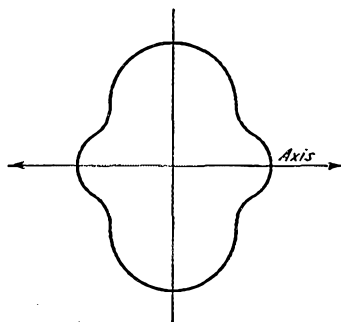


FIG. 2—ACTUAL FIELD PATTERN OF THE ANTENNA DESCRIBED IN THE TEXT, SHOWING DISTORTION CAUSED BY METAL POLES

poles might have some distorting effect on the field pattern. No data on this could be found in various textbooks, aside from the statement that the use of steel masts was observed to cause losses in certain instances. To check the possibility of such distortion, a detector and electronic voltmeter were set up to measure the field strength and plot a pattern. By making certain changes in the antenna system the resulting change in the field pattern could be noted and the results analyzed. A description of the experiments and the results obtained therefrom follow.

THE EXPERIMENTS

The pattern shown in Fig. 2 was obtained from the antenna already described above. It can be seen that in addition to the legitimate field of the antenna there is also strong radiation in the direction of the axis. Here was the explanation for the ease with which this particular system was able to work eastern and western stations. By placing the measuring apparatus on a line which was an extension of the axis and noting the effect of horizontal and vertical receiving antennas on the field detector, it was observed that the radiation was vertically polarized. Such being the case it was assumed that there was some radiation from

the transmitting supports. It was impossible for the wave radiated from the antenna itself to change its polarization in the short distance be-

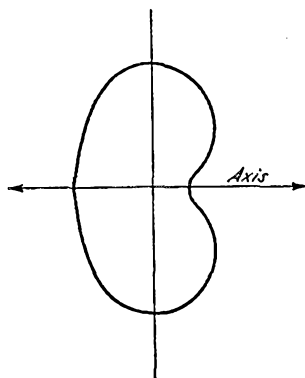


FIG. 3.—DISTORTION OF FIELD PATTERN RESULTING FROM USE OF A METAL POLE CLOSE TO ONE END OF THE ANTENNA

tween transmitter and field equipment. The supports used were ungrounded, but further tests with grounded masts made no startling difference in the results.

The metal poles were then replaced with wooden ones, and the field strength measurements repeated. In this test the easterly and westerly radiation dropped to a very low figure and a pattern very similar to the ideal shown in Fig. 1 was obtained. It was also observed that radiation to the north and south had increased somewhat in intensity.

Comparing the two sets of data thus secured, it was reasoned that if the metal poles could be moved out of the immediate field of the flat-top the radiation in the direction of the axis would be materially reduced. The necessary space to make this test in the same location not being available, a local transmitting antenna was pressed into service. The insulators at both ends of the flat-top were connected to the supports by ropes approximately 15 feet long. No figure was plotted for this experiment, but it was noted that the signal intensity in a portable receiver placed on an extension of the axis dropped from, in amateur parlance, R9 to R6.

As a further check on the mast effect, the pole on the western end (using the same antenna) was moved closer to the flat-top, and the pattern depicted in Fig. 3 was obtained.

Moving the pole on the eastern end in place of that on the western gave identical results, except that the "parasitic" field pointed in the opposite direction.

CONCLUSION

The experiments show rather conclusively that the field pattern of a horizontal transmitting antenna using metallic supports can be considerably

distorted by such supports, and quite possibly also, in some locations, by broadcast receiving antennas, power lines, buildings, etc., in proximity to the antenna. A survey of local transmitting antennas disclosed the fact that 8 percent of them were suspended from metal poles of various heights, and in no case was the distance between the end of the flat-top and the pole greater than 5 feet. Doubtless the field strength would be still more distorted as the pole approaches a half wave in length. The distortions shown in the figures probably would not be so pronounced at the lower frequencies, because of the greater ratio between the length of the radiator and the height of most masts in use at present.

Low-Power Screened Pentode Transmitting Tubes

JUST as we go to press come announcements from two manufacturers of a type of tube we've been wanting (and asking for) for quite some time—a small pentode having the same order of r.f. output as we ordinarily get from a 46, 59, etc., but with grid-plate shielding complete enough so that the tube can be used as an r.f. amplifier without neutralization. It is hardly necessary to add that the suppressor-grid connection is separate, thus making suppressor modulation possible.

Both RCA Radiotron and Raytheon Production Corp. are making the tubes. The development work apparently has been done independently, since the tubes brought out by the two organizations, although practically identical in output ratings, are of different construction and have different basing arrangements.

The Raytheon tubes will be known as the RK-23 and RK-25, the difference in the two numbers being solely in the heater ratings. The 23 has a 2.5-volt, 2.0-ampere heater, while the 25 heater is rated at 6.3 volts, 0.8 amp. Other ratings follow:

D.c. plate voltage	400 volts
D.c. screen voltage	200 volts
D.c. plate current	60 ma.
D.c. screen current	35 ma.
Plate dissipation	10 watts
Nominal r.f. output	10 watts

The direct interelectrode capacitances are

$$C_{gp} = 0.038 \mu\text{fd.}$$

$$C_{pk} = 10.0 \mu\text{fd.}$$

$$C_{pk} = 10.0 \mu\text{fd.}$$

The grid-plate capacity, incidentally, is lower than that of any other transmitting screen-grid tetrodes now available.

The RK-23 and RK-25 will have 6-prong ceramic bases, with the plate connection brought out to a cap on top of the tube. The additional

(Continued on page 78)

Highlights of the Convention Season

Midwest Division (Kansas City) Convention

STARTING promptly at 8 a.m. and winding up after the banquet the following evening, the Kansas City Convention proved of great interest to all. The first morning was taken up with examinations, hamfesting, exhibits and visits to local amateur supply houses.

At 2 p.m. on August 4th, with the temperature at 110°, the assemblage were officially welcomed by Col. Ruby D. Garrett of the Chamber of Commerce, who made all feel they were welcome in Kansas City. "Barney" Stanley, W9EJH, president of the Heart of America Radio Club, then took charge and introduced John Reinartz, WIQP. A talk was given by Mr. Kadell of the Raytheon Production Corp. on the RK-20 and RK-19.

"Grandpa" Kerr, W9GP, was then introduced to the gang. 'Phone and c.w. round tables followed with their discussions of modulation and traffic. After everyone had had his say, the lighting bureau of the Kansas City Power and Light Co. was visited. This led to a trip to KMBC on the edge of town, with Mr. Church providing the transportation. When everyone returned to the hotel the banquet on the first night was held with Everett Dillard, W9BKO, as toastmaster. Entertainment was provided by the KMBC staff. Elmo Melton, Guy Wilson and Barney Stanley gave short addresses. John Reinartz told about a bath he took in the ocean near the Arctic Circle. Commdr. Holton, representing the Naval Reserve, was introduced by Al Dodge, W9CFL. Keat Crockett, W9KG, represented the A.A.R.S. Radio Inspector MacDowell had a word for the gang, and Director Kerr invited us to the Convention at Lincoln. John Amis invited all to the Topeka Convention. John Reinartz wound up the evening with a demonstration of his home-made oscilloscope.

On Sunday morning Arthur Collins, W9CXX, opened the day's sessions with much dope on antenna tuning systems. The Army and Navy had their discussions and were followed with a paper sent by the E. F. Johnson Co. of Waseca, Minn., read by Jay Wilcox, W9CUN. Herb Hollister, W9DRD, talked on zero temperature coefficient crystals. Mr. Wheeler of the University of Kansas talked on the peculiarities of high-frequency transmission. John Reinartz followed with a talk on the variation of angle of radiation of an antenna from the operating table. Before the main banquet contests were held and the big prize drawing was transferred to the banquet hall.

Herb Hollister as master of ceremonies introduced those at the speakers table and won the

hearts of all by saying there were to be no speeches! SCM Cannady of Missouri could not be present to receive the Activity Cup. The climax came when W9JPA and W9GUB walked away with a Hammarlund Pro apiece.

—F. D. L.

Dakota Hamfest Big Success

PIERRE, South Dakota, was the scene of the annual hamfest. The Pierre Radio Club sponsored the hamfest and Scott Davison, W9OED was chairman. The program started at 9 a.m. on October 13th, and every minute was filled with some activity until the final banquet on the following evening.

Trips were made to KGFX for the OM's and the city and C.C.C. camps proved attractive to the YL's and YF's. An explanation and tour of the Dakota Central Telephone Company and their carrier system was headed by W9LBU. A code speed contest was won by W9OXC with W9SGI, W9IQZ and W9NM following in order.

The following day there was a demonstration of two-way 5-meter communication between ground and 'plane. Visits to ham shacks also proved popular. The banquet in the evening brought the program to a close.

—S. E. D., W9OED

Northwestern Division Convention

THE Northwest Division Convention held in Seattle at the Gowman Hotel, August 18th and 19th, was one that will long be remembered by those who were able to attend.

The evening preceding the convention the Amateur Radio Club of Seattle held an informal meeting where John Reinartz displayed and talked on pictures taken during his trip with Admiral Byrd to the Great Circle. A number of convention delegates that came early were in attendance.

The official convention opening started off with a welcome talk by a representative from the Mayor's office, followed by interesting addresses from A. A. Hebert, officers of the Thirteenth Naval Reserve, and the United States Signal Corps. Following this meeting a car caravan carried the delegates to Seattle's new Natatorium where swimming and diving contests took place with an enjoyable time for everyone.

The technical program featured interesting talks on "Radio Aids to Aviation," "National Park Service Portable Equipment," "Radio Problems in Alaska," "Impedance Antennas,"

and an exceptional talk and demonstration by John Reinartz. So interested were a number that he was detained for a considerable period following the adjournment of the meeting. The dance following was very colorful with wonderful music and professional entertainment.

On Sunday, August 19th, the usual traffic meeting and general meeting got under way where many important subjects were discussed. This meeting was followed by a special television show and demonstration which was the first of its kind ever shown in Seattle, and created considerable interest. Through the courtesy of the commander of the Naval Communication Reserve a cruise on the U.S.N.R. *Eagle Boat 57* to visit the big radio station at Keyport was one of the major features of the convention. During this cruise a five-meter 'phone test was conducted with an airplane circling overhead and with 5-meter equipment at Boeing Field. All stations carried on successful communication which proved to be of much interest to everyone. The delegates that made this trip had the pleasure of going through the Government Canal Locks on both the out and in voyage. Coffee and doughnuts were served.

A number of brief talks were made with Mr. Ralph J. Gibbons as toastmaster at the banquet. Stanley Belcveau was lauded for his splendid work as S.C.M., and Larry Sobring of Everett, Washington, was voted the most outstanding amateur in the Northwestern Division. It was through a small majority vote that Wenatchee lost the 1935 convention to Spokane.

—C. C. L.

Midwest Division Convention

HAM conventions, like Caesar's famous Gaul, must be considered in three parts: the program; the banquet, and the prize drawing! So, in presenting a post mortem of the Midwest Convention held at Lincoln, Nebr., August 31-September 1st, only the following three paragraphs will be necessary:

Program: When John Reinartz, W1QP, brings his \$4.00 cathode ray oscilloscope and his pet horned frogs, and Fred Schnell, W9UZ, sets up his automatic transmitter sending a "see-yourself-as-others-see-us" CQ, everybody is in for a good time. Let them talk antennas, transmitters, efficiency and such things, and fill in the rest of the days with talks on: crystal microphones by H. F. Gulliver; receivers by Guy Wilson, W9EL; 'phone round table by Herb Hollister, W9DRD; theory and use of cathode ray tubes by B. C. Burden, W9BOH; synchronizing WBBM and KFAB by Mark Bullack, W9BWH and the program stands out as a mark for future committees to shoot at. With Director "Gramp" Kerr and Fieldman Hebert looking after League affairs, the

Midwest Division presented a well-rounded program.

Banquet: Good home-style cooking featured the banquet held on Saturday night in the basement of the First Methodist Church. Toastmaster Kerr found it necessary to hurry along and, by timing the speeches with a watch instead of the usual calendar, kept the schedule well in hand. A. A. Hebert showed the headquarters' film and was asked to explain why the typewriters at Hq. move from left to right! (The film had been wound 180° out of phase.) The banquet concluded with—

Prize Drawing: One hundred and seventy-five banquetees deserted their places to descend to the prize table. Over 90 of them were successful in the drawing. The happiest man in Lincoln was Mr. Charles Pullem, Jr., of Hiawatha, Kans., who brought back to W9OQC the National FB7A, which was the grand prize.

—H. D. K., W9CWM

Louisiana Section Convention

STARTING on Sunday, September 1st, the Louisiana Convention got under way first thing in the morning and was very much of a success when it broke up the following night after the banquet.

Many interesting phases of amateur radio were discussed and demonstrated on the first evening. Contests were held much of the following day with trips made to points of interest. Worthwhile radio equipment had been donated by many manufacturers as prizes.

Mr. George Freeman, president of the Louisiana State Fair, was the guest of honor. He assured us that room would be had for a complete amateur station to be in operation during the Fair, October 20-28th inclusive.

New Orleans next year, fellows!

—W. J. W., W9DWW

The Central Division Convention

THE 1934 Central Division Convention was held at Columbus, Ohio, under the auspices of the Columbus Amateur Radio Association on September 7th, 8th, and 9th. J. M. Bays, W8BZY, who assumed the chairmanship of all meetings, had his hands full keeping to schedule. Starting off with John Reinartz, W1QP, the lectures proved most interesting, with other talks by Fred Schnell, W9UZ, and Al Kahn of the Electro-Voice Manufacturing Company. Harvey Brauer of the Power and Light Company took one through the trials and tribulations of locating "radio troubles," and Mr. Dwyer of Chicago explained the making of condensers.

(Continued on page 88)

Quartz Crystal Fundamentals

The Piezo-Electric Effect, Crystal Cuts, and Applications

By J. M. Wolfskill*

The use of quartz crystals has become so essential to the peak operation of present-day amateur transmitters and receivers that it seems to us that the time is ripe for collecting the widely-scattered information on crystals and presenting it in a form which will be helpful to amateurs. This article—which sets forth, as its title states, the fundamentals of piezo-electric crystal action—is the first of a series which will cover various phases of the subject. In the second article another author will describe practical methods of cutting and grinding crystals.

EDITOR

THE properties of quartz crystals which make them useful in many electrical circuits are due largely to the piezo-electric effect. If a piece of crystalline quartz is strained mechanically, it sets up an electric field in its neighborhood, inducing charges or electric potentials on conductors in that field. Hence the derivation of the term "piezo-electric," from the Greek expression "piezein," which means "to press." Conversely, when a crystal is placed in an electric field, a mechanical deformation takes place.

Quartz, however, is not the only crystalline material to exhibit these phenomena, nor is it the most "active." Rochelle salt crystals have a much more pronounced piezo-electric activity. Common cane sugar also has marked electrical properties. Other desirable properties of quartz, such as low internal friction, chemical stability, and hardness, in addition to its piezo-electric effect, make it the most used material. Tourmaline has marked piezo-electric properties and is used to some extent for oscillator control in the higher frequency range, the highest frequency obtainable being twice that of quartz. Because of its scarcity and consequent high price, however, its use is not nearly so extensive as that of quartz.

The chemical properties of quartz are such as to make it ideal for permanency. Its hardness prevents wear and scratching in holding or clamping devices, with consequent change of the response frequency. Oxidation cannot take place, since it is already silicon dioxide (SiO_2). Hydrofluoric acid is about the only chemical substance that will affect it to any extent; this fact is made use of, as will be discussed later, to detect twinning in crystals. The occurrence of clear quartz crystals among rocks that are disintegrating with age is a guarantee of the permanence of this material.

The use of mechanical vibrating systems in frequency generation is not new. The classical example is, of course, the clock pendulum; the clock is a frequency generator whether it delivers

electrical impulses or not. Tuning forks, driven by vacuum tubes, often have been used as frequency standards. With these mechanical vibrators some means must be provided for coupling between the mechanical and electrical vibrating systems. This is usually accomplished magnetically, but for frequencies above the audible range hysteresis and eddy current losses tend to defeat the very purpose of the mechanical system. It was not until Professor Cady of Wesleyan University pointed out that the piezo-electric effect in crystals could be used to furnish this coupling mechanism that mechanical vibrators were used at the higher frequencies.¹ A quartz plate is truly a mechanical vibrator, and the same modes of vibration occur in it as in other mechanical systems.

MODES OF VIBRATION

Vibration may occur in four different modes: longitudinal, transverse, flexural, and torsional.

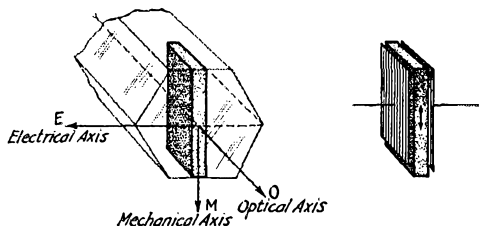


FIG. 1—THE PARALLEL OR Y-CUT

Showing method of cutting to obtain thickness vibration

These are defined in the following paragraphs.

Longitudinal: This mode applies to rods or to more extended masses in which the motion of the vibrating particles is parallel to the direction of propagation of the wave, that is, normal to the wave front.

Transverse: The vibrating particles move in a direction parallel to the wave front, and normal to

*Sheridan, Pa. Formerly with Bell Telephone Laboratories.

¹W. G. Cady, "The Piezo-Electric Resonator," *Proc. I.R.E.*, April, 1922.—EDITOR.

the direction of propagation. This type of vibration occurs in vibrating strings, membranes, and thin plates. In crystals these vibrations may occur when the direction of the electric field is

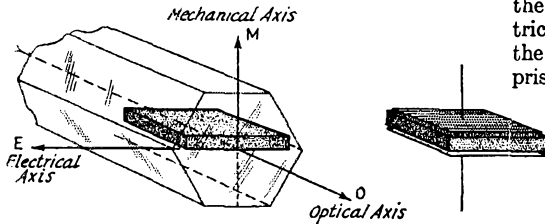


FIG. 2—THE CURIE, PERPENDICULAR OR X CUT
For low frequencies the vibration is in the direction shown by the arrow. A thickness vibration is used for high-frequency work.

such that the field produces a shearing stress about some axis.

Flexural: These occur in elongated plates or bars, and are frequently called "transverse" or "lateral." To distinguish them, however, they are associated with a bending of the specimen in a certain plane.

Torsional: In this mode a relative angular displacement about the axis of the figure takes place; as in a cylinder or prism between adjacent cross sections.

The two principal modes employed are longitudinal and transverse; a crystal may vibrate in any of the above mentioned modes, however. The elimination of the unwanted modes and the selection of a particular mode of vibration has required considerable study. A crystal plate constitutes an extremely complex vibrating system, having a large number of degrees of freedom. The general relation between stress and strain, which in an ordinary isotropic medium involves only two constants, in quartz requires six.² The choice of a particular constant or constants that enter into a given mode of vibration depends upon the orientation of the quartz plate with respect to the original crystal axes, and the particular type of vibration employed. To secure uniformity and to make a particular mode the principal mode of vibration, it was necessary to set up criteria for cutting the plates with respect to their principal axes, the object being to make them vibrate in a definite mode having determinable characteristics.

² Love's "Mathematical Theory of Elasticity," Ch. 6.

AXES AND METHODS OF CUTTING

The method of cutting a crystal depends upon the purpose for which it is to be used. In describing a particular cut, reference must be made to the three principal axes of the crystal; the electrical, mechanical, and optical. The optic axis is the axis of symmetry of the hexagonal quartz prism, so called because of the unique optical effects obtained in this direction. The electrical is parallel to opposite faces of the prism and perpendicular to the optic axis. The mechanical axis is also perpendicular to the optic axis, but is perpendicular instead of parallel to opposite faces of the prism. These axes and methods of cutting are shown in Figs. 1 and 2.

Quartz crystal vibrators can be constructed for any frequency from a few kilocycles to ten megacycles, but the ordinary useful commercial limits are from forty kilocycles to seven megacycles. Crystals for the broadcast and high-frequency range are principally obtainable from slabs cut parallel to one of the six natural faces of the crystal.³ Resonators of the desired shape, either round or square as is most convenient for

cutting and mounting, are then cut from these slabs; see Fig. 1. For this method of cutting the most important dimension, from the standpoint of frequency, is the thickness along the mechanical axis, as the principal response depends on this dimension. The frequency may be determined by dividing

the constant 1,960,000 by the thickness in millimeters.⁴

$$F = \frac{1.96 \times 10^6}{M \text{ in mm.}}$$

M = thickness of mechanical axis
 F = frequency in cycles.

Conversely the thickness of a crystal to resonate at a specified frequency may be computed from the above. The other dimensions determine mainly the amount of energy the crystal can safely handle. This constant applies to crystals mounted between pairs of parallel plate conductors, often, though not necessarily, in contact with the crystal. The principal mode of vibration is transverse.

³ General practice in amateur work has been to use perpendicular or X-cut crystals. See footnote 5.—EDITOR.

⁴ F. R. Lack, "Observations on Modes of Vibration and Temperature Coefficient of Quartz Crystal Plates," *Proc. I.R.E.*, July, 1929.

Crystals for operating at the relatively lower frequencies are cut so that the long dimension is parallel to the mechanical axis, that is, perpendicular to the electrical and optic axes (X cut). The electric field is applied by electrodes which are in the plane of the mechanical and optic axes as indicated in Fig. 2. In order to obtain one major response frequency and eliminate parasitic frequencies, it is necessary to make the dimension along the mechanical axis twice or greater than twice the dimension along the optic axis. A crystal cut in this manner represents a bar or rod, employing longitudinal vibration, the response frequency of which is determined by dividing the constant 2,860,000 by the length (mechanical axis) in millimeters.⁵

$$F = \frac{2.86 \times 10^6}{M \text{ in } mm.}$$

Where M is equal to or greater than twice the optic axis. This constant is for a crystal held between parallel plates. Recent practice has been to eliminate the series capacity caused by the parallel plates by using closely adhering electrodes, such as platinum sputtered on the crystal surfaces. In this case another constant applies:

$$F = \frac{2.72 \times 10^6}{M \text{ in } mm.}$$

EQUIVALENT NETWORK

Equations and constants have been derived by which the values of the equivalent electrical network of the crystal may be obtained from its dimensions; conversely, if a crystal is to replace a given network of electrical elements the dimensions of the crystal required may be determined. These equations will be given later. The equivalent electrical network and the reactance-frequency characteristic of a quartz crystal are shown in Figs. 3 and 4 respectively. The equivalent network is for a crystal with plates in intimate contact with the quartz, as with platinum-sputtered surfaces. For electrodes with an air gap between the plates and the crystal, an additional capacity must be added in series with the network shown.

With the methods just described it is difficult to obtain really low frequencies, since a rod giving a frequency of 1000 cycles is impracticable because it is impossible to obtain large enough crystals to make such a cut. A crystal frequency of 25,000 cycles is about as low as can be produced by the above methods.

⁵ Two modes of vibration, one for a low frequency and the other for a high frequency, may be employed with either X- or Y-cut plates. Although the Y-cut plates are more "active" and oscillate more readily at the high frequencies, the fact that Y-cut plates usually show two frequencies at few kilocycles apart, and have a tendency to "jump" from one frequency to the other in oscillator circuits, has caused most amateurs to prefer the somewhat less active but more stable X cut. The formula given above applies equally well for the high frequency of X-cut plates if the thickness of the plate is substituted for the length along the mechanical axis.—
ERRATA.

Methods of obtaining much lower frequencies have been devised in which flexural or bending vibration is employed. This is done by having the electrodes cover the entire length of the crystal, but only half of the width (cut as in Fig. 2).

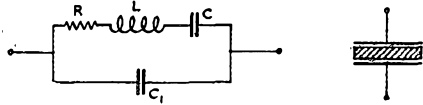


FIG. 3—EQUIVALENT CIRCUIT OF THE QUARTZ CRYSTAL IN TERMS OF ELECTRICAL CONSTANTS

This circuit assumes intimate contact between the plates and the crystal such as would be obtained by sputtered platinum or silvered surfaces. For crystals mounted in an air-gap holder an additional small capacity should be placed in series with the circuit shown.

One side of the crystal is shortened and lengthened alternately, resulting in flexural vibration in the plane of the mechanical and optic axes. Another method is to cut the crystal in the shape of a tuning fork, and employ flexural vibration by applying the electrodes to half of the width of the fork. Frequencies as low as 1000 cycles per second have been obtained by this method. Application of crystals to the audible frequency range has not been very satisfactory up to the present, however, and will not be given further consideration here.

EQUATIONS FOR COMPUTING ELEMENT VALUES

Considering now only the two most used methods of cutting, namely the perpendicular or X-cut and the parallel or Y-cut; let us examine first the process by which the plate is set in vibration. When a potential is applied to the electrodes, the crystal plate, by reason of its piezoelectric effect, expands in the direction of the mechanical axis and contracts along the direction of the electrical axis. Along the third or optic axis there is no motion. When the potential is removed, the crystal contracts and develops a voltage of opposite sign on the electrodes. For a steady potential the magnitude of this effect is small—of the order of 6×10^{-7} centimeters for a potential of 3000 volts. But when an alternating potential having a frequency corresponding to one of the mechanical vibration frequencies of the plate is applied, the phenomenon of resonance builds up the amplitude of vibration to a level at which the forces are quite large—sometimes great enough to shatter the crystal.

The elements L , R , and C (Fig. 3) represent the electrical equivalent of the mechanical vibrating system. C_1 is the capacity of the plate itself—of a condenser with the quartz plate as the dielectric. (K for quartz = 4.55.) The inductance, which corresponds to the mass, may be of the order of $\frac{1}{2}$ henry to several hundred, depending on the size and frequency. C is the capacity required to resonate with this inductance at the given frequency; and R is the resistance of the

inductance L . The ratio of the inductive reactance to resistance is very high, representing a circuit with low damping—much lower than can be obtained by electrical elements. Outside the region of resonance, the crystal acts as a simple capacity. The values of these quantities in terms of their dimensions, for the parallel-cut high frequency crystals, are given in henrys and farads by the equations:⁶

$$L = \frac{118 E^3}{M O}$$

$$C = .289 \times 10^{-14} M O/E$$

$$C_1 = .405 \times 10^{-12} M O/E$$

where M , O , and E are the dimensions in centimeters along the mechanical, optic and electric

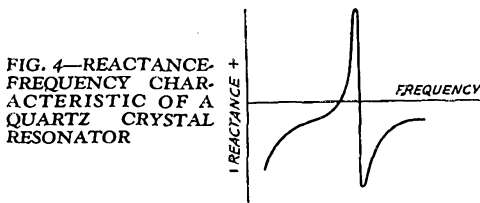


FIG. 4—REACTANCE-FREQUENCY CHARACTERISTIC OF A QUARTZ CRYSTAL RESONATOR

axes respectively. R must generally be determined experimentally, since it varies with different holders.

In the case of X or perpendicular cut crystals used for the low frequencies the equations become:

$$L = \frac{118 M E}{O}$$

$$C = .289 \times 10^{-14} \frac{M O}{E}$$

$$C_1 = .405 \times 10^{-12} \frac{M O}{E}$$

$$F = \frac{2.72 \times 10^5}{M} = \frac{1}{2\pi\sqrt{LC}}$$

It will be noted that in both these cases the ratio of C_1 to C is in the order of 140 to 1. This is an inherent quality of the quartz and cannot easily be lowered, but may be raised any time by applying a condenser in shunt with the crystal. This ratio and the equations given above apply to crystals with closely adhering electrodes, such as sputtered platinum.

Equations for determining the dimensions of a crystal in terms of its equivalent electrical elements may be obtained by solving the above as simultaneous equations.

TEMPERATURE EFFECTS

A change in temperature affects a quartz crystal in the same way that it affects any other

⁶ P. Vigoreux, *Phil. Mag.*, December 1928, pages 1140-1153.

mechanical object; that is, there is a temporary change in the dimensions. Because the three principal axes have different coefficients the temperature effect in a quartz crystal is very complex. For the parallel or Y -cut plates the temperature coefficient varies with the shape and size of the crystal, having a wide range of values

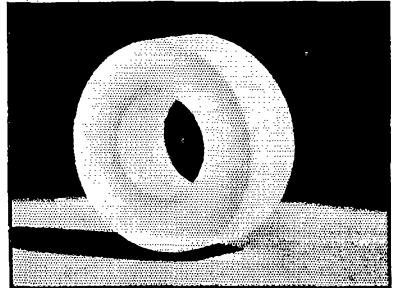


FIG. 5—SPECIAL TYPE OF LOW-FREQUENCY CRYSTAL HAVING ZERO TEMPERATURE COEFFICIENT

whose limits are approximately plus 100 cycles in a million per degree centigrade and minus 20 cycles/million/degree, with all possible intermediate values, including zero. This peculiar phenomenon indicates that a crystal might be so cut as to have a negligible temperature coefficient. Fig. 5 shows a crystal cup in the shape of a "life saver" which has a zero temperature coefficient over a small temperature range. The ring is cut in the plane of the optic and electric axes, with the difference between the radii equal to the thickness.⁷

For the perpendicular or X -cut plates the temperature coefficient varies but little with the size of the crystal; this coefficient lies between minus 15 to minus 25 cycles in a million per degree Centigrade. The small variation is due to different qualities of quartz and the accuracy in cutting, particularly with regard to following the axes within close limits.

USES OF QUARTZ CRYSTALS

The chief application of quartz resonators up to the present has been for the measurement and control of frequency. Efficient distribution of frequency channels among various radio services and the strict adherence to specified frequencies would be practically impossible without this stable, efficient vibrating system.

(Continued on page 82)

⁷ This is not to be confused with the new Bell Labs "AT" cut mentioned in October *QST*, page 17. The annular crystal, also a product of Bell Telephone Laboratories, attains a zero temperature coefficient because its dimensions are proportioned so that the positive and negative temperature coefficients of different modes of vibration of a "Y" cut crystal are made to compensate for each other. It is suitable only for the lower frequencies. Zero temperature coefficient with "AT" cut plates is obtained by choosing a critical angle which lies between the true X and Y cuts.—EDITOR.

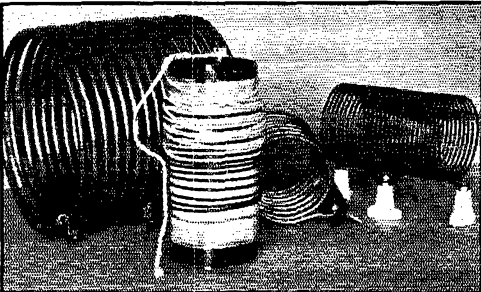
Low-Loss Low-Cost Transmitting Coils

A Simple Method of Winding Self-Supporting Coils of Wire or Tubing

By A. D. Muldoon, W1FRQ*

“ONCE upon a time” is the way the fairy tales that delighted our childhood began. We use the phrase at the very outset, however, to prevent a trend of thought that might possibly brand us as “copy cats.”

A few years ago it was possible to purchase, by the inch or foot, a very substantial winding of “low-loss” coil from which the user could cut as many turns as he needed for a specific purpose. Very little of this material is seen these days, and the particular type referred to probably would not suffice in the position of plate tank coil in a moderate or high-power rig. Nevertheless, it was this self-same type of coil that we wished to duplicate, except for size and spacing. One of our old-time friends, W8IH, supplied the idea for the present method of winding when we saw him stiffen a coil on which the turns wanted to flop together instead of staying nicely spaced.



THE WOODEN MANDREL SHOWN ABOVE IS CONVENIENT IF MANY COILS ARE TO BE WOUND

A copper tubing coil just as it comes off the winding form is shown at the left; the coil at the right has been “trimmed” and mounted.

About that time we needed a few coils and had only one piece of bakelite tubing for a form. Since necessity is said to be the mother of invention, we proceeded to experiment and develop a means of providing a substantial low-loss coil that would stand ordinary usage and have neat appearance without the losses incurred through the use of bakelite or formica forms or their various substitutes. The explanation of the procedure is far more complicated than the job itself, and we can assure you that if you wade through these instructions the task of winding coils will prove simple by comparison.

*4 Allen Place, Longmeadow, Mass.

COIL SIZES AND WINDING FORMS

In a discussion on winding coils it is appropriate enough to say something about coil dimensions. In some cases, for instance, it is desirable that the coil have a rather extensive external field so it can be easily coupled in inductively-coupled circuits. This calls for a fairly large diameter in coils having considerable inductance, such as would be used on the lower frequencies. A suitable 160-meter power amplifier plate coil designed to tune with a 100- μ fd. condenser, for example, would be 4 inches in diameter and have about 40 turns of No. 12 wire.

Coils intended for capacity-coupled or link-coupled circuits, on the other hand, will usually have lower losses if the external field is minimized as much as possible. In such cases a small diameter is preferable. All of which brings us to the conclusion that 2-, 2½- and 3-inch diameter coils probably will suit most purposes.

The author's coils are wound on forms which are removed after the coil is finished, the turns being supported “on air” by strips of celluloid. The winding form may be of ordinary bakelite tubing or wood, the latter being more satisfactory if a great many coils are to be made. One form will suffice for all coils of that particular diameter.

The wooden mandrels should be turned out of maple or other hard wood. A square piece slightly larger than the desired diameter is used. Before it is turned to size, it should be sawed diagonally into two wedge-shaped pieces. Clamp these together and turn them down to size on the lathe. This procedure eliminates the necessity for a shim to make up for the saw cut if the piece is turned first and then cut diagonally afterwards. Round-head wood screws through the thin ends of the pieces hold them together. A length of 8 inches is satisfactory since it is rarely necessary to wind coils that long. If tubing is used, 8 inches is likewise a good length.

Variety stores carry in their household wares departments two sizes of wooden rolling pins that are “the berries,” both for size and cost. These can be cut diagonally in a mitre box.

The materials needed, in addition to the forms, consist of a sheet of celluloid side curtain repair material (from any auto accessory store), some waxed paper, a tube of Duco Household Cement, and of course the wire or copper tubing for the coil.

WINDING THE COILS

First cut four strips of celluloid, $\frac{1}{2}$ -inch wide and 2 inches longer than the finished coil is to be. Wrap *two* layers of waxed paper on the form, and then one layer of ordinary tablet paper or newspaper over the waxed paper, holding all in place with a tight rubber band at each end. Now slide the celluloid strips under the rubber bands and space them at equal points around the form so that there are four longitudinal "braces."

Run a 6/32 bolt through the form (a $\frac{1}{2}$ -inch No. 5 round-head wood screw in the wooden mandrel) at points equal to the intended length of the coil. The 6/32 should be held in place with a nut. Next, secure one end of the wire to one of the bolts or screws and wind on about half the total number of turns close wound, then space out the balance to reach the other bolt or screw at the opposite end. Cut off the wire and secure this end by means of another nut (or by turning down the screw into the wooden form).

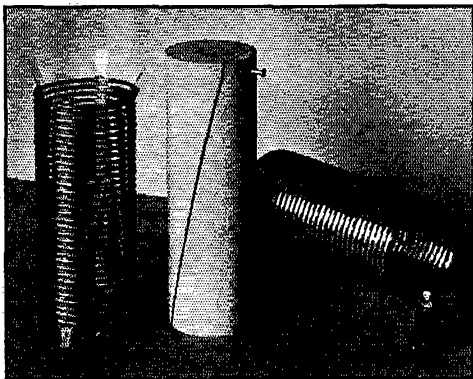
Spacing is the next job. This is done by winding a length of chalk line or heavy twine between the turns, starting at the close-wound end. Forcing the twine or cord between the close-wound turns pushes them apart and will close up the wider spacing at the opposite end. Ordinary chalk line will give about 8 turns per inch with No. 12 enameled copper wire, and it naturally follows that if fewer turns per inch are wanted heavier twine or cord must be used. If this method of spacing the turns produces some slack in the last few turns—and it invariably does—take the coil in one hand and hold a fair tension on the winding, then with the other hand turn the form so that the coil acts as a screw working through a thread. This will take out some more slack and a new turn taken around the terminal bolt will hold it tight. When the wire is wound as tightly as possible the spacing cord can be unwound without having the turns of wire slip back together.

The next step is to apply a line of cement from one end of the coil to the other directly over the celluloid. With a toothpick or thin match, press the cement down between the turns so the cement flows out over a good portion of the width of the strip. Another layer of cement can be put on immediately and the same toothpick or match used as a trowel to smooth the cement off and cover the first application. Care should be taken not to apply so much cement that it runs off the strip onto the paper. After all four strips have been treated a third and finishing coat of cement is put on in just the same way as the second coat.

Allow the coil to dry over night, or at least eight hours, before attempting to remove the form. This much time is required for the cement to soften the celluloid, shrink it up between the turns and become sufficiently hard to stand "on its own."

To remove the coil from the wooden forms the

screws should *all* be taken out; then, with a firm grip on the coil, a slight tap or two on the thin end of one half of the form will loosen it and it can be pulled out from the other end with no effort at all. The bakelite form is not quite as easy to



DURING THE WINDING PROCESS

This photograph shows the celluloid strips and paper wrappings on a bakelite winding form. Part of the winding has been spaced out with heavy cord.

Several coils made by the method suggested also are shown. The big fellow is six inches in diameter, has sixteen turns of quarter-inch copper tubing, and is as rigid as though it were braced with the old-fashioned longitudinal clamps.

remove, but it can be done by holding the coil in one hand and pulling the form out with a pair of pliers. The *two* layers of waxed paper facilitate removal.

The ends of the strips are easily trimmed off with a knife or scissors. The methods of mounting, several of which are suggested in the photographs, are left to the constructor's preferences.

For 1- or $1\frac{1}{2}$ -inch diameters a full-sized piece of celluloid can be used as suggested on page 10 of March *QST*, but the waxed paper idea still holds good when it comes to removing the winding form.

Everything from No. 14 enameled wire up to and including $\frac{1}{4}$ -inch copper tubing can be used, on diameters up to 6 inches, with this method. The builder can feel certain of obtaining a rigid coil with a minimum of "losser" matter, as well as a commercial-looking job that will do justice to the appearance of the rig.

Strays

Please!

Every magazine publisher finds the change-of-address problem a difficult one. By necessity wrappers are prepared well in advance of actual date of mailing of each issue. Prompt advice of your new address, giving your old one at the same time, will be appreciated. Thank you!

for the EXPERIMENTER



Antenna Pruning for Efficiency

In connection with recent notes in the Experimenters' Section on end-fed antennas, James A. O'Neil, W6GIS, has some good suggestions on the business of getting the proper antenna length. His letter is quoted below:

"I read with interest the articles by W1TX and W6QF on the end-fed antenna because several of us in San Francisco are using it to our satisfaction. But why the necessity for making field tests for the correct length, since it means additional apparatus and outdoor measurements? The method we use is to cut the antenna over-long and

presents no problem because a strong tug restores the needed inches.

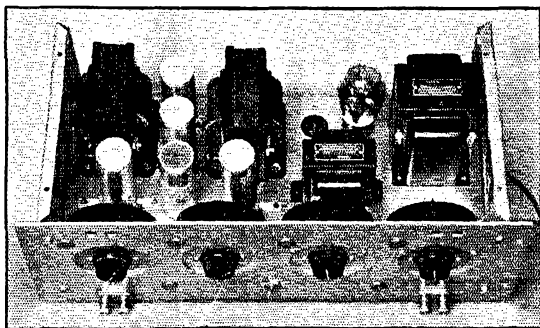
"The foregoing, of course, only applies to transmitters which are not self-excited. Adjustment of such may be achieved without much more trouble. The receiver, monitor, frequency meter, or what have you, should be set to the portion of the band where operation is desired and the transmitter tuned to zero beat with the antenna disconnected. Tapping on the over-long antenna will drive the transmitter off the selected frequency and necessitate retuning of the transmitter and checking device for zero beat. Cut and again cut till the transmitter frequency remains constant unloaded or loaded.

"In either case the antenna resonant frequency perfectly corresponds to that of the transmitter and the radiating system acts as a resistor load. A good match can be expected over the whole band, usually better than the average hit and miss installation.

"Clipping onto the plate coil for coupling is the ultimate in simplicity, particularly if a split-stator is used for harmonic suppression, but unfortunately is not lawful. The next best thing is the antenna filter described by Collins, which also discriminates against harmonics, and furthermore gives a perfect match on any part of any band if frequency shift is desirable.

"Surely some one will say: why cut to the inch, when copper will stretch a foot or more under strain and any difference can be compensated for in the coupler? The first answer is copper-weld cut to the frequency most in use, or else a periodic trimming of the wire. Secondly the antenna filter is fine and dandy for moving hither and yon, but, for the main frequency, it is my personal opinion that the antenna should be a straight stretch of wire without a loading device. Particularly so when low power is used and every watt is wanted where it belongs.

"The preceding remarks apply mainly to the end-fed antenna since it enters directly into the shack. It is advisable to place the set as close as possible to the entrance for obvious reasons, which brings up the question of loss of height and absorption. Theoretically, they both tend to lower radiation efficiency. But actual results—and after all that is what the majority strive for, whether



A POWER SUPPLY FOR EXPERIMENTAL WORK

Currents up to 200 ma. at any voltage up to 400, can be obtained. Voltages are readily adjustable through heavy duty potentiometers.

then clip to the final tank circuit, which of course is tuned to resonance, selecting a point where plate current is near the desired amount. It then becomes necessary to retune the final to lesser capacity for minimum plate current.

"Disconnecting the antenna, six inches or a foot is cut off, the final returned to resonance, and the antenna put back on. The change in capacity for the low point in plate current will be less. This process is repeated several times until a length of wire is obtained which requires no retuning of the plate circuit; resonance has then been obtained. It is quite an accurate indication of exact length because as the antenna resonant frequency is approached the pruning must be done in inches. Should too much be removed, the plate tank again requires retuning, the capacity now being increased. With ordinary No. 12 copper this

by orthodox means or not—proved the end-fed superior to a Zepp and single-wire feed system in the same direction at a greater height. Better transfer of energy from the transmitter to the antenna proper helps account for it, and in addition, the usual end-fed has one end considerably lower than the other with resultant directivity off the low end which is absent in the horizontal type.

“To sum up—

“1. The end-fed is the essence of simplicity, requiring no feeder arrangement.

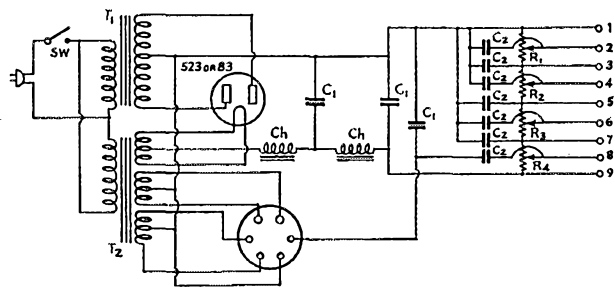


FIG. 1—CIRCUIT DIAGRAM OF THE UNIVERSAL POWER SUPPLY

- T_1 —400-v. 250-ma. plate transformer (Thordarson T-5303 or equivalent).
 T_2 —Combination filament transformer to meet circuit needs; in this case, 5 v. 3 a., 2.5 v. 10 a., and 2.5 v. 3.5 a
 Ch —15-henry 250-ma. chokes.
 C_1 —16- μ fd. 500-v. electrolytic condensers.
 C_2 —3-section 4- μ fd. 500-v. electrolytic condensers.
 R_1 —4500-ohm 150-watt potentiometer (Ohmite 0547 or equivalent).
 R_2, R_3 —10,000-ohm 150-watt potentiometer (Ohmite 0549 or equivalent).
 R_4 —2250-ohm 150-watt potentiometer (Ohmite 0545 or equivalent).

“2. The correct length is easily obtained using only the plate meter.

“3. There is no need to worry whether the power entering the feeder or feeders is being transferred efficiently.

“As a specific instance, an ordinary Zepp caused a 203-A to color slightly at 200 watts input while an end-fed allowed the same tube to be run cold at 350 watts.

“In conclusion, no matter what type of antenna or feed is used the results obtained from careful adjustment are well worth the trouble, since, as K. B. Warner pointed out, the antenna is the weak link in the set-up.”

Universal Power Supply for Experimental Work

When doing experimental work, it seems inevitable that one never has at hand the facilities one needs. Particularly is this true in the case of power supply equipment, especially when working with receivers, audio amplifiers, and the like. In an attempt to cleave through this difficulty with one stroke I built a universal power supply which provides me with any voltage up to 400 on eight different terminals, with a maximum current drain of 235 ma. The maximum current drain was arrived at by subtracting the bleeder current

(15 ma.) from the total capabilities of the unit, 250 ma.

Four husky potentiometers provide as many variable voltages; their interconnections provide the same number of semi-fixed voltages. Variable voltages are thus available for every circuit element. To illustrate: by connecting terminal 1 (Fig. 1) to grid, 2 or 4 to cathode, variable grid bias of the “fixed” variety is obtainable. Plate, screen, and cathode grids can then be connected to any suitable one of the higher-voltage taps, also readily variable. Units requiring different plate or cathode voltages are easily accommodated. In fact, there is no requirement short of a 400-volt total potential difference that can’t be met. Every terminal is heavily by-passed, both for filtering and to eliminate inter-coupling.

A 6-prong socket is provided for filament and variable plate voltages to facilitate use of a separate beat frequency oscillator and signal generator unit in connection with experimental work. A separate 16- μ fd. condenser provides added filtering for this unit. The current reserve is ample to accommodate an ordinary receiver on test as well.

Construction is simplified by use of the General Radio punched panel, and chassis and end plate assembly.

No dust cover is used because it would impair heat radiation—at times there is as much as 100 watts to be radiated.

Using the constants given, the hum is negligible, being less than one-half volt at the high-voltage terminal, with an even lower percentage on the lower terminals.

—Clinton B. De Soto, W1C8D

Making Inductance Clips

It is hard to do a neat job of making small clips to go on tubing, etc., with a pair of pliers. This kink may help.

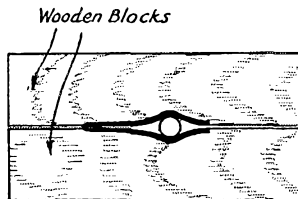


FIG. 2—SPRING CLIPS FOR TRANSMITTING INDUCTANCES CAN BE FORMED READILY WITH THE HELP OF A PAIR OF WOOD BLOCKS AND A VISE

A strip of phosphor bronze or other suitable material of the proper width is bent in the middle

to form the two sides of the clip. A nail or rod of approximately the same diameter as the tubing on which the clip is to work is then inserted between the blades at the point where the bends should occur. The whole is then put in the vise between two small blocks of very hard wood, the nail carefully set at right angles to the length of the material, and the vise screwed home. Fast and neat—and the two halves come opposite each other! The outer lips are then bent back slightly with pliers. A small through bolt may be put about mid-way the length of the clip if necessary.

—K. B. Warner, W1EH

Power Supply Delay Switch

Many amateurs who do not have expensive equipment find two switches necessary for getting the rectifiers and the transmitter on the air. A slight alteration to a d.p.s.t. knife switch, as shown in Fig. 3, affords a simple and convenient way of providing a few seconds time delay for the

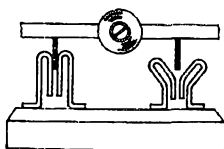


FIG. 3—WITH ONE JAW OF THE POWER SWITCH BENT AS SHOWN, AND WITH THE CONNECTIONS DESCRIBED IN THE TEXT, THE FILAMENT POWER IS CERTAIN TO GO ON BEFORE THE PRIMARY CIRCUIT OF THE PLATE TRANSFORMER IS CLOSED

mercury tube filaments to heat, yet only one switch is required.

The filaments of the rectifier and transmitter tubes are controlled by the side making contact first, while the primary of the plate transformer is closed by the second contact. This combines all of the advantages of two separate switches, yet is simpler to operate.

—L. D. Miles, W2GGB

Bias Power Packs and Blocked-Grid Keying

In connection with "Biasing the Power Amplifier," page 33, March 1934 *QST*, a few changes will transform this circuit into a very good arrangement for blocked-grid keying. The key is placed in series with the ground side of the voltage divider at position (X) as shown in Fig. 4, and the only current keyed is the bleeder current, which is small. This makes it very simple to eliminate key clicks; in fact, this is the only circuit of about a dozen tried here that eliminated

thumps completely, even without a thump filter across the key.

The pack must deliver enough voltage effectively to block the grid when the key is up. The voltage necessary will be dependent upon the type tube being used. A 400-volt pack here effectively blocks the grid of a 203-A tube with 1150 volts on the plate. With the key up the full eliminator voltage is applied to the grid plus the automatic bias through the upper part of the divider (R_2). The values of R_1 and R_2 should be as

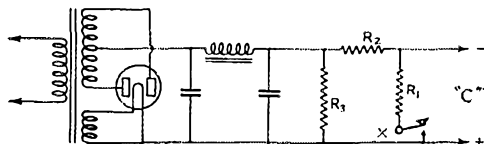


FIG. 4—WHEN A BIAS POWER PACK IS USED, THE KEY MAY BE INSERTED AT "X" FOR BLOCKED-GRID KEYING

The total output voltage of the power pack should be great enough to block off the tube used under the excitation conditions.

advocated in the above-mentioned article. R_2 is a 2-watt carbon resistor of 100,000 ohms, used to put a small load on the pack even though the key is open.

—Robert E. Foltz, W9GBT

"Shockless" Meter Jacks

Some of the "brethren," who want to live as long as possible, may be interested in the following:

When using a single plate meter and single grid meter to service two or more stages in a transmitter, it is usual to connect the frames of one set of jacks to positive of plate supply and the frames of the other set to negative, which makes the front of the panel a very bad place for hands. The

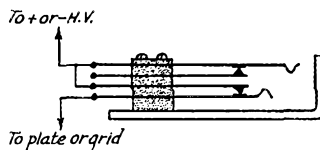


FIG. 5—THE FRAMES OF UNUSED METER JACKS ARE "COLD" WHEN THIS CIRCUIT IS USED

writer uses the four-spring, double-circuit type jack wired as shown in Fig. 5.

The frame of this jack is "cold" except when the plug is inserted.

—Neil E. Henry, W3BRY

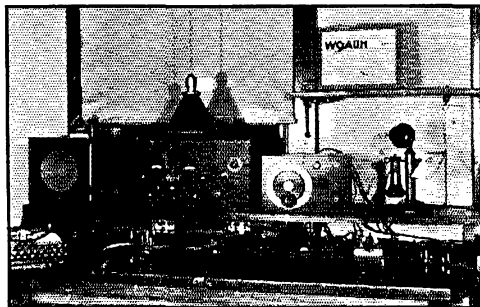


Amateur Radio STATIONS



W9AUH, Louisville, Ky.

IN ANY sporting activity there's always one team or man you've got to beat if you want to get to the top of the heap. In Communications Department contest activities that man is G. W. Mossbarger, W9AUH, who has acquired for himself the title of "ORS Party QSO King" because



THE RECEIVING TABLE AT W9AUH IS LAID OUT FOR OPERATING CONVENIENCE

Receiver, frequency meter, loudspeaker and telephone are on a shelf just high enough above the table to put the control knobs within easy reach while leaving practically all the table space free for keys, control switches and writing materials.

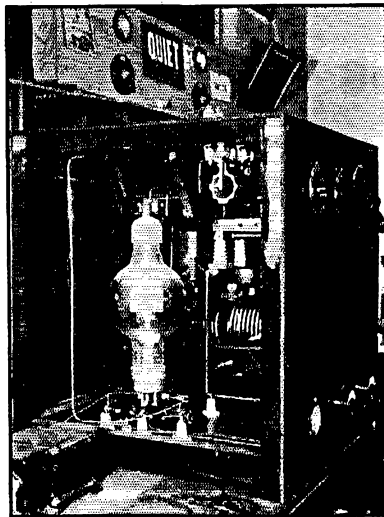
he's won so many of the QSO parties that it's become a habit. In the twelve parties held up to this writing W9AUH has been the high scorer of eight of them—and that's something of a record. It's his ambition to work every A.R.R.L. section in one of the parties, and at the rate he's going it looks to be only a matter of time—in the April QSO party he worked 139 O.R.S. in 48 of the 69 sections. That's knocking them off at quite a rate, considering that only ORS count in the results and that the contest period covers only a little over a day!

"Moss" also is a heavy competitor in the Sweepstakes, having been the highest scorer for the country in the 1933 contest, gathering 62,622 points while working 63 sections, and was the Kentucky leader in the 1932 contest with 35,000 points, coming out second in the national standings that year.

Because the station is an extremely active one we imagine a great many amateurs, particularly those operating in the 3.5-mc. c.w. band, must

look upon W9AUH as a familiar call. The set that makes the signal possible is shown in the accompanying photographs. The power input to the final stage of the transmitter is nearly the maximum allowed amateur stations, being 900 watts under normal conditions.

The circuit diagram shows the tube line-up of the transmitter. The oscillator is a 47, used in the regular pentode circuit with parallel plate feed. The crystals—W9AUH has eleven of them, all told—are kept in a home-made temperature control box using a bimetallic thermostat, with



W9AUH'S ONE-KILOWATT FINAL STAGE IS A SEPARATE UNIT

This side view shows the 571 tube in operation. This unit is link-coupled to the output stage of the transmitter shown in the other photograph. Antenna condensers and ammeters are on a panel mounted from the wall above the amplifier frame.

10-watt bulbs for heaters, and the temperature holds to within a degree Fahrenheit. The second stage, using a Type 10, is a neutralized buffer, capacity coupled to the oscillator. Following it is an 841, neutralized, which may be used either as straight amplifier or doubler. The key is inserted in the grid circuit of this stage. The fourth stage

is an 860, capacity-coupled to the 841. The oscillator and two low-power stages are all shielded.

The 860 is coupled by a link line to the final amplifier tube, a 571 (equivalent to the 831), a

high enough above the table top to allow ample room for keys and control switches, holds the Hammarlund Crystal Pro receiver, loud speaker, General Radio frequency-meter-monitor, and the

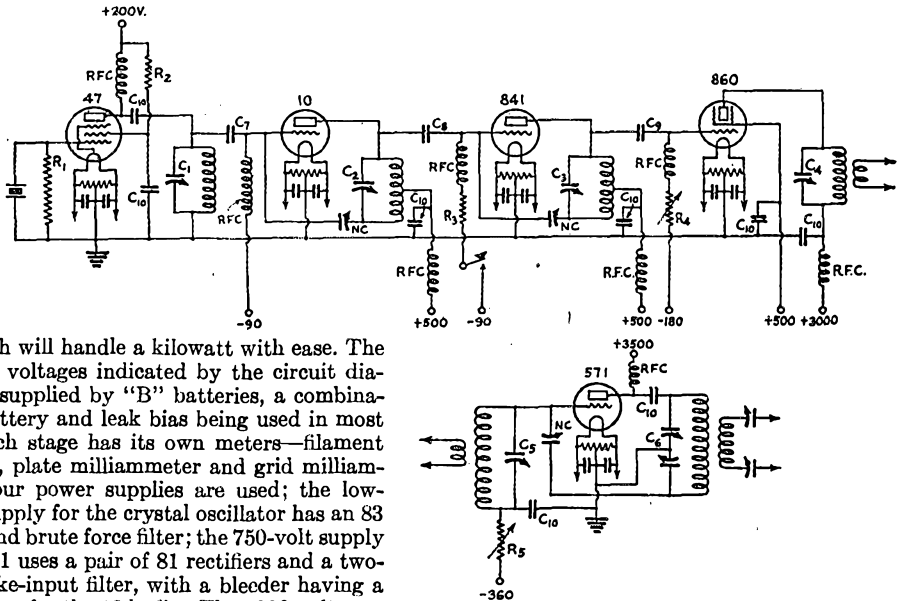


FIG. 1—CIRCUIT OF W9AUH'S FIVESTAGE TRANSMITTER

- C₁—100- μ fd. variable.
- C₂—100- μ fd. variable.
- C₃—225- μ fd. variable.
- C₄—250- μ fd. variable, high voltage.
- C₅—100- μ fd. variable, high voltage.
- C₆—75- μ fd. (effective) split-stator, high voltage.
- C₇—150- μ fd. fixed.
- C₈—250- μ fd. fixed.
- C₉—500- μ fd. fixed.
- C₁₀—.002 μ d., voltage rating depending on circuit in which condenser is used. Filament by-pass condensers also are .002 μ d. each.
- R₁—10,000 ohms.
- R₂—50,000 ohms.
- R₃—10,000 ohms.
- R₄—10,000-ohm variable.
- R₅—15,000-ohm variable.

Coil specifications depend on frequency and tuning capacity. Suitable data can be obtained from the Handbook by those interested. Neutralizing condensers for the 10 and 841 should have a maximum capacity of about 20 μ fd. A condenser having a range of 2 to 10 μ fd. should be satisfactory for neutralizing the 571.

tube which will handle a kilowatt with ease. The fixed bias voltages indicated by the circuit diagram are supplied by "B" batteries, a combination of battery and leak bias being used in most cases. Each stage has its own meters—filament voltmeter, plate milliammeter and grid milliammeter. Four power supplies are used; the low-voltage supply for the crystal oscillator has an 83 rectifier and brute force filter; the 750-volt supply for the 841 uses a pair of 81 rectifiers and a two-stage choke-input filter, with a bleeder having a 500-volt tap for the 10 buffer. The 3000-volt supply for the 860 uses 866's, and the 3500-volt supply for the 571 a pair of 866-A's working into a two-section choke-input filter. The last power supply is equipped with an auto transformer connected in with the primary of the power transformer so that the output voltage can be regulated.

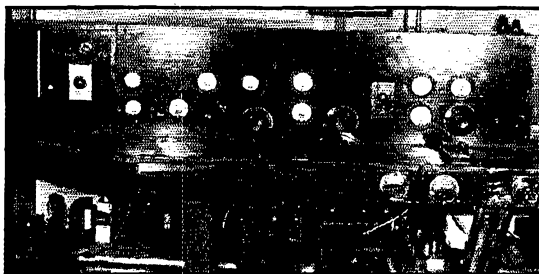
W9AUH's antenna is a Zepp consisting of a 133-foot length of quarter-inch copper tubing, supported at the ends by 60-foot telephone poles.

One might expect a traffic handler to have his operating table conveniently arranged, and so it turns out to be at W9AUH. A shelf, supported

telephone. Although the receiver does not take up table space, its controls are within easy reach through the use of this arrangement. A typewriter also is handy.

W9AUH has been heard in fifteen foreign countries on 3.5 mc., and Hawaii has been worked several times on the same band with R8 reports. Plenty of work is carried on in the other bands, too; during the last international DX contest, Japan was snagged for the coveted WAC certificate. Besides

(Continued on page 82)



THE FIRST FOUR STAGES OF THE TRANSMITTER ARE BEHIND THIS PANEL

Each stage has its own plate milliammeter, grid milliammeter and filament voltmeter. To the left of the transmitter panel is the home-made crystal oven. Some of the power-supply equipment and bias batteries can be glimpsed underneath the table.

• I. A. R. U. NEWS •

Devoted to the interests and activities of the

INTERNATIONAL AMATEUR RADIO UNION

President: H. P. MAXIM

Vice-President: C. H. STEWART

Secretary: K. B. WARNER

Headquarters Society: THE AMERICAN RADIO RELAY LEAGUE, West Hartford, Conn.

MEMBER SOCIETIES

American Radio Relay League
Associazione Radiotecnica Italiana
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Československá Amatérská Vydělácká
Deutscher Amateur Sende-und-Empfangs
Dienst
Experimenterende Danske Radioamatører
Irish Radio Transmitters Society
Japanese Amateur Radio League
Liga Colombiana de Radio Aficionados

Liga Mexicana de Radio Experimentadores
Nederlandsche Vereeniging voor Internationaal Radioamateurisme
Nederlandsch-Indische Vereeniging voor Internationaal Radioamateurisme
New Zealand Association of Radio Transmitters
Norsk Radio Relæ Liga
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Reseau Belge
Reseau des Emetteurs Français
South African Radio Relay League
Suomen Radioamatööri- ja -kyläseuran r.y.
Sveriges Sändareamatörer
Unión de Radioemissores Españoles
Union Schweiz Kurzwellen Amateure
Wireless Institute of Australia

Conducted by Clinton B. DeSoto

Union:

A new member-society appears in the list at the head of this department this month. We offer our congratulations to the *Japanese Amateur Radio League* upon its accession to membership in the I.A.R.U. and express our gratification at the added strength lent the Union by the presence of a strong Asiatic member upon its membership rolls.

The celerity with which this Union of ours is growing in strength and prestige is a thing of joy to all. Think of it—twenty-five member-societies, in as many of the most important countries of the world, acting in concert for the representation and protection of perhaps 60,000 licensed amateur operators. Nearly a third of the number of nations represented at international treaty conferences—covering a good proportion of the civilized earth—by many times the largest body of radio transmitters, even if representing only a small proportion of the monetary investment in the art—yes, indeed, this Union of ours is rapidly growing to a place of power in the radio circles of the earth. Contrasted with 1927, or even 1932, its power to-day is manifold. Evidence of that is contained in the excellent reception of the work done by the I.A.R.U. delegation at the Estoril (Portugal) conference by the representatives of more than thirty nations, companies, and international bodies there assembled.

Our task now is to build that strength to even greater proportions—to increase our membership to include all important bodies of amateurs everywhere—to improve conditions in each of the member-nations—to better organize and concentrate our activities. Specifically, the responsibility for this work devolves upon the headquarters of the Union and the headquarters of

the respective member-societies. It is basically dependent, however, upon the support of the individual amateur—on the faithfulness with which he observes frequency band limits and good operating practice, on the efficacy of the research work and public service which he does to justify his occupancy of his portion of the radio spectrum.

In other words, not only the continued progress of amateur radio, but the very existence of amateur radio, depends on the manner in which the individual amateur discharges his responsibilities as a citizen of the great world of radio. If that responsibility is adequately discharged, then the Union can work unimpeded toward the preservation, glorification and expansion of our art.

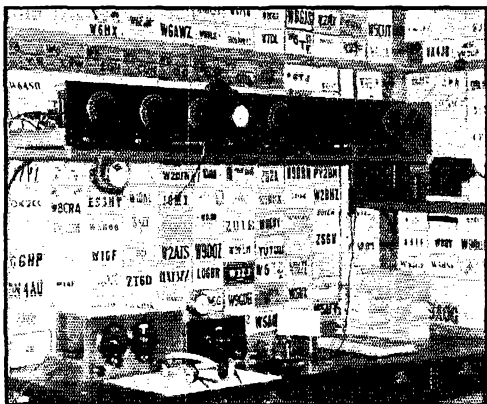
Regulations:

Important improvements in the amateur regulatory structure of two nations have recently been effected.

In Great Britain, the R.S.G.B., working principally through its president, Arthur Watts, G6UN, has secured a reduction in the guard or buffer bands set aside along the boundaries of the various amateur bands. These tolerances have now been reduced to a 5-ke. guard band at the end of all bands except the high-frequency end of the 3.5-mc. (3730 kc.) band. Members of the R.S.G.B. are being advised to set their nominal frequencies 0.1% inside the new bands in order to prevent their transmissions appearing outside the bands as a result of crystal or transmitter variations, it is reported by J. Clarricoats, Secretary of the R.S.G.B. Another important concession provides for the carrying out of television tests between 30 and 32 mc. The 28- to 30-mc.

band will then, it is expected, be used for the sound channel.

In South Africa, the Postmaster General, following upon conference and recommendations by a committee of the S.A.R.R.L., with G. Ross Kent, ZT6R, responsible for much of the work, has issued a broad new interpretation of amateur



matters. For the first time, amateurs are recognized as such, the "experimental" status having been abandoned. The creation of an amateur status internationally will be recalled as one of the major triumphs of the amateur delegates at the Madrid treaty conference. A separate classification of "private and experimental" stations has been created allowing only for operation in the 56- and 28-mc. bands. Radiotelephony is now to be permitted on all bands; transmission of music under limitations is permitted; and a number of licensing and general regulations are liberalized and clarified. The resulting set of regulations should be a great asset to South African amateur radio.



don't begin doubting your ears; a little kookaburra bird told us with a meaning snicker that a good many Aussies are inclined to smirk knowingly when the power limit is mentioned.

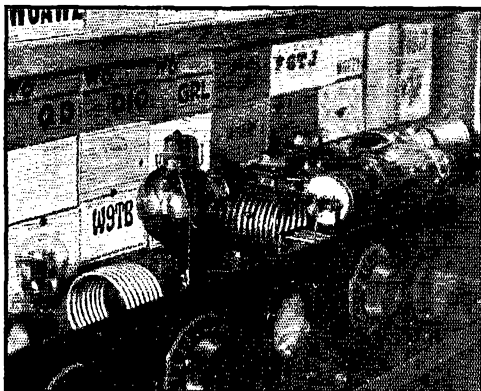
Special: In April, 1934, the *Union de Radioemisoras Espan-*
(Continued on page 88)

TWO CLOSEUPS OF FAMED J2GX—THE TRANSMITTER AND THE OPERATOR

Top—full view of the station. Note the "rationalized autodyne" and the stacks of QSL cards. Center—Y. T. Yagi, the man behind the bug, WAC-maker extraordinary. Below—the line-up reads 47, 46, 46, 860, and 204A. Photos courtesy W5BOW.

General:

E. J. Dunkley, VU2LZ, now WAC, is searching for a VE QSO for WBE He operates on 7 and 14 mc. between 1200 and 1600, and 0030 and 0130, G.T. SX3A, Athens, Greece, was worked on 14,120 kc. Oct. 13th at 1:53 p.m. by Frank Gow, WIAF The tone was 500 cycle, the QRA, Directions des Services Radiotelegraphiques, Delamarine, Athens, Greece The E.D.R. awarded WIDHE a certificate in connection with his excellent work during the "First Danish-International Competition" OZ7KG won





CALLS HEARD



G2BYH, Alan S. Macnab, 30 Elton Rd., Bishopston, Bristol 7, England

(14-mc. 'phone)

cm2am cm2wz hi7g hi7v hi8x hplee k4sa lu8dr ti2ad ve3ga ve3he ve3if w4au w4bc w4by w4cj w4ddr w4lg w4si w4vf w4za w6ali w5bdd w5bnn w5ccb w5eb w5un w6cim w7qc w9alv w9ark w9bhm w9bht w9bix w9bj w9brx w9bw w9cix w9dif w9dlw w9eel w9enu w9mm w9mwn w9usa w10xda x1g x1z

(3.9-mc. 'phone)

velar velei w1adm w1ber w2aga w2b2p w2bqv w2bsr w2kr w3aeq w3aex w3axi w3crr w3qv w3wi w9bsp w9mbz

G2ANT, D. A. G. Edwards, Chester Rd., Sutton Coldfield, Birmingham, England

(3.9-mc. 'phone)

velei w1cwh w2adj w2cif w2dc w2qr w3cq w3duy

(14-mc. 'phone)

cm2ra cm6xs fm4aa sm4u hi8x ti2wd w4lt w4ix w5aeb w5bdb w5ccb w5sa w9eib w9fj w9gyk w9hbd w1oxda

Albert E. Lower, U. S. Asiatic Fleet, U.S.S. Augusta

(7-mc. band from 8 p.m. to 11:30 p.m., China Time, at Chinwangtao, North China (near Peking))

kalca kalxa om1tb om2rx pk3st ulxu vk2da vk2pw vk2xc vk2ed vk2vq vk2xj vk2oj vk2ny vk2hf vk3eg vk4us vk5wb vk5em vk5uk vk6lr vk6mn vk6kb vu2lj vs7gj vs8ah w6hik w6cxw w6hiv w6fkd w6bgw w6awt w6xru w6eyc w6iju w6am z12gk z12dw z12bz z13fn z13go z86am ss2x k6fab k6gqf yr5aa ly1j pa0az

W10XDA, Bob Moe, Aboard S.S. Morrissey

(Phone stations worked south of Arctic Circle)

w1dmv w2aif w2ajd w2aoe w2aog w2bfb w2bok w2bsd w2cdl w2cls w2dc w2edw w2ff w2gdv w2goq w2hfs w2kr w2nv w2ns w3aqc w3bph w3dq w3dm w3zx-w3cot w4si w5aeb w8awt w8cdw w8ddl w8gly w9bhm w9brx w9dxj w9eib w9fj w9idz w9kf w9lai w9ld w9nno w9pz w9ro w9usa k4sa velco

(C.w. stations worked)

g2hg w2jo w4cfz w9oxm w1blm vo8z

(Phone stations worked north of the Arctic Circle)

w1gbe w1had w1sz w2aoe w2ff w2goq w2mb w2nv w2nz w3qv w8eyt w8dce w8gly w9csi w9dxj w9eib w9ji w9usa g2sd g5bj ve2ee

(C.w. stations worked)

w1duk w2deg w2ecu w2fxc w4ada w8cra d4bpj g2gf g6d g6lk g6rv g6tt ve4hm ve5ld j2gy

K6CFQ, Frank L. Fullaway, Steamer Guide, 510 Custom House, San Francisco, Calif.

(Heard at anchor, Monterey Bay, Calif.)

(14-mc. c.w.)

w1bix w1brc w1cmg w1cmx w1da w1dbg w1dhe w1sz w1we w2bao w2kw w3ant w3bir w3bvn w3rt w4gq w4tr w4tt w6fet w6qd w6qp w7avl w7awj w7bd w7bme w7cht w8bck w8bme w8cra w8dhe w8dkk w8ytt w9dvw w9emb w9eru w9kko w9ocl w9ple w9pri w9pst w9rol w9ww ve3ag ve3cu ve3qd ve3wa ve4du ve4ni x1ay

(14-mc. 'phone)

w5abj w5bet w5dq w5ecl w8gly w8wa w9bpc w9dku w9jil w9nmo

James B. Robbins, 11 Church St., Westboro, Mass.

(14-mc. 'phone)

cm2qy cm2ra cm2se cm2av cm2wz cm6xs g2sd g5bj g5dj(?) g6py hclfg hi8x k4sa lu8dr x1g

W1HUO (ex-W7AOU), G. F. Breilling, Fort Banks, Mass.

(7000-ke. band)

ac8na aulaa hclfg ('phone) j3cl kalna kalcm kalhr oalb ('phone) pk2fs vs6ag pk3bq vpu2 vu2nn vu7bj zd2c

(14-mc. c.w. band)

tf2iv vu2bn xu3fu zc6ff j2gx j2hi

(14-mc. 'phone band)

ct3ab g6ir g5bj g5by g5us g6dl g6dl hclfg la1g lu8dr on4bz ok1aw x1g

E15F, H. Hodgens, Clyonua, Leigh, Shankill, Co. Dublin, Irish Free State

(7-mc. band)

cm8ps hcljw hclpx k4aan k4cvv k4rj py2ak ti2fg ti2ru ve3ba vp9r w4ajx w4bc w4cpz w5eaa w5yh w8bfn w8eth w8ize w8jrl w9bhk w9fbk xu4q z13bj z14fk

(14-mc. band)

cm2jm j2gx pylaw py2bx ve3no vp4tc vq4crp

Charlie Myers, 48 West Main St., Mechanicsburg, Pa.

(14-mc. band)

j2hi j2gx j2hb j2hx vu2cp vk2ba vk2ma vk2oc vk2xu vk3cx vk3wl vk3pp vk4dd vk4gk vk5bg z12ac z12ci z12gn z13al

W9BXX, M. F. Whitton, Burlington, Wisc.

(14-mc. c.w.)

cm2ra g2bm g2la g5ml g6lk g6nj g6vp ea5af hb9ao k5aa k5af nylaa nylab pa0fx ok2hm pylif py2cd vo8y vo8z vp5pz x2c

(14-mc. 'phone)

g5by hi7g hi8x k4sa on4bc on4vc w10xda

W5EIP, P. B. Williams, Blytheville, Ark.

(7-mc. c.w.)

kalhr kalxs kalcm d4biu

(14-mc. c.w.)

j2gx vq4crp ok1bc

(14-mc. 'phone)

hi7g hi8x hi6f x1aa k4sa hj5abg k6bas cm2qy cm2se cm2ra cm2aw ve2ca ve2dx ve4fi ve4hw

W6CXW, H. Y. Sasaki, Rt. 2, Box 1085, Long Beach, Calif.

(7- and 14-mc. c.w.)

g2di g2ma g6tt g5yh g5yv g8lk g2oa g5bj g5vb g5vy g6rb g6nj g2dv g5qy g6my g6hp g6qb g6us g6cj g6oy g5yg g6dl

g2ks g2xa g2sj g2sq g6ir g6qx g5gq g2by g5fv g6py g5rj
g5vq g5vm g2ax g6ut g5qu g6uj g5jh g5qa g2gt g6uf g2nm
g6qp g2od g6fn g5mi g6yl g5yb g2mh g5ml d4bbu d4biu
d4bar d4bdr d4bmj d4caf d4buf d4bbu d4baa d4bhr d4bco
d4bkk d4bmt d4bnl f8pz f8eo f8ex f8wb f8fc f8gg f8vj f8vt
f8ca f8xc f8eb f3mtc f8vp pa0ce pa0ll pa0ps pa0xf pa0ql
pa0jmw pa0lr pa0rp pa0ch pa0az pa0zz sm7ws sm7yg
ly1j u2pz u3an ez4sax oh3na oh3np oh7nf splde sp8yb
oe1er oe1cm oe3fl gi5mz haf3d haf8c ct1gu yr5aa la1x
la3c ea4av ea3an ea5de ea3eg ea8gce on4au on4my on4z
on4bx on4fe on4ray on4mad on4bb it1km ilal hb9j ok2hm
ok2ma ok2dd ok2kp ok2ms ok1bc sulsg sulec sulch su6hl
zd2a vq4crr

Unsigned, Prophetstown, Ill.

(14-mc. c.w.)

fm4aa fm8bg j2gx on4csl vq4cro ulbc ulbl u3ve u6aq
xxon4au xu3fu zc6ff

*W3AMP, Charles Butt, 737 Bunker Hill Ave.,
Trenton, N. J.*

(56-mc. band)

w1pt w2aoe w2azb w2bbt w2bky w2buz w2cql w2cuw w2dx
w2etu w2ffr w2gis w2gj w2gjb w2glh w2gym w2gzc w2heb
w2hej w2hkh w2jz w2lp w2mo w2xk w3aap w3abq w3af
w3afv w3aid w3ajf w3ajs w3amw w3amz w3anu w3aoc
w3atf w3avb w3awh w3awl(?) w3axu w3bir w3blh w3boi
w3boo w3bto w3bzj w3ces w3cm w3ctk(?) w3cwl w3eaq
w3eba w3eeq w3eet w3ege w3ekp w3emj(?) w3enz w3epn
w3epo w3ege(?) w3hw w3iu w3vx w3xz(?) w3zn w3zf
w3xae w3xaf

*G6YL, Miss B. Dunn, Felton, Northumberland,
England*

(7000-ke. band)

w1fup w1gzx w4bhv w4cpz w6aor luidt lulep lu5fg lu6ax
lu9bv pk1bo vp5is vp9r vk2bp zllbc zllhy z1ai z1af
zsf6a xoh2fj xxon4au xzn2b xzn2c xzn2e

(14,000-ke. band)

w5bxm w5bxn w6adp w6ahz w6asv w6bbz w6bc w6bp
w6brw w6byb w6byu w6cxw w6dio w6dez w6geh w6fkq
w6fyt w6fzy w6grl w6grx w6ish w6jju w6knf w7aaf w7af
w7afp w7apv w7bac w7bby w7bd w7bpb w7cht w7dl w7if
w7qc w7qd w7uf w9bmd w9usa (fone) w10xda cm2do
cm2gr cm2mg cm2rz cm2wd hclfg (yl fone) hp1a j2gx
j2hi j3dp k4kd k4sa (fone) k4ug k5ae k6vp kalcs lu6dg
nylab ny2ab on4csl pylah pylaw py2bk py2cb py2cd
py5ab py5ad py9ah st1av ti2kf ti2rc ve4ae ve4ag ve4bf
ve4jh ve4mv vp2cd vp2rt vp4aa vp5aj vp5pz vp6mo
vp6zp vp9w vq4crl vs2af vs6aq vs6ax vs7gj vu2re x1aa
x1ag x1q zel1j zs2a vpy7 spk3 xoh2fj xoh3fp xzn2b xzn2c

(28,000-ke. band)

f3ag f3bw f8ct f8oz f8sw f8tq f8uu f8vi g2fn g5qy g5vb
oe1fh oklaw oklmo oklva ok2ma on4au on4jb on4nc
pa0apx yi7qa f8eo f8ij f8pz ok1wx pa0xf

*VE1EP/VE1HG, A. H. Grant, 116 Oxford St.,
Halifax, N. S., Canada*

(14-mc. c.w.)

ez4sab ez4sac ez4sax j2cx j2gx k6cog ly1j sulab sulec
sulch sulsg su1aj su6hl zsid zslh zslf ztlz ztlr zs2a zt2f
zt2l zs3d zs4m zs5a zs6aa su8p zc6ff on4csl zd2a zd2c ulbc
ulbl u3bv u3ve yl2bq ym4zo yi2fk yi7tk vk2xq vk2er
vk2lz vk2xu vk3jq vk3mr vk5gr

*W9ABS, Bob Arrowsmith, 135 So. 14th St.,
Quincy, Ill.*

(3.5-mc. c.w.)

z12bn z13ag k6vr ny2ab

(3.9-mc. 'phone)

k6baz vk7ck z14gs

(7-mc. c.w.)

pk6ag j3df j2dx kalxa ka1hr ac8br k6gqv

(7-mc. 'phone)

Iu5cd hclar py2ab py2ar

(14-mc. 'phone)

k4sa hi7g hi6x xlg oalb g5bj k6bas g5bx w10xda

*W1EOG, Ed. McQuade, 103 Chandler St.,
Marlboro, Mass.*

(56-mc. band)

w1ak w1al w1ach w1az w1aqp w1awy w1ayg w1bek
w1bhl w1bqk w1btk w1bwj w1ck w1cq w1cwf w1coo w1crh
w1dbc w1dbe w1ddm w1dek w1dpp w1dpw w1dkz w1dvy
w1dzk w1ehv w1efe bt1 w1enw bt1 w1elt bt1 w1elp w1etp
w1eoc bt1 w1fj w1fg w1fem w1ghq w1gj w1gcu w1gfw
w1gmt w1gdj w1giz w1gaq w1hrp w1hvc w1hro w1hva
w1htr w1hnn w1hyg w1hma w1haw w1hrx w1hbk w1huv
w1hvr w1hox w1hom bt1 w1iew w1lpx w1lhy w1lfc w1lio
bt1 w1livk w1jk w1jh w1kh w1lc bt1 w1rf w1row w1xw
w1xv w1xab w1xwc w1oq w3ejx bt1 w3pr bt1

W9DGC, Edwin L. Robb, Decker, Ind.

(7-mc. band)

j2hq ac3ma hb9av fm8jo

*W6FMU, Herbert Wright, R. F. D., Martinez,
Calif.*

(14-mc. c.w.)

f8eb f8pz f8cx f8dc f8rj f8wb f8eo g6qz g6lk g6nj g6rb
g6xm g5gq g5by g6qb g6hp g2dh g6vk g2ma ea2aa ea5be
ea1az ea1am ct1gu ct1by ct2bk d4baa d4bmj d4bar d4bdr
d4caf d4buk d4biu on4bx on4au on4fe on4my on4jb pa0ce
pa0ll pa0xf ok2dd ok1be oe3fl oh3np oh3na ly1j haf3d
la1x zd2a yi7ox om2aa vs2af vpl1 xfm8c l0eb sulsg

(7-mc. c.w.)

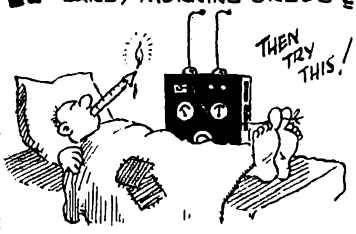
zslb zt6x ztle zt5v zs4m zule sulp zs5c zt5r zelcp zs2f
zt2l zt2e zs2a zslz zulj zt2e zs5u zt2h zu5q zu5n zs2d
zt5q zt2r zu5e zslh zs2h zs5q zs5e zs6b zu6p zt5s cr7aw
ze1jf vu2jb vu2lz py9az py2ak on4fe d4bar

Strays

QST Index (1934) Now Available

The annual index to *QST* for 1934 (Volume XVIII) has been published as part of this issue, and sent to every member of the League. News stand readers may obtain a copy of this index for 6 cents in stamps.

**HAVE TROUBLE GETTING UP FOR
EARLY MORNING SKEDS?**



**WHEN THE CANDLE BURNS DOWN TO
THE PROPER LENGTH AT THE APPROPRIATE
HOUR THE OPERATOR GETS OUT OF BED IN
SUCH A HURRY THAT THE STRING ATTACHED
TO THE TOE CLOSES SWITCH STARTING
FIL-AMENTS, GIVING THEM PLENTY OF
TIME TO WARM UP WHILE OPERATOR IS
GETTING INTO HIS PANTS.**



OPERATING NEWS



Conducted by the Communications Department

F. E. Handy, Communications Manager

E. L. Battey, Asst. Communications Manager

COURTESY and good operating ability are often found together. Both phone and telegraph operators find this so. We have met few operators so discourteous as to show utter lack of attention during a "rag chew." All operators of course want to be considered thoughtful and courteous. Some operators manage to surround themselves with noise and distractions, either in the form of "family QRM" or a noisy broadcast receiver for "background." The ability of an operator to copy is based partly on the ability to concentrate and the power to focus complete attention on the job in hand. In planning a radio shack, the choice of the operating position to permit the relative seclusion of the operator with freedom from interruptions and noise, ought to be given consideration. This helps us to be both courteous and efficient in our radio operation.

Operating ability is developed only through practice. The station DX, the number of QSOs, the value of an amateur to himself and to his community in cases of local or any kind of emergency depends a great deal on highly developed operating ability. The power to copy what we hear accurately is important in all communication. Speaking of skill and operating ability, the "S.S." was the most recent opportunity to put this to one kind of a test. Another type of opportunity is afforded in THE COPYING BEE, announced on page 23 of this issue. It will be held on Friday evening of December 14th. Everyone we have discussed the idea with likes the scheme. As well as giving us a chance to check our copying ability this should result in considerable fun. The early plans for transmission from a single station were expanded when early announcements showed enthusiasm for the idea, which was suggested by W1EH. Thanks are also due the stations helping to make this activity a success by their transmissions. Send us your log on the Bee, and report which stations you could hear too, please. Good luck on December 14.

Briefs

Over 400 chapters of the American Red Cross have arranged to render their annual roll call reports to their zone Red Cross Headquarters over the Army Amateur Radio System during the week of December 1st-8th.

Correction

Sweepstakes Participants will please note an error in the announcement of the new "power equalizing factor." Under (b), page 18, November QST, the rule should read: Over 25, and up to 75 watts — multiply score by 2.

On the first day of M.I.T.'s Freshman camp, which was attended by 200 freshmen, W1ENE got lonesome and whistled CQ to see if he could find another ham in camp. He raised a W9, a W8, a W6, a W3, two W2's, and two W1's!! The rest of the camp period was devoted to a miniature hamfest. The moral for hams is, "Learn to whistle!"

W9FYC offers: Some high-power stations reduce power when working locally. This is sometimes difficult to accomplish without elaborate switching arrangements. As a means

to accomplish the same effect, W9FYC suggests disconnecting the antenna when working local stations; he has been able to maintain communication over as great distances as 175 to 300 miles with his antenna off.

QRR

October 21st found one of the worst windstorms in the history of the Northwest raging in that territory. Wind velocity went as high as 70 miles per hour in Seattle, Wash. Many trees fell, glass windows were broken, telephone lines were down. VE5JE, Vancouver, B. C., with a rush message for the Coast Guard at Bellingham, Wash., sent a QRR. The message regarded the safety of two men clinging to piling in heavy seas at Boundary Bay near the border. W7LD and W7DGN both delivered the message to the Coast Guard. The papers stated later that the two men had been rescued. W7CXX, Seaside, Oregon, delivered a message to the Lighthouse Service at Portland saying that many windows in the Tillamook Rock Lighthouse had been broken by the wind.

W3HG, Baltimore, Md., has worked all W and VE districts on 1.75-mc. phone with 60 watts input to a 10 amplifier.

DX Briefs

On the afternoon of October 11th, W6GRX, Los Angeles, was QSO ON4CSL, Belgian Congo, on 14 mc. This is believed to be the first W6/Congo QSO. The use of beam antennae at W6GRX assisted the QSO; reception of ON4CSL was increased from R2 to R5 with the beam.

W1DBU, New London, Conn., was QSO FC4CJJ at 3:15 p.m. E.S.T., October 22nd, and reports that FC4CJJ is located in the Belgian Congo. QSL's should be sent via Reseau Belge.

On May 11th, W2WT, Stapleton, N. Y., was QSO VK3MR on 7 mc. at 8:00 p.m. E.D.S.T. On June 1st at 5:15 p.m. E.S.T., W1ZI was QSO VK3ML on 7 mc. On January 31st on 7 mc., W2CJM worked VK3KX and VK5FG at 3:50 p.m. and 4:45 p.m. E.S.T., respectively. W3AOJ, on February 9th at 3:40 p.m. E.S.T., was QSO VK3KX.

And then there's the one about the embryo ham who asked why hams have to "bake" their crystals! He saw an advertisement for crystal "ovens."

---W9HDP

Service, Plus!

While on a business trip to Roanoke, Va., W3ASK of Shenandoah, Va., was entertained during an idle evening by W3CNY. Due to some information received from W3CNY, it became desirable for W3ASK to communicate with W3DQ of Wilmington, Del. Efforts to raise W3DQ from W3CNY during the early evening were unsuccessful. However, W3BTM of Roanoke, whose station was visited during the evening by W3CNY and W3ASK, knew that W3ASK was anxious to QSO W3DQ, and, hearing him on

about 12:30 a.m., managed to hook up with him. Contact being established he informed W3DQ of W3ASK's desire, called W3ASK out of a sound sleep by means of the telephone in his hotel room, and W3ASK, without getting out of bed, carried on a successful fifteen-minute telephone-radiophone QSO with W3DQ, with W3BTM acting as monitoring station, and manipulating the telephone and transmitter at the intermediate point. This was all on 3.9-mc. 'phone.

VE3WW—London Amateur Radio Club

The London (Ont.) Amateur Radio Club operated VE3WW on 1.75-mc. 'phone at an amateur radio booth in the Confederation building of Western Fair, London, September 10th-15th. VE3WW was crystal-controlled on 1790 kcs. Quite a bunch of messages were originated. Operators were VE3PA, VE3VR, VE3GA, VE3AAO, VE3AAN, VE3WW and Jack Paige. The exhibit was a complete success.

A.R.R.L. Trunk Lines

The first of the reorganized A.R.R.L. Trunk Lines to be completed and working 100% throughout is the Illinois to Texas route. "K." This line consists of: W9KJY, Glen Ellyn, Illinois—W9ILH, Alton, Illinois—W9FLG, Topeka, Kansas—W5CEZ, Ponca City, Oklahoma—W5MN, San Antonio, Texas.

Lines "A," "B," "C" and "H" are also practically complete throughout. All the other lines are expected to be in running order by the end of November.

The following stations have been chosen to handle the A.R.R.L. Trunk Lines; the order of listing in the case of each line shows the route taken:

Line "A": W2DBQ W8GUF W8FTW W9CKC W9OXP
3805 kcs. W9DGS W7ASQ W7LD
Line "B": W3APV W8GSO W9CDA W4AFM W9MZD
3795 kcs. W9IOL W9EHC W6GQC W6GYX W6LIE
Line "C": W1CRP W1ERQ W1AMG W2CHK W3EZ
3665 kcs. W3BWT W3BYA W4DW W4ASR
Line "D": W4DS W5CWQ W5BAR W5BII
3625 kcs.
Line "E": W3CIZ W8ELJ W4PL W9BWJ W9RYD
3870 kcs. W9K'Y W7BMF W7AYO W7AEA
Line "F": VE5FM W7CZY W7WY W7DTG W7UJ
3827.5 kcs. W6KGO W6EFK
Line "G": W2BJA W8DBX W8JTT W8DVC W9LEZ
3615 kcs. W7AVP W7DUE
Line "H": W9OEL W9PFI W9DEA W9LXC W9DHN
3605 kcs. W9BMA W9IEL W5BED W5DEJ
Line "I": VE1ER VE2HK VE3JT VE4AG VE4CM
3690 kcs. VE4MH VE4BZ VE5AC
Line "J": W9IYA W9BAW W4APU W4CRH
3875 kcs.
Line "K": W9KJY W9ILH W9FLG W5CEZ W5MN
3835 kcs.
Line "L": W2EKM W8CIO W9JRK W9HKC W9FAM
3865 kcs. W9KPA W9PVZ W6DGR
Line "M": W3CWL W3BND W8KWA W8HCS VE3TM
3855 kcs. W8AEQ W9PDE

In order to maintain a place in the A.R.R.L. Trunk Line System all stations listed, and any others that may later become trunk line stations, must hold appointments as Official Relay Stations, must be crystal-controlled, must maintain trunk schedules at least five days per week, and must have Alternates to handle schedules should anything prevent them from keeping them. More complete details on the lines will appear in January QST.

Last season's "Star" line is again in working order and has picked up its excellent work where it left off last year. This line specializes in trans-Pacific traffic. The route is same as last year: W1FIO-W9KG-W9ESA-W6BMC-W6ETL.

An all-ORS transcon route, which operates "net style" in the early morning hours, is the "Owl Special" and comprises these stations: W6LIE-W6GYX-W5BDX-W4PL-

W3CIZ. About midnight W6LIE, W6GYX and W5BDX have a 3-way QSO, passing traffic both ways. At 4:45 a.m. C.S.T. W3CIZ, W4PL and W5BDX hold a similar 3-way. Something less than 12 hours service west to east; something over 12 hours east to west. The "Owl Special" operates six days per week.

Another fast line N.Y.C. to San Francisco: W2BGO-W5BDX-W6GYX-W6LIE.

Crystals, a "spot" frequency for each trunk line, are being furnished as follows: by Bliley Electric Company, lines A, B, E, F, I, J, K and M; by Precision Piezo Service, lines D and L; by Murrill & Murrill, line C; by American Piezo Supply Company, line H; by Kleber Radio Laboratories, line G. Crystals have already been received for lines A, B, F, H, I, J and K and are being forwarded to trunk line stations as their schedules are completed.

A message from Captain Minckler, Liaison Officer, Army Amateur Radio System:

WLM ck 74 AARS Washington D C October 1 1934
Headquarters A.R.R.L.

West Hartford Conn

This office wishes to congratulate your office on the manner in which the new system of trunk lines is formed stop It has been the belief here that single frequency operation of a net or trunk line for the handling of traffic by commercial comma war or navy department of amateur organizations was the most feasible of all methods stop Our sincere wishes for a most successful future in your trunk line operation

Minckler

Liaison Officer AARS

56-Mc. Schedule for Cleveland, Ohio

Every Wednesday, Saturday and Sunday are "56-mc. days" in Cleveland, Ohio. 56-mc. stations in that vicinity concentrate their operation on those days. The following are among the active 56-mc. group in Cleveland: W8AXV AES IOG DDK HC BAH JVN COX LUY MOH CIN BFA.

A 56-Mc. Tribute

W1FEM, popular member of the Massachusetts 56-mc. gang, was killed in a motorcycle accident on Sunday, October 21st. At the instigation of W1FSK, word was passed around on Monday and Tuesday nights that there would be a 56-mc. silent period on Wednesday night in memory of W1FEM. At 7:30 p.m., Wednesday, W1KH, New England Division Director, sent QST's at about minute intervals until 8:00 p.m. At exactly 8:00 p.m. he signed—and the band was completely silent! A constant watch was kept on the band and not a single voice was heard for fifteen minutes—a most impressive tribute to W1FEM, and an almost unbelievable example of cooperation. At exactly 8:15 W1KH put his carrier on and said, "73 to W1FEM," thanked the gang for their silence, and said, "Let's carry on"—in two minutes the band was a roaring mass of signals from end to end!!!

On October 8th the Second Corps Area Net Control Station of the Army Amateur Radio System, W2SC/WLN went on the air with a new transmitter. The station now contains a 300-watt transmitter, using a pair of 211 tubes in the P.A., and is housed in a building of its own in old Fort Jay on Governors Island, N. Y. It is operated by regular Army personnel and by Army Amateurs on the regular A.A.R.S. schedules.

As this issue goes to press, 420 operators have submitted copies in the Navy Day receiving competition. The 1933 participation figure has already been surpassed.

The Meters of the Morning

A 1.75-mc. 'phone club has been in operation in Florida since April 30, 1934. It is called the "Meters of the Morning." The purpose for which the group organized was traffic schedules and storm emergency relief work. At the present time cross-band drills are held with 3.9-mc. 'phones and excellent contact is maintained between the two bands. The officers at time of organizing were: W4BCZ, Frequency

Meters; W4CPG, Oscillator; W4CTS, Buffer; W4CQJ, Final Amplifier; and W4CQZ, Modulator, who enters the minutes of the meeting. Procedure of meetings is usually: reading of the minutes of the last meeting, some kind of technical discussion and then a general round table talk. The Meters of the Morning maintains a weather net which is of great service in time of emergency. The club also has an official publication, W4BCZ Editor, known as "The Allegator."

The Haywire Net

A group of 3.9-mc. 'phone operators have organized under the title "The Haywire Net," and have dedicated their efforts to the establishment of a high standard of operating ethics and better operating conditions for all 3.9-mc. 'phones. This network operates normally from 12:30 to 1:30 p.m. E.S.T. Special procedure for the operation of the "net" has been recently formulated. Among the members at present are W3BFZ, W3NB, W3CKD, W2BO and W3AXR. All 3.9-mc. 'phone operators meeting the qualifications and having a sincere interest in the aims of the group are invited to join in.

Right in the heat of the O.R.S. Party (Sunday night, October 21st), W6AKW called W5CEZ, informed him there had been a disaster on the west coast, and asked him if he could get on an A.A.R.S. frequency and ask the gang to stand by for emergency traffic. W5CEZ got on 3497.5 kcs., raised WLMF, WLUA, WLMUC and WLM the first crack out of the box, and the dope was circulated.

Carroll Stegall, ON4CSL, hails from Chattanooga, Tenn. He is doing missionary work in Belgian Congo for one of the Chattanooga churches. For some time he had been very anxious to contact a Chattanooga ham for the handling of traffic to and from his relatives and friends. On October 13th, W4AM, Chattanooga, succeeded in contacting ON4CSL and handled several messages. Two additional schedules, on the 16th and 18th, went off without a hitch. On the afternoon of the 18th W4AM invited several of ON4CSL's relatives to sit in during the QSO: many messages were relayed back and forth over the thousands of miles that separate the two stations. It is hoped that a permanent schedule may be arranged.

Do you have any trouble spotting various frequencies throughout the high-frequency spectrum? A list of "Marker" Stations useful for checking receiver and frequency meter calibrations will be found on page 84, June, 1934 QST. This list will be found very helpful in many frequency determination problems.

The Harlem Radio Club, N.Y.C., is supervising three radio courses given as part of the activities of the 135th Street Branch Y.M.C.A. The classes are held every Saturday from 7 to 10 p.m. These courses are free and open to all: Amateur Radio Operation (7-8 p.m.), Radio Servicing (8-9 p.m.), Radio Code Practice (9-10 p.m.). The instructors are W2BCE, W2GTU and W2CSQ.

W9FO is picking names for a crew at the ideal ham station. Here are the results so far (all actual names of hams): RECEIVER—W7BDL, Call; W6FBC, Dial; W3IY, Hook; W4TC, Shields; W8LNI, Tape. TRANSMITTER—W1FXB, C. W. Rook; W2HEY, C. W. Sharp; VK2VY, Hartley; W3DGY, Hartley; W8HYW, Phillis Colpitts; W9KYU, Poulsen; W1IAS, Power; W3DUZ, Popoff (overload relay); W6JBK, Lighthouse (for the 1-kw. tube); W6DOK, Shorthose (watercools 1-kw. tube). QRM DEPT.—W3EHF, Ketchem. SUPPLY DEPT.—W8CCR, Cheese; W8AAF, Cook; W8MDK, Rug; W6CEQ, Cashdollar; W5DGT, Mikezell. OPERATORS—W4EF, Allday; W6BUZ, Fast; W8EXD, Fullop; W7AMO, Marconi; VK2EM, Mars; W5CRQ, Morse; VE5KS, Sparks; W7CWI, Sparks; W7RL, Sparks; W8OI, Sparks; W1FOP, Morse. ANTENNA CREW—W1GZM, Stackpole; W9RTU,

Walkup; W9OHJ, Willingham. DX CARDS—W1APM-W1BHI, Mailhot.

—QTC, published by the Chicago Radio Traffic Association.

The Use of "ORS" After a Call

One hears more and more use of "ORS" after calls these days. The "ORS" added after a "sine" is the mark of a reliable operator. It helps other amateurs to know an experienced man is on the air, and ready to help in relaying traffic or making deliveries if they will but give him a call. "ORS" are known widely for their good signals, fine operating, courtesy, and general efficiency and readiness for any communicating job. "ORS" sent after a sign-off is hammy and filled with fraternal spirit, in addition to its practical use in establishing "identity." It aids general traffic movement, too. If you have traffic, try to give it to a station that signs "ORS." A postal will bring any League member information on becoming an Official Relay Station appointee.

"CQ TFC" is the general call used in the GENERAL TRAFFIC PERIOD—6:30-8:00 p.m. (local time). Use this period to move your traffic through reliable stations. Operators who sign "ORS," "TLC," "RM" or "SCM" after their call are sure to be "reliables." The very use of "CQ TFC" by any operator indicates an interest in reliable traffic work. Cooperate with the stations using the TRAFFIC HOUR!

WIMK

Addressed transmissions to amateurs are sent simultaneously on two frequencies, by automatic, from the Headquarters station, WIMK, on the following schedule:

Days	Times E.S.T.	Speeds (w.p.m.)	Frequencies
Sunday	8:30 p.m.	13	3825-7150 kcs.
Sunday	Midnight	22	3825-7150 kcs.
Monday	8:30 p.m.	22	3575-7150 kcs.
Monday	10:30 p.m.	13	3575-7150 kcs.
Tuesday	8:30 p.m.	13	3575-7150 kcs.
Thursday	8:30 p.m.	13	3825-7150 kcs.
Thursday	Midnight	22	3825-7150 kcs.
Friday	8:30 p.m.	22	3575-7150 kcs.
Friday	10:30 p.m.	13	3575-7150 kcs.

Schedules at present are with W1ERQ, W1GOG, WZDBQ, WZELK, W3BWT, W3CXL, W6AM, W8LFG, W8DSS, W8GUF, W9AUH, W9MZD, W9FO, CM8YB, NY1AA. The additional time is divided between 7- and 3.5-mc. bands for "general" contact with any ham who may call. Operators try to "chew the rag" with just as many hams as time permits, as well as QSP whenever possible. QRG service is also available.

A new transmitter to be located at the A.R.R.L. Headquarters office, 38 La Salle Road, West Hartford, Conn., and designed primarily for 1.75-, 3.9- and 14-mc. radiophone should be on the air when this issue is off the press.

Headquarters operators and their personal "sines"; Harold A. Bubb, "HAL," Chief Operator WIMK; F. E. Handy, "FH," W1BDI; E. L. Battey, "EV," W1UE; A. A. Hebert, "AH," W1ES; C. C. Rodimon, "ROD," W1SZ; F. C. Beekley, "BEEK," W1GS; C. B. DeSoto, "DC," W1CBD; K. B. Warner, "KEN," W1EH; George Grammer, "HG," W1DF; Don Mix, "DON," W1TS; Jim Lamb and Ross Hull W1AL.

W6WO, Los Angeles, reports hearing HJAW, a South American Expedition at Cartagena, Colombia. HJAW was just outside the low-frequency end of the 14-mc. band when heard with an r.a.c. note.

The following contribution by Miss Opal Sisk, W9CMV, wins C.D. article contest prize for this month. Your articles on any phase of amateur communication activity are likewise solicited and may win you a bound Handbook, six logs, or equivalent credit applied toward other A.R.R.L. supplies. Let us have your article, and mark it "for the C.D. Contest," please. ---F. E. H.

Testimonial—By a YL What Radio Has Done For Me By Miss Opal Sisk, W9CMV

I WAS once a very quiet person, perhaps some might have called me dull—life went on for me in a very humdrum fashion. I was never popular socially in school, as I devoted all my time to my studies—so I had no time for other activities (that's what happens to a person trying to keep up a "rep" as an "A" student). Boys seemed to be afraid of me on account of my grades, and, although expressing admiration, they remained aloof. I was one of those girls that everyone likes or respects, but no one pays any attention to in a crowd. Of course I always had a small following of devotees, but as far as being termed "popular" I was NIL! After I graduated, and joined the ranks of the "poor working girls," nothing out of the ordinary ever happened—it all became a matter of routine—sleep, eat, and work—day in and day out—and time hung heavy on my hands. I was becoming "dispeptic" from a run-down mental condition—I lacked "pep" and initiative—life in general was getting irksome!

Then one day an event occurred that changed my whole outlook on life—with the same results as some of the old-time fairy tales we've all read—I was introduced to amateur radio! Through a personal friend, a radio enthusiast who constantly rode his hobby, I was prepared, and I became eager to enter the portals of that fascinating world all its own—that realm of high adventure, where all marks of rank, caste or creed are cast aside, and operators are bound together the world over by the strongest of bonds—Amateur Spirit! Gradually the "light" seeped in, and after passing the exam without getting "stage fright" among so many OM's, I had the thrill of once in a life-time—my first QSO!

The little "bugs" bit, and bit hard! The "unusual" always fascinated me, and at first I showed signs of acquiring "radio mania." Meals became only a bothersome interruption, while sleep was only a bad habit I was sorry I had formed. After a few QSO's, I was impressed by the fact that a YL seemed to be a big novelty to 99% of the hams—so feeling something like a "freak" or rare specimen of some sort, I tried to make my QSO's interesting, in defense of my sex—also to make a second QSO desirable. What happened?

A new phase of life opened up before me—it became one thrill after another—new contacts every day—new friends—letters, cards, messages, calls in person, requests for pictures, and personal description—OM's were only too glad to pour out information regarding themselves—their age, color of hair and eyes—yea, even to the size of shoes they wore! (What a wonderful matrimonial bureau that would make!) Some hams wrote who swore they had never written a YL before, and QSL cards were many times followed up with fotos of station and operator.

Life became just one grand rush—trying to be on time for skeds, grabbing a bite to eat in the few minutes between skeds—endeavoring to catch up on correspondence from eleven states, ranging from California to New York, and down to Texas, with South Africa for variety—entertaining visitors every weak from somewhere—parties, trips, conventions, club meetings—demands on time and attention every hour of the day! Write-ups and fotos in various magazines or papers have brought in "fan mail," and created new acquaintances! All this activity was brought about through the medium of ham radio!

And so what has all this meant to me? Just this—I now have a new interest in life—radio changed the once quiet, demure YL into one of self-confidence—no longer bothered by an "inferiority complex"—an ardent enthusiast of the ham game in all its phases—the building part included! All

the years previous seem to have dropped into non-existence -- I live in a new world entirely—all my interests are based directly on radio—all my friends are hams—life is worth living—"there's romance on the air," as an Ohio ham said. Also adventure, mystery, humor, knowledge, the satisfaction of accomplishing something worthwhile, the thrill of playing with strange forces!

Each contact may lead to a new friendship—something worthwhile, a new influence in a person's life! Without radio, life would be a monotonous routine of existence, again—it seems as essential as the very food I eat! So this is my testimonial of what radio has done for me—or to me—and the only regret I have is that I did not know of it years ago—and that I have only one life to lead as a YL!

Code Practice on 1.75 Mc.

November *QST*, page 43, carried information on stations whose operators have volunteered their services in sending code practice on 1.75 mc. In addition to those listed in that issue, the following have also agreed to send code lessons: W6IXZ, San Francisco, Calif., on 1845 kcs. transmits on Mondays and Thursdays from 7:00 to 8:00 p.m. P.S.T. W6JQQ, Corning, Calif., will give code practice Sundays from 1:30 to 2:30 p.m. P.S.T. on 1910 kcs. W8CVF, Baldwin, Mich., has started code lessons on 1.75 mc. each Wednesday at 7:30 p.m. and each Sunday at 9:00 a.m.; this schedule will continue until May 1, 1935. W4BQT, Quitman, Ga., using 1993 kcs. will transmit code practice daily except Sunday from 8:00 to 7:00 p.m. E.S.T. W1GIX, East Windsor, Conn., plans to cooperate in this endeavor. Any other amateur operating on 1.75 mc. who is desirous of assisting in the code practice program is invited to drop a line to A.R.R.L. Communications Department listing schedule for announcement in *QST*.

The W9AUH O.R.S. Trophy is a big silver cup, donated by Griffin W. Mossbarger, of Louisville, Ky., to be awarded permanently to the O.R.S. winning it three different times (whether consecutive or not). The Cup Trophy is one of the handsomest achievement awards we have seen and it takes



O.R.S. TROPHY CUP

W9KJY, L. J. Huntoon, Glen Ellyn, Illinois, is the first winner of the W9AUH-O.R.S. Cup Trophy shown above. "JH" worked one hundred eleven Official Relay Stations in 37 A.R.R.L. Sections, and heard 65 additional A.R.R.L. appointees in the contest period October 20/21. Using one single frequency, 3531 kcs., his input never over 50 watts, he rolled up a score of 19,277 points!

real operating ability to win it. The Cup is the temporary trophy of each winner of the quarterly O.R.S. activities until another winner comes along. The cup will have each winner's call and the month of the award engraved thereon until the permanent winner is decided. All Official Relay Station appointees confirmed by A.R.R.L. Section Managers up to January 19, 1935, will be eligible to compete in the activities which start that date, and which will decide the second call to be engraved on the Cup.

BRASS POUNDERS' LEAGUE

(Sept. 16th-Oct. 15th)

Call	Orig.	Del.	Rel.	Total
W2EKM	110	40	1352	1502
W6BMC	16	33	1386	1435
W9MZD	45	25	1264	1334
W6HHF	15	11	1296	1322
W9KG	32	84	1086	1202
W9FSA	20	139	1032	1191
W8GUF	314	74	514	902
W5CEZ	110	127	652	889
W9ILH	17	53	802	872
W9KJY	84	95	636	815
W9ETL	103	219	430	752
W6FQU	144	54	535	733
W9FWW	87	46	522	655
W8JTT	145	95	328	568
W3BWT	85	127	341	553
W3CWL	71	26	452	549
W6EK	49	92	389	530
W93WX	68	96	360	524
W9BMA	111	91	314	516
W5MN	27	64	414	505

MORE-THAN-ONE-OPERATOR STATIONS

W9ZG	661	805	555	2021
KAIHR	507	353	722	1582
W9HNT	233	306	296	835
W5OW	93	373	250	716

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:

W1FIO, 232	W6H2T, 146	W3E0U, 106
W6FTL, 217	KAILG, 140	W3EZ, 103
W2ELK, 139	W1MRC, 137	W6NE/CFN, 102
W6CVF, 180	W1EOB, 120	W9GNK, 102
W6AZU, 179	VE3JT, 108	More-than-one-opr.
W3ANT, 156	W1AMG, 107	W3CXL, 103

A.A.R.S. STATIONS

Call	Orig.	Del.	Rel.	Total
W1NF	37	87	611	735
W1JB	98	152	336	586

MORE-THAN-ONE-OPERATOR STATIONS

WLM	163	365	1714	2242
WLJ	137	68	488	693
WLV	23	85	400	508

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.

Double Your DX — Get More QSOs — Be Courteous

Both c.w. telegraph and voice operated stations will make operation on 14-mc. and all other bands used by both kinds of stations more effective IF THE 14,150-14,250, 3,900-4,000 and 1,800-2,000, kc. allocations (where 'phone work is allowed are avoided, and adjustments for c.w. telegraph operation carefully confined to 14,000-14,150, 14,250-14,400, 3500-3900 and 1715-0800 kcs. when working in these three bands.

John B. Rideg, Jr., W2EKM

1910-1934

It is with deep regret that we record the passing on November 9th of John "Buddy" Rideg, Jr., W2EKM, A.R.R.L. Section Communications Manager, Northern New Jersey. A former Navy man, "Bud," as he was known on the air, was active in the N.C.R. and A.A.R.S. He was an inveterate brasspounder, being Chief Operator at W2JC and W2HMK, stations of the Bloomfield Radio Club and West Essex Radio Club respectively, as well as making many QSO records for his own station. From September 1933 to September 1934 W2EKM had 4322 QSO's and worked 698 stations in one month! "Bud" was one of the best known operators on the air and his snappy fist will be missed by his many friends.

Results of the Dakota Division QSO Party

The first annual Dakota Division QSO Party held Sept. 28th-30th was a huge success. 136 stations took part in this gala affair, and their "CQ-Dak" could be heard at all times during the contest. The R.F. Ammeter given as grand prize was won by W9PDL with a score of 1172 points. The winners in each section who receive a Radio Amateur's Handbook as prize are as follows:

Section	Call	Stations Worked	Score
N. Dak.	W9HJC	36	836
S. Dak.	W9FOQ	24	508
No. Minn.	W9PTU	42	924
So. Minn.	W9MOW	18	420

A summary of the scores above 400:

Call	QSOs	Score	Call	QSOs	Score
W9PDL	48	1172	W9KBE	27	560
W9PTU	42	924	W9FOQ	24	508
W9HJC	36	836	W9MOW	18	420
W9FVV	35	820	W9BLZ	20	408
W9PDC	31	688	W9IQZ	20	404
W9MZE	27	564	W9DKT	20	400

O.B.S.

The following is a supplement to the list of A.R.R.L. Official Broadcasting Stations in October QST (page 49): W1ACV, W2DSH, W2FNI, W5DPX, W8DZO, W8JTW, W9LCX, W9LLV, W9YA, VE3RK.

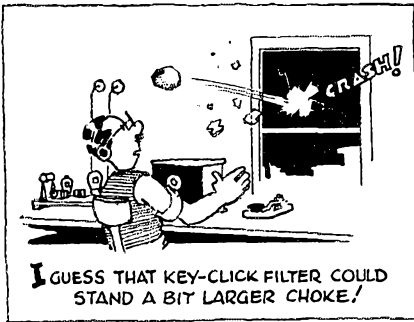
W9MJE, Chicago, will send code practice on 56-mc 'phone for the benefit of local short-wave listeners. His schedule starts November 20th and will continue regularly until further notice.

According to W2AYN, the departure of the club president for Chicago with his car has put the Flatbush Transmitting Club on its feet and Brooklyn Rapid Transit stock is paying dividends at last!

The Hannibal (Mo.) Amateur Radio Club assisted representatives of the F.C.C. in obtaining information which led to the conviction of Charles Fower, who for several years had been operating an unlicensed broadcasting station at Macon, Mo. Amateur radio clubs can often be of material assistance in tracking down illegal operation, and their efforts to that end are most commendable.

W3CTD mentions many messages coming through his station containing only a telephone number and name of city for address. This makes mail delivery very complicated; and mail delivery is necessary when the delivering station does not have 'phone facilities. This brings to mind the importance of complete addresses on all radio-grams. Never accept a message for origination at your station unless it contains a full address, which will assure delivery. A "complete" address may be said to consist of (1) full name of addressee, (2) street and number, (3) city and state.

FOR BROADCASTING STATION OPERATORS.—Plans are under way for a non-commercial "Broadcast Operators Bulletin." All radio operators at broadcasting stations are invited to send the following information to R. N. Eubank, W3AAJ (Chief opr. at WRVA), 2917 Montrose Ave., Richmond, Virginia: Name, Address, Class License, Amateur Call.



Conn., by noon of the closing date given for receipt of nominating petitions. There is no limit to the number of petitions that may be filed, but no member shall sign more than one such petition.

4. Members are urged to take initiative immediately, filing petitions for the officials for each Section listed above. This is your opportunity to put the man of your choice in office to carry on the work of the organization in your Section.

—P. E. Handy, Communications Manager

ELECTION RESULTS

Valid petitions nominating a single candidate as Section Manager were filed in a number of Sections, as provided in our Constitution and By-Laws, electing the following officials, the term of office starting on the date given.

Tennessee	Merrill B. Parker, Jr.	W4BBT	Oct. 14, 1934
Southern New Jersey	Gedney M. Rigor	W3QL	Oct. 14, 1934
Kansas	O. J. Spetter	W9FLG	Oct. 15, 1934
San Joaquin Valley	Clyde C. Anderson	W6FFP	Nov. 14, 1934

In the Virginia Section of the Roanoke Division, Mr. Nell E. Henry, W3BKY, and Mr. Charles M. Waff, Jr., W3UVA, were nominated. Mr. Henry received 57 votes and Mr. Waff received 26 votes. Mr. Henry's term of office began Oct. 30, 1934.

ELECTION NOTICES

To all A.R.R.L. Members residing in the Sections listed below: (The list gives the Sections, closing date for receipt of nominating petitions for Section Manager, the name of the present incumbent and the date of expiration of his term of office.) This notice supersedes previous notices.

In cases where no valid nominating petitions have been received from A.R.R.L. members residing in the different Sections in response to our previous notices, the closing dates for receipt of nominating petitions are set ahead to the dates given herewith. In the absence of nominating petitions from Members of a Section, the incumbent continues to hold his official position and carry on the work of the Section subject, of course, to the filing of proper nominating petitions and the holding of an election by ballot or as may be necessary. Petitions must be in Hartford on or before noon of the dates specified.

Due to the death of the Northern New Jersey SCM and resignations in the North Carolina, Quebec, and Georgia-South Carolina-Cuba-Ile of Pines-Porto Rico-Virgin Islands Sections nominating petitions are hereby solicited for the office of Section Communications Manager in these Sections and the closing date for receipt of nominations at A.R.R.L. Headquarters is herewith specified as noon, December 14, 1934.

Section	Closing Date	Present SCM	Present Term of Office Ends
Nevada	Dec. 14, 1934	K. L. Hansey	Aug. 15, 1934
Saskatchewan*	Dec. 14, 1934	Wilfred Skaffe	June 15, 1934
Alaska	Dec. 14, 1934	Richard J. Fox	Feb. 16, 1934
N. Carolina	Dec. 14, 1934	G. H. Wright, Jr. (resigned)	
Quebec*	Dec. 14, 1934	J. A. Robertson (resigned)	
Northern New Jersey	Dec. 14, 1934	John B. Rldge, Jr. (deceased)	
Georgia-South Carolina-Cuba-Ile of Pines-Porto Rico-V. I.	Dec. 14, 1934	George A. Love (resigned)	
San Francisco	Jan. 15, 1935	Byron Goodman	Jan. 18, 1935
Maritime*	Jan. 15, 1935	A. M. Crowell	Jan. 18, 1935
Michigan	Feb. 1, 1935	Kenneth F. Conroy	Feb. 9, 1935
Maine*	Feb. 1, 1935	Reg Strong	Feb. 15, 1935
Sacramento Valley	Feb. 1, 1935	George L. Woodington	Feb. 15, 1935
Western Fla.	Mar. 1, 1935	Edward J. Collins	Mar. 20, 1935
N. Texas	Apr. 1, 1935	Glen E. Talbutt	Apr. 15, 1935
New York City & L. I.	Apr. 1, 1935	Edward L. Baunach	Apr. 15, 1935

* In Canadian Sections nominating petitions for Section Managers must be addressed to Canadian General Manager, Alex Reid, 169 Logan Ave., St. Lambert, Quebec. To be valid such petitions must be filed with him on or before the closing dates named.

1. You are hereby notified that an election for an A.R.R.L. Section Communications Manager for the next two-year term of office is about to be held in each of these Sections in accordance with the provisions of By-Laws 5, 6, 7, and 8.

2. The elections will take place in the different Sections immediately after the closing date for receipt of nominating petitions as given opposite the different Sections. The Ballots mailed from Headquarters will list the names of all eligible candidates nominated for the position by A.R.R.L. members residing in the Sections concerned. Ballots will be mailed to members as of the closing dates specified above, for receipt of nominating petitions.

3. Nominating petitions from the Sections named are hereby solicited. Five or more A.R.R.L. members residing in any Section have the privilege of nominating any member of the League as candidate for Section Manager. The following form for nomination is suggested:

Communications Manager, A.R.R.L. (Place and date)
38 La Salle Road, West Hartford, Conn.

We, the undersigned members of the A.R.R.L. residing in the Section of the Division hereby nominate as candidate for Section Communications Manager for this Section for the next two-year term of office.

(Five or more signatures of A.R.R.L. members are required.)

The candidates and five or more signers must be League members in good standing or the petition will be thrown out as invalid. The complete name, address, and station call of the candidate should be included. All such petitions must be filed at the headquarters office of the League in West Hartford,

STATION ACTIVITIES

ATLANTIC DIVISION

EASTERN PENNSYLVANIA—SCM, Jack Wagener, W3GS—By order of P. O. Dept., please address all mail to S.C.M. to Llanerch, UPPER DARBY, Penna. Please send suggestions for Section Contest. 3EZ has been appointed Route Manager. 8DIG wants schedules with C.C.C. camps in central Penna. 8EOH has 21 schedules per week. 3ABZ was on N.C.R. cruise. 8LRI worked all VE districts in contest. 8ASW has had 50-watter. 3AKB's transmitter is "red hot." 3AQN is QRL Army traffic. 8IWT reports Shamokin Radio Club on air under call 8MRH. 8FLA is D.N.C.S. Army Net. 3CL is resuming schedules. 3BOL reports regular call at C.C.C. Camp in Reading now 3EOY. 3EWJ worked all U.S. districts in one month on air. 3AKG blew two power supplies in one month. 3CJY put up 40-foot mast on roof. 3ECD is in line for O.R.S. 3ALX works West Coast every morning on 3.5 mc. 3CIQ and 3OK report via radiogram. 3EPJ's new rig uses 830 final. 3EGA says DX excellent.

Traffic: W3ABZ 7 EZ 393 ADM 189 AKB 317 AQN 170 BY5 101 CL 184 ADE 12 BOL 217 EWJ 11 AKG 54 CJI 9 ECD 124 ALX 152 CIQ 88 EPJ 5 OK 342 GS 33. W8DIG 39 EOH 66 LRI 31 ASW 11 IWT 83 FLA 236.

MARYLAND-DELAWARE-DISTRICT OF COLUMBIA—SCM, Edgar L. Hudson, W3BAK—W3CXL—WLM, Sgt. Ed Day, accompanied by Pvt. Bradford Crowell, 3BTI and opr. at "WAR," enjoyed fine trip to Roanoke Convention. BWT has eleven schedules. EOU made fine showing in O.R.S. Party! EOG now works schedules on 7 mc. CIZ is new O.R.S. There are eight hams in DML's high school. EDS took Class "A" exam. CDG is active in A.A.R.S. DTO took portable up in Mts. CQS is QRL N.C.R. WZ is back after being off two years. EHW/OZ is rebuilding. W2CYA, portable, is awaiting W3 call. BHE is building new c.c. rig. CDQ attended Roanoke Convention. 3DOG of Laurel, Del., has a job as teacher of radio in local high school.

Traffic: W3CXL 359 (WLM 2242) BWT 553 EOU 450 EOG 89 ASO 61 CIZ 57 DML 42 CWE 40 DUK 26 ETV 20 BAK 11 EDS 10 CDG 8 DTO 3 ATQ 5 CQS-EIL-WZ 2 EHW/OZ 1. W2CYA 1.

SOUTHERN NEW JERSEY—SCM, Gedney Rigor, W3QL—AQK has moved to N. C. DNU is getting O.R.S. ticket. ZI handles over 50 schedules per week. APV is handling Trunk Line schedules. NF is new Route Manager for extreme northern portion of Section. EDP has Jr. opr. No. 2 now. AEF is looking for local skeds this winter. CWL turned in largest traffic total in So. N. J. in many months. ETL works on very low power. AYZ gets out well with low-power phone. ZX had large score in RMNite contest. QL, S.C.M., went on sea trip. Many thanks for re-election, and will see that all reports are in on time. The S.J.R.A. had invitation to Naval

Militia and heard Admiral Robinson, first Chief of Radio in the U.S., speak and tell of the first radio on our naval vessels. The new club in Atlantic City, known as the Island Radio Club, has opened with a bang. All stations within radius of 25 miles of Camden send in applications for entry in station contest in So. Jersey held by S.J.R.A. A Silver Loving Cup will be awarded the winner in February. A card will enter your station. AVJ's signals were heard in Gulf R9 by QL. BDH is operator aboard the Grace Line steamer *Santa Barbara*, plying between New York and Valparaiso, Chile.

Traffic: W3AQC 1 DNU 3 ZI 124 APV 264 NF 53 EDP 8 AEJ 12 CWL 549 ETL 16 (WLNE 121) BIR 2 AYZ 3 VE 19 ZX 4 DST 9 AVJ 13.

WESTERN NEW YORK—SCM, Don Farrell, W8DSP—The Mohawk Valley Brass Pounders have new club rooms at 236 Genesee St., Utica. JAK and DSU are on 56 mc. DT and LGZ visited Schenectady. MNR is building new high-power rig. LUJ is buying new super. EXT's antenna broke. HWR is on with new rig. JQV sends complete description of his station. JTT, R.M., is high traffic man. ATJ has new transceiver with 19 tubes. DSS, R.M., attended Toronto Convention as did JW, EMX, IYL. AQE has nice schedules. MQY is new Sodas call. KBS is working on new rig. EUY reports VK's and ZL's are coming thru on 3.5 mc. in early morning. GWY is putting in new operating desk and equipping with break-in. GPS changed QRA. FYF keeps schedules on Monday only. GZM has been operating at 9USA. LGR, MAD, LVZ attended Schenectady hamfest. EWP attends all Navy drills. BQJ is going to the big woods. KMC is starting up again. EMX is on at Waterville. AAR has gone on 3.9- and 14-mc. 'phone. ERU is changing to link-coupling. VJ reports T.C.R.C. having a portable contest. LDA blew his '10. The following report: LGN, DBX, ABX, AFM, DHU, JJJ. The Southern Tier Transmitting Association held an enjoyable hamfest at Wagner Hotel in Penn Yan on Oct. 20th. Speakers included Radio Inspector M. W. Grinell from Buffalo, Dr. Burton T. Simpson from Buffalo and the S.C.M. LN, better known as "Eight Lousy Notes," was one of the high lights of the entertainment. FOY is building RK-20 Tri-tet job for the S.C.M.

Traffic: W8JTT 568 DSS 278 JTP 119 AQE 60 KBS 37 EUY 32 GWY 25 GPS 21 FYF 17 GZM 16 BWY 14 LGR-EWP 12 BQJ 9 KMC-FMX 8 AAR-FTB 6 ERU 5 VJ 3 JTH 8.

WESTERN PENNSYLVANIA—SCM, C. H. Grosarth, W8CUG—GUF tried hard to break RMNite QSO record. KWA has been appointed Route Manager. CUG worked all districts in last RM party. HGG and JZZ enjoyed VE/W contest. GBC resigned as R.M. due to lack of time. EZT reports by radio. KOB has two rigs, one on 7, one on 3.5 mc. GSH is building panel job. LOQ has RK18 going. LIG reports LTQ active on 1.75 mc., ESR busy with P.A. work and BOZ building highpower rig. IOH says INE with ops IOI, KXP, LSH and IOH had an all-night QSO party. He reports for IOI and JZR. GVI sends first report. CMP is erecting directive array for 56 mc. GJM gives us dope on Hallowe'en party held by SHBP&M. HMJ had a visit from KRG. FKU is trying to get club started in high school. KYW wants O.R.S. appointment. KSG is rebuilding final. CQA says things going smoothly in Warren.

Traffic: W8GUF 902 KWA 348 CUG 171 HGG 104 GBC 83 JZZ 32 EZT 15 KOB 22 GSH 21 KD 14 AXD 11 LOQ 9 LIG 8 IOH 7 IOI 3 JZR 11 GVI-CMP 6 GJM 3 HMJ-HBG-FKU-KYW 2 KSG 1. EZT 17 IUY 43.

CENTRAL DIVISION

ILLINOIS—SCM, F. J. Hinds, W9APY-WR—R.M.s 9ERU, 9ILH, 9KJY. IBC put up new R.C.A. antenna with new mast. HUM has U. of Ill. to draw traffic from. New Tri-tet at EQX. IKQ reports DX fine. RPM has new RME-9D receiver. New super at MRQ. BRX uses link coupling throughout. MCC is rebuilding entire station. CKC is on A.R.R.L. Trunk Line "A." DQH is DXing. New c.c. outfit at RDU. RVB rebuilt to Class B. PZ put on one of the biggest hamfests ever. ERU says

FFQ won the "HRO" at PZ hamfest. HUX has been made O.R.S. for local chapter of American Red Cross—Signal Corps. MLH is low power A.A.R.S. New bug at OLA. WC handled half-hour conversation with UZ at 44BY—family QSO of UZ's. CUH was heard in England and Germany on 3.5 mc. KA has worked 49 countries. KEH worked UFTA Bulgaria. The ops at KAT were DOX, RTY, ALI and NKV. AND is working hard on Illinois Net. MIN is now W.A.C. MMH has new receiver. MRII got R-8 in Hawaii. ASZ is on with two c.c. frequencies. DDO changed QRA. STG, RWS, SQY and SRC send first reports. KMC is at C.C.C. Camp at Ottawa, Ill. PNE found his counterpoise absorbing the juice. HQH has A.A.R.S. under control. ILH and KJY are on A.R.R.L. Trunk Line "K." ICN is giving code practice to ham aspirants. IYA is on A.R.R.L. Trunk Line "J."

Traffic: W9KJY 815 ILH 872 DOU 281 (WLT 191) HUM 226 CGV 200 HKC 174 HPC 169 CKC 124 SAH 103 NN 99 KAT 95 DJG-MIN 94 HSG 89 OXA 85 HQH 57 MLH 49 FO 47 DBO 44 LIV 37 NXG 36 KEH 29 CUH 21 HUX 19 DQH 18 IEP 15 PNE 13 SQY 12 PTW 10 SG 8 CEO 7 ICN 5 ASZ-KA-STG 4 ANQ-IKQ-RPN 3 ERU-RWS 2 COW-DDO-MCC-WR 1 IYA 23. INDIANA—SCM, Arthur L. Braun, W9TE—FQ built new transmitter for school. HBK won a scholarship at I.U. ARK was visited by K4SA and 8CPC. MQV entered DePaw Univ. SFG gets out fine with low power. GFS is QRL school. SSE has job with T.W.A. GSX has vertical ant. HUU keeps regular s:chedules. YB is building shack. HUF is QRL work. HPQ is building rack and panel. AXH doesn't like the way Ocsil'scope shows his rig up. LLV is giving 3.9-mc. 'phone a try. TE was visited by W6BPU, S.C.M. L.A. JOQ and AET visited Indianapolis gang. AEU is on from N.G. armory. SWH is new at Ft. Wayne. OKX is blooming out with new rig. LQ is rebuilding. DXing: EGQ, HUV, OFA, CKG. RE is doing fine as O.P.S. JHY is QRL as traveling salesman. Calumet Amateur Radio Assn. has 51 members; just organized, located at East Chgo, Ind. ABB Pres.; RGB Secy.; PLW Treas. New hams are urged to report to S.C.M.

Traffic: W9FQ 3 DET 5 EGQ 4 ARK 8 MQV 4 JRK 105 (WLHM 26) CKG 5 LSZ 21 HUO 14 YB 12 HUF 7 HPQ 22 HUV 2 AXH 5 TE 7 DPL 3.

KENTUCKY—SCM, G. W. Mossbarger, W9AUH—PXX wants another Ky. hamfest. We expect OX on soon. GGB got traffic in W/VE contest. HCO is on with 200-watt 'phone. CDA is going strong on A.R.R.L. Trunk Line "B." FGK did some pinch hitting on Trunk "J." BZS has new pole up. ACD bought RK18. ELL works all frequencies for Navy. PLM, former 1MK op, turns in nice total for starter. HBQ is rapidly becoming Ky.'s best state traffic man. BAZ is now in power class with full 1-kw. rig. MN is new O.R.S. BWJ socks an R9 signal into Louisville. EDQ likes a good rag-chew. IXN burns AUH down because AUH used a straight key on him. HAX twins with A.A.R.S. LDL comes up out of pickle vat to report. KKG has ambitions again. FQQ operated 3ZD during O.R.S. Party. NBD has designs on neighbors as mike purchase shows up. ABV awaits Patterson receiver. CNE is in new QRA. ARU has new way of reporting: shouting it from his bus as he shakes by. Are you gentlemen set for the November state contest? AUH hopes something will cause you chaps to report on time.

Traffic: W9AUH 156 KKG 17 HAZ 35 LDL 6 IXN 52 EDQ 30 BWJ 60 MN 9 BAZ 4 HBQ 28 PLM 29 ELL 41 ACD 11 FGK 7 BZS 16 ARU 20 PXX 25 CDA 10 GGB 27.

MICHIGAN—SCM, Kenneth F. Conroy, W8DYH—Free copy of Michigan Bulletin to all stations reporting active in Michigan; sponsored by Detroit Amateur Rdo Ass'n (Meetings 2nd Thurs. each month) MICHIGAN NINES: Congrats to ADY, who will work as R.M. No. 2 of U.P. PDE continues in his regular capacity. CWD, P.A.M., is perking at the boys to get new 'phone men as O.P.S. RHM begs for traffic. PCU will be snowed in by now and won't get mail. OZM is trying to get back in the graces of YL! CRX is QRL work. EQV grinds away with his "caraborandum." CWR hopes for more

traffic. HK could not control that itching in his fingers, and is back on again. MICHIGAN EIGHTS: Congrats to QT, A.A.R.S. R.M. and to ARR, U.S.N.R. R.M. GUC is Corps Area N.C.S. Alt. and QT is State N.C.S. DVC, with plenty of schedules, leads the gang. DWB reports new Jr. oprs. at LAL and FCL. Congrats. R.M. AEQ piles up plenty of traffic. IXI wants schedule with Elmira (N. Y.) for "38" traffic. IPX reports nice talk by R.I. at Genesee County A.R.C. EKT wants to get O.P.S. chain gang going. DYH sends code practice on 3838 kc., 5 to 5:30, Tues. and Friday, and 12 Noon E.S.T., Sunday. 1FQ has been QRL club raffle—L.A.R.C. is going to have rig going again—HXT. "Ole Political Boss," FX, is QRL lining up his candidates. Luck! We are all sorry to hear of the death of R.M. EGI's mother. IBH hooked his first ZL, reports JKO. IDB works on rack and panel. Two bits says R.M. FTW he hits 2000 this year! IOR sold GRN his '10s.—IOR bought pair RK18s from GG—GG is on with old '03A! BMG is down on guys who say "SK" and mean: "It's about time I was thinking of QRTing." CAT's new wife went home to mother and next morning he was on the air—next morning. At least that's OUR story. Hi. LZV has N.R.A. station—receiver works when transmitter doesn't, and vice versa. KJP reports M.C.R.C. licensed, MRM. GHP works on c.c. rig. IKZ says 1.75 mc. getting better day by day. 5AUW, former S.C.M. of New Mexico, is now OUR 8LTS. Welcome, O.M. SH starts an active season from MSC. Michigan R.M. contest is under way. Your R.M. would appreciate your help. Join up with the Great Lakes Storm Net—NOW!

Traffic: W8DVC 422 QT 268 (WLTX 34) AEQ 232 DWB 221 GUC 176 (WLTC 72) CPY 110 LAL 105 BMG 92 EGX 80 IOR 74 1CM-LSF 62 DED 58 FTW 54 ARR 48 IDB 45 COW 33 IWM 29 JKO 27 FX 24 IFQ 21 EGI-KYS 16 DYH 15 EKT 14 AYO 13 ABH 12 1FD-MAY 10 IPX 9 IXI 8 GQS-KLR 7 CAT-KNP 6 HBZ-KJP 4 DZ-LZV-MPT 3 ETP-GHP-GSP-IKZ-KNT 2 NQ 1. W9HK 151 ADY 80 PDE 58 RHM 30 PCU 21 OZM 17 CWR 1.

OHIO—SCM, Robert P. Irvine, W8C10—BBH is doing good job as Chief R.M. Western Ohio. DVL has hard time making 7-mc. back yard take a 3.5-mc. antenna. IET sends a list of schedules that looks like a R.R. time table. AQ obtained 8AQ for his 1935 license plates for his car. HGE gets big kick out of A.A.R.S. work. EPP says single freq. operation for A.A.R.S. Net is F.B. HMH at last has a chance to try ultra high freq. Ex-3DAI is on with call MQC. CTP is building ¼ KW rig. BON is out to heat the Section in the SS. HXJ is looking for DX. GSO says things lining up F.B. in Southern Ohio. BDY reports by radio. WE spends most of his time on 7 and 14 mc. RAH is active on 56 mc. Someone set fire to AMF's mail box and burned up his QST. GUL is new O.R.S. KQO is also 9ACE. BKE says, "Look out for southern Ohio." JIN says 14 mc. getting better. DND will have four-band transmitter. BMK is QRL Akron Univ. ISK has new receiver. GDC works all bands from 56 to 1.75 mc. BAC is on 14,300 kc. KLP is trying to figure out how to make the old antenna work. LGL is Good-year Radio Club station. AXV sends report via 56-mc. 'phone. KWJ, LJR, DIH, FGC, ANU, BRB, RN and BRQ report. New A.A.R.S.: DCY, LZE, HXC is new ham in Mingo Jet. New reporters: LEM, LVH. MQV of Woodfield had JWL as code instructor. LBE worked Calif. MSF is new Cincinnati man. New operator at DZO: an 8-pound boy. BRQ spends all his time on 23- and 56-mc. 'phone. ANU is at Bethany College. FGA is out after W.A.C. DIH is busy building DDQ. LJR reports for Y.M.C.A. Wireless Club of Ashtabula. GGF is QRL Miami U. KWJ says Key & Mike Club of Canton is building new transmitter. CIO says: Interest in O.R.S. and O.P.S. is on the increase. Cleveland and several other localities are going in heavy for 56-mc. work, and 28 mc. seems to be on the increase also. News from the Coshocton Radio Traffic Assn. sent in by the president, 8CSP: GXK has wonderful results with 1.75-mc. 'phone. CBC found his crystal changed frequency. FXL

is with the Pennsylvania air lines. CSP lost his sky piece in one of those summer wind storms. CKX, our vice-pres., cannot give much time to his rig because of YL!

S.C.M. W8C10 will give an 83 rectifier tube to the Ohio operator having the highest percentage of his total traffic points in deliveries for the reporting month December 16th-January 15th. The traffic total must be at least 30 in order to be eligible. In case of a tie, the one having the greatest number of deliveries will be the winner. This competition is not open to R.M.'s.

Traffic: W8C10 260 (WLHC 95) BBH 45 (WLHA 177) HCS 146 UW 61 (WLHI 191) DVL 120 IET 96 AQ 68 HGE 66 EPP 52 HMH 50 CTP-BON 41 HSK 33 LZK 30 GSO 28 BDY 25 LEM 24 WE 19 EJ 14 BAH-LZE-AMF 12 GUL 11 LVH 8 KQO-JTW 6 BKE-JIN 4 DND 3 DZO-BMK-ISK 2 GDC-BAC-LCY-KLP-LGL-AXV 1.

WISCONSIN—SCM, Harold H. Kurth, W9FSS—The S.C.M. has resumed his post and shall welcome all reports from Wis. amateurs. My new address is 9 So. Randall Ave., Madison. ATO is QRL beer parties Friday nights. HSK is still the good old western standby. SDK is an up-and-coming traffic man. OXP is Wisconsin station on A.R.R.L. Trunk Line "A." OKS is c.c. on 3777 kc. SHN is planning bigger rig. LFK is "that way" about 56 mc. HDP wants O.R.S. ETM, AON, and GIT attended 9PZ hamfest. KQL has been painting all summer. STP is new Milw. ham. FCS and other hams at U. of W. Ext. Div. are invited to send in monthly reports. RSA is building wigglesticks (bugs to you). Hey, fellas, let's give 9HTZ and QRZ our full support. He's doing a real job. KLF, HBE, RNU, NJF, HMS, GWK and FSS are attending U. of W. HMS wants to run hamfests every week.

Traffic: W9ATO 111 HSK 109 SDK 75 OXP 71 OKS 37 PGU 18 SHN-LFK 10 RKP 4 HDP 6.

DAKOTA DIVISION

NORTH DAKOTA—SCM, Fred J. Wells, W9JVP—HJC's new rig works like a charm. OEL keeps seven schedules daily. PAI has new job at KFYY. JVP is putting 849 in final. LBI made nice score in VE/W contest. PDC's new QRA: Thompson Falls, Mont. FVV's new QRA: Port Arthur College. SHI is trying 1.75 mc. SAW has c.c. rig. IRA. PGO and GER are oprs. at WUCR. JTP is on 3.9-mc. 'phone. New Bismarck hams: STT, STJ. KZL is new O.R.S. RQX plans on 'phone. BTJ QRL college: BTJ, EIG, KBE. SNP likes 14 mc. best.

Traffic: W9HJC 110 KBE 105 OEL 86 PAI 81 JVP 79 LBI 10 PDC 24 FVV 9 LHS 10 SHI 13 SAW 14 IRA 17 PGO 19 SNP 10.

SOUTH DAKOTA—SCM, Mike Strahon, W9PFI—FOQ applied for A.A.R.S. PFI has new RME-9D receiver. CRY conducts state drill for N.C.R. on 3877 kc. at 1:00 p.m. every Sunday. TY says SCB (his OW) is visiting on the west coast. ALO, JLI and PFI have been experimenting on 56 mc.

Traffic: W9PGV 56 FOQ 38 PFI 30 TY 19 ALO 18.

SOUTHERN MINNESOTA—SCM, Francis C. Kramer, W9DEI—FMA is gathering news for this column from Mpls. gang. Give him your news and traffic reports. PDL won grand prize in Dak. Div. QSO party. MOW won Handbook in QSO party. BKK, R.M., has started fall traffic activities. EGI moved to Slayton from No. Dak. BN is going full blast. DH had BBN as a guest. RHT's 10's went west in QSO party. DVH is now in Owatonna. RKG hopes to have 100 watts. ZT was in VE/W contest 45 minutes to get 135 points. DKT has new c.c. rig with '03A final. AFR is building new 3.5-mc. rig. BNN wants to know what's good for a waning ham spirit? FWN gets R9 from Mexico. SKX, SKW, KJR, and PZN are attending U. of Minn. AIR expects to be home by mid-Nov. ADQ has Class A ticket. RBW has P.P. RK-20's on 'phone and c.w. RAB uses P.P. '46's. DEI has new 35-foot mast on top of his house. STB and SNW are new Mpls. hams. KAV attends Dunwoody Inst. SEU won a 0-200 milliammeter for naming the coming convention. GTE succeeded in raising a new mast. PJA

hears FB DX. EKU and KVI are QRL Univ. SJX is new ham on 1.75-mc. 'phone. The Red Wing fellows held a private hamfest. Albert Lea has a new radio club named after the town.

Traffic: W9BKK 227 DEI 104 BN 60 DH-RHT 20 DVH 8 RKG 7 ZT 6 DKT-BNN 2.

DELTA DIVISION

ARKANSAS—SCM, H. E. Vette, W5ABI—BMI—WLUA lost tube in final. ABI completely rebuilt. ASD is at C.C.C. Waldron, Ark. DRR has been appointed O.P.S. DTI was appointed O.R.S. CZG-DVI is putting almost 200 watts into a pair of '10s. DSW has new Super. DJQ is located at Pine Bluff. CIU worked K5 and VE1. DYT has new SW3. DFZ took Class A exam. EIP worked LU on 14 mc. EAR is on 3630 kcs. PX remodeling house. ARQ enlisted in C.C.C. CPV is trying antenna coupling unit. DVR has been sick in bed. CVO is working on local light plant. DRZ has new monitor. DNX is located in Hot Springs. EBG is new DeQueen ham. Are you in the traffic-handling contest now going on in this state? It will run for five months. If you have not been reporting to the S.C.M. each month you should do so, as you may win one of the prizes offered. We are going to put Arkansas and the Delta Division on top. We challenge any state in the Delta Division to a Traffic-Handling Contest.

Traffic: W5BMI 255 (WLUA 35) ARI 140 BED 105 ASD 28 DRR 19 DTI-JK 16 CZG/DVI 14 DSW-DJQ 12 CIU-DYT 10 DHG-DFZ 4 EIP 1.

LOUISIANA—SCM, W. J. Wilkinson, Jr., W5DWW—DLG keeps daily schedules. HR is 'phone traffic man. BID uses 'phone and c.w. on 3.5 mc. CJO invites you to see him when in N.O. ABS is active on 56 mc. LA is building 1-KW 'phone. BPN is active in Gretna. BI is fun maker at club meetings. BSM visited in N.O. AEH transmits official broadcasts. ELF is new N.O. station. EDZ worked a VK. DIQ is active in Algiers, La. CTR's new QRA: 4489 Music St., N.O. DES operates at R.C.A. station in N.O. AVO returned from year at sea. ACA, OZ, and ACV are at sea. CWX attends Tulane Univ. EKY, ex-5AXG, back on after 5 years' silence—located in Morgan City, La. BDJ has new rig. FR is on 3.9-mc. 'phone. DXI is in Monroe. ANQ is on 7 mc. DAW visited Monroe. AXU is O.P.S. Rebuilding: GR, BYY, EDY, AOZ, DMF. The Shreveport A.R.C. will have station at Louisiana State Fair. Officers of N.O.R.C.: BPL Pres., JW Vice-Pres., DKR Secy., ST Activities Mgr. BZR reported late direct to HQs.

Traffic: W5DDL 73 BPL 12 HR 18 BID 8 AOZ 16 DKR 28 AXU 8 BZR 123.

MISSISSIPPI—SCM, J. H. Weems, Jr., W5CWQ—EKV is assisting the Stork with daily schedule. CUU is raising power. DEJ and CWQ are Trunk Line appointees. ANI is with us again. BXZ is working in Port Arthur, Texas. North Miss. hams interested in forming an N.C.R. Net, get in touch with UM, Starkville. Notice S.C.M.'s change of address: Box 244, State College. Reports welcomed from everyone.

Traffic: W5DEJ 89 EKV 18.

TENNESSEE—SCM, Merrill B. Parker, Jr., W4BBT—The new S.C.M. wishes to thank all who responded to news of his election with messages and letters. PL leads the Section in traffic. AYV carries several good schedules. AAO is back on 3.5 mc. Knoxville gang held impromptu reception for Mr. Herbert and discussed forming club. AFM is back with 270 watts input to pair of '10's and a new antenna mast. MU and BDB attended hamfest held by 9PX. The Nashville Amateur Radio Club has 100% A.R.R.L. membership. The Memphis gang has been QRL Delta Division Convention. In honor of Mr. Herbert's visit and election of the new S.C.M., a big party was held at the home of PL. About fifty hams and near-hams were present. RO and BQK drove clear across state to attend the party. ARP and BBT have new receivers. AM works ON4CSL on 14 mc. and relays traffic to and from CSL's folks. CBA visited 9USA, 9PX, 91XX on visit to Chi. BIR is rebuilding. CBS and CDC are out for 7-mc. DX. IB is on with 3.9-mc. 'phone. LU

is visiting in Chicago. BOZ hopes to get rig on in his apartment soon. Messrs. Hebert and Schnell spoke at Nashville Club. Let's all report next month, gang. New stations: DAL, DAX, DBR, DDZ, CZL.

Traffic: W4PL 209 AFM 49 (WLRH 183) RO 84 AYV 58 ACU 20 BBT 43 ATW 4 BM 2.

HUDSON DIVISION

EASTERN NEW YORK—SCM, Robert E. Haight, W2LU—LU has 830 final with 133-ft. Zepp. EGF uses ball ant.-per ETH. FQG attended S.A.R.A. hamfest. ATM is troubled with key clicks. ESO and HJN were heard in Germany on 3.5 mc. GNI reports three new hams: HNU, HMT, HMX, all c.c. KW is on 14 mc. with '04A. FKL reports HRD new ham. HJZ reports in the game. GRY won condenser at S.A.R.A. hamfest. DSH is new O.B.S. on 3660 and 7160 kcs. FXC is QRL Teachers College. CJS at S.A.R.A. hamfests won Mutter (G.L. drip pan. DTB has worked 67 countries with '10's. QY's football team took first game. BJA is working on new rig. ANV took FB receiver from S.A.R.A. hamfest. CBN, BLL and FWC backed the U.S.N. at S.A.R.A. hamfest. CLL has new rig. SZ, R.P.I. Radio Club, is off with a bang. BPH gets FB reports with new ant. FSD moved to Rochester. CL is getting '52 back on air. BJB says fourteen M.H.A.R.C. members showed the good old ham spirit by attending S.A.R.A. hamfest. BXH-BAF is back at college. CVT and CGT are active on 7 mc. DWO is struggling along on 56 mc. HES is heard on 3.5 mc. using P.P. '45's. HKY is on 3.5 mc. with P.P. '10s. GXE is 3.5-mc. man. BWB comes to life. ESO reports: AQJ building 56-mc. receiver; CPQ swapped power supply for Cocker spaniel pup; HMM has QST's '46 job perking FB on 1.75-mc. 'phone; FEQ is getting Comet Pro; FPX has '52 final; GMM has 75 watts input; ESO has three S.W.L.'s under his tender guidance, breaking in the game. The *E.N.Y. Bulletin* is discontinued until further notice.

Traffic: W2LU 217 EGF 208 FQG 131 UL-ATM 26 ESO-GNI 18 KW 15 PKL 12 CC 9 GPB 4 GRY 3 DSH 2 FXC-CJS-HJN 1.

NEW YORK CITY AND LONG ISLAND—SCM, Ed. L. Baunach, W2AZV—New O.P.S.: 2HBQ at Bayside L.I., from the first district, ex-1CNA. CSO is at new QRA in Little Neck, L. I. DXO entered Northern Nassau Wireless Ass'n flea power contest with 31 watts input on a '01A. HQJ is new at Roslyn. BCW took the final step. Good luck, OM. FDQ is drafting new plans for antenna skyscraper. EYQ's rig gets out FB. DBE is now a traveling salesman. EWS attends Pratts Institute. APD is in N.C.R. CFE is on 1.75-mc. 'phone. FXM is on 7 mc. with $\frac{1}{4}$ kw. input to final. EYS worked his first '7" on 3.5 mc. GXN and HLD are on 56 mc. DOG plays tennis with his YF on Sundays. BSR was in the thick of Melbourne Centenary DX contest. US is on 3.9-mc. 'phone. BFA can be heard on 1.75-mc. c.w. HBO scored 81 points in VE/W contest. GNX put e.c. 43 osc. in his M.O.P.A. BLH is QRL N.Y.U. evenings. DJL and BWA are QRL work and school. DBQ is N.Y.C. station on Trunk Line "A" and CHK is on Trunk Line "C." DJP went on 7 mc. after being on 3.5 mc. for two years. AEN schedules portable 2AYN in Chicago. FF worked VQ4CRP Kenya, Africa, on 14236 kc. CYX schedules IHRC three days a week. CCD has '03A on 3.5 mc. BGO handled some interesting police traffic. KI schedules 1DOW and 3BY5. FLG handles VK traffic. OQ discovered bad tube in 59 Tri-tet after scrapping it! LB left the Section and is operating 9MN. ELK makes B.P.L. in tenth month. GDF rebuilt rig. GMP has been busy as chairman of Board of Elections and is also on Democratic ticket. EAF's best 56-mc. DX using two 2A5's in a transceiver with 180 volts: 3EJ in Bethlehem, Pa., worked, a distance of over 75 miles. PF operates SC for A.A.R.S. schedules. DRG reports for N.Y.U. Radio Club, call DSA, 400 watts input on 7 mc., 16 licensed ops, BOP pres., DRG chief op, EXK secy.-treas.; the station is on campus at Univ. Heights, Bronx. HNH is 14 years old. GEI reports for newly formed club in Queens, Crystal Wireless League. ATB uses pair '10's. GMI is fiddling with e.c.

rig. GNO uses indoor antenna. GSF uses flea power, one 71A. GEI is trying suppressor grid modulation. DFO reports ESK, the Harlem Radio Club, is conducting a radio class on Saturday evenings from 7 to 10 p.m.; all essentials of radio are being covered. AZV works DX with 59 Tri-tet and 841 amp. on 3.5 mc.

Traffic: W2ELK 346 CHK 336 DBQ 141 GMP 138 HGO 131 (WLNB 98) EYS 93 EYQ 86 FDQ 60 DBE 47 (WLNJ 40) CYX 37 DJP 35 AZV 30 PF 27 FF 19 CCD 17 OQ 12 ADW-FLG-BPJ-BYL 10 AEN 9 AA-CIT 8 GDF 9 GMS 7 BKP 6 BTF 7 ATD 3 FPU 4 DOG 2 DXO 1 HBO 2 GEI-BVT-AGC 1 AOV 4 WK 2 FIP-GZ 4 BIK 6.

NORTHERN NEW JERSEY—SCM, John Rideg, Jr., W2EKM—EKM is eastern terminal, Trunk Line "L." LK is active in A.A.R.S. GOX is new O.R.S. FQR worked his first Mexican. ABS worked all VE districts in 4½ hours. AFK spends most of his time experimenting. CLM made big score in VE contest. GGW and HPO both install new Zepp ants. HEB joined A.A.R.S. FOP worked 10 countries in a week. GMN reports for first time. GVZ, ex-2AUG and 3DH, reports. BXM is busy on 3.9- and 1.75-mc. 'phone. HRN is new ham from Kearny. 3EWI is active on 56 mc. 2DPB and HBB contacted GLXB during *Morro Castle* disaster off Asbury Park. GNW worked all districts for first time. DEN is active in A.A.R.S. JC, Bloomfield Radio Club, will enter S.S.

Traffic: W2EKM 1502 LK 366 GOX 355 CGG 71 FQR 44 ABS 39 BSZ 43 AFK 33 CLM 25 GGW 20 CJX 16 HEB-FOP 12 GMN 7 GVZ 5 BXM 2 DEN 10. BCX 205 (WLNF 735). W3EWI 6.

MIDWEST DIVISION

IOWA—SCM, Phil Boardman, W9LEZ—9ABE, Chief RM; 9CWG, 9HCH, 9HMM, 9HPA, RM's. Don't forget to send in your activity reports on the 16th of each month. ACL continues to lead. LEZ visited Chicago hams. ABE reports FLI back in fold. EIV is S.N.C.S., A.A.R.S., DEB worked all districts in 10 hours. CWG wants to hear from all interested in O.B.S. or O.O. NDN says DNU moving to Dubuque. IPC erected new masts. RCR has new skywire. HUY is a duck hunter. OZW is leading in local QSO contest. AHH is QRL college. PAH has Class A ticket. FYC reports new ham, SKM. ERY can be found on air Sundays. IQR and IYV received Class A license. HMM completes first Iowa Traffic Net. All eastern Iowa O.R.S. are requested to forward their schedule list to R.M. HMM.

Traffic: W9ACL 133 LEZ 113 LCX 92 ABE 88 EIV 46 DEA 21 CWG 29 NDN 9 IPC 7 RCR 6 HUY 5 OZW-PA 2 HCH 52 HMM 57.

KANSAS—SCM, O. J. Spetter, W9FLG—9KG and 9IOL R.M.'s 9ESL P.A.M. The 8th Annual Kansas Convention at Topeka, under auspices of K.V.R.C., was a great success. IEL has new 830. FRC says, "Am I tired!" (reported day after convention). RIZ is O.R.S. applicant as well as AWP and IEL. PWX married recently. Congrats, O.M. Club activities: W.V.R.C. is in full swing. W.A.R.C. is getting under way for winter activities. H.A.R.C. had election, PB president again. OQC won FBXA at Nebr. Convention. MKR takes the air with Tri-tet. RQE operated USA at World's Fair. GXV is QRL radio service. IQI is rebuilding. PIW moves again. It is reported LJO is selling out.

Traffic: W9KG 1202 FLG 493 IOL 250 IEL 125 NJS 107 EYY 103 CDM 101 BYM-NI 69 EFE 62 KFQ 60 FKD 44 FRC 35 OAQ 30 RIZ 19 KTJ-IQI 15 CMV 7 PWX 4.

MISSOURI—SCM, C. R. Cannady, W9EYG-JPT—MZZ is Alt. D.N.C.S. in A.A.R.S. BMA is working on State Net! JWI is trying 14-mc. DX. DHN is trying for R.P.L. LWG uses inside 7-mc. Marconi for 3.5 mc. EYG is experimenting with 56 mc. KEF attended ham-fest in Chicago. KEI applies for O.R.S. The *Missouri Bull* continuation date is set for November 25th. If you miss your copy, LET US KNOW! NOTICE—ALL O.R.S., O.P.S., O.O., O.B.S., and R.M.'s—If your activity and reports have not been sent in for the last three months,

YOUR appointment is being cancelled! Openings are available for good men in all appointive offices! Interested station operators should make application at once!

Traffic: W9MZZ 1334 BMA 516 AIJ 161 NNZ 153 JWI 100 DHN 96 GBJ 54 HUG 32 ECE 24 CRM 22 DIC 17 LWG 11 EYG 10 JAP-JPT-KEF 2 MLR 1.

NEBRASKA—SCM, Samuel C. Wallace, W9FAM—BNT-WLU keeps schedules with each state daily except Sundays. FWW schedules 9OPR, LGX, BNT, FYY, PAM, RUJ, EHW, IOL, KG, CKC, and 5CEZ. KPA is holding down Trunk Line "L." FAM schedules KPA west, and KJY in Ill., East in Trunk Line "L." Please get in touch with DI or KPA for schedules. DI is R.M. for Eastern Nebr., KPA for Western Nebr. FYP, P.A.M. for Eastern Nebr., wants all 'phones lined up to form a 'phone net. CGF, George Horton, is newly appointed P.A.M. at Grand Island for Western Nebr. Send your ideas to either CGF or FYP and help get 'phone net going. RUJ and KJP received appointments as O.R.S. DMY likes new R-8-T reporting system. EHW schedules mostly A.A.R.S. on Mondays. JED has new Collins 32-B transmitter. BQR is hammering away. DGL is mostly DXing. IFE is in the game again. All making a special showing of some kind are mentioned. All reports are appreciated, no matter how small they are. Send the SCM your report each month. A copy of the report appears in *The Radio Forum* (Omaha) as well as *QST*. Each ham should subscribe for this fine ham paper to keep himself posted; the cost is down where anyone can afford it.

Traffic: W9BNT 835 (WLU 181) FWW 655 KPA 297 FAM 279 DI 239 FYP 183 RUJ 144 DMY 103 EHW 41 JED 28 KJP-BQR 2 DGL 3 FZJ 316 BBS 12.

NEW ENGLAND DIVISION

CONNECTICUT—SCM, Frederick Ellis, Jr., W1CTI—Conn. QSO Contest went over with a bang. UE made highest score. Prizes were won by ASH on c.w. and EEP on 'phone. Conn. Traffic Net is under way. AMG leads gang in traffic, with MK a close second. FIO is up to neck on sure-fire west coast trunk and made B.P.L. in two days. "GII" and UE kept CJD on the air about 27 hours during O.R.S. Party. CVL-WLGI managed to hold onto the traffic banner. DOW is after banner again. HDI is QRL N.C.R. work, but keeps several schedules. BHM plans traffic work. GKM says c.c. rig perks fine. HPI has new Packard. New rig at APW nearing completion. BNB reports new station, IEP. DLX had 11 QSO's with Europe in 30 days on 7 mc. with only 4 watts. IDI is using HJW's rig and pushing traffic. ACV is new O.B.S. HYF has new bug. GTW has an RK-20. BNP is rebuilding. First report from IKE. Please send comments and news items for 10:30 a.m. Sunday broadcasts to either AMG, CJD or CTI. Sunday morning is a good time for general Conn. QSO's. New O.R.S.: TS, HSX, GME, NE. Present O.P.S. are SZ, BIC and QV.

Traffic: W1AMG 474 MK 466 FIO 342 CJD 291 UE 181 CVL 86 (WLGI 53) DOW 86 GME 63 BDI 62 CTI 55 BHM 42 GKM 29 GGX 22 HPI 13 APW 12 HXZ-HLE 10 HSU 2 DLX-BNB-IDI 6 ACV 5 HYF 1.

MAINE—SCM, John W. Singleton, W1CDX—BTG leads the list. BYP at Fairfield is next in line. CDX will soon have new final stage on air. EZR and FQU are new O.R.S. EBM has new high-power rig. HUS moved to Augusta. DHH is putting in new tubes. GBM plans visit to 73 Radio Club. IBM joined U.S.N.R. CRP is on Trunk Line "C." IDN and his mascot "woozie" can be heard nightly on 56-mc. 'phone. IEH gets out FB. ERO, FNG and ERB will soon be O.R.S. EFA has been working at WLBZ. OR is on again from Bowdoin. IKC has c.c. rig on in Waterville. IJF of Fairfield is Ex-4AAH. The 73 Club of Wilton plans an All-States Contest for its members. The Queen City Radio Club held FB ham-fest at Brewer. ARV says the 'phone men's QSO party on Sunday afternoons is going along FB. ARV is also handling traffic for boys at C.C.C. Camp No. 178.

Traffic: W1BTG 66 BYP 48 CDX 46 ARV 33 EZR 32 DHH 19 GBM 13 GOJ 12 IBM-IDN 6 IEH 4 CRP 3 BNC 5 ERO-HUX 1.

EASTERN MASSACHUSETTS—SCM, Joseph A. Mullen, W1ASI—ASI attended Cape and Melrose hamfest. ABG has largest unit in N.C.R. Section. KH is busy visiting clubs. WV wants expedition schedules. GCL is on 3.5 mc. CEL is new O.R.S. BR uses 849's Class A 1 KW 'phone. SW is Phillips Andover Radio Club. IEK is adding RK20's. HKY is busy with Army Net. BSF is going on 28 mc. with 50-watt 'phone and i.c.w. RE has 59 Tri-tet feeding RK18. FPO received 2nd class commercial. HW uses c.c. IDA works DX on 14 mc. ICH is going to Eastern Radio School. ELL is going c.c. on 3505 kc. Following are results of club elections: Eastern Mass. A.R.A.: Pres. KH, Vice-Pres. GL, Treas. DK, Secy. FSK, Publicity ALY, Directors DPP, FIK, NA. South Shore A.R.C.: Pres. AKY, Secy. GYZ, Vice-Pres. SB-HRF, Treas. CHX, Planning Board: ZK, WK. Those interested in handling a county net station appointment, please get in touch with the S.C.M.

Traffic: W1ASI 15 ABG 75 KH 44 WV 16 EVJ 8 BZO 21 FRO 71 GCL 10 CEL 158 BR 21 SW 7 IEK 4 HKY 13 BSF 112.

WESTERN MASSACHUSETTS—SCM, Percy C. Noble, W1BVR/WLG—EOB makes B.P.L. for first time. GZL is busy A.A.R.S. ing on 1.75-mc. 'phone. BVR keeps daily A.A.R.S. schedules. COI worked VK5SU on 7 mc. GUO reports new ham in Adams—J.V. ASY worked 56-mc. portable at Eastern States Exposition for Boy Scouts. D.V.W. returned from hospital. HZK sends first report. B.V.P. has new position in Lowell. Sorry to lose you, Larry. CCH is busy building 28-mc. rig for R.S.G.B. contest. CTK is new O.R.S. DUS moved to 3 Suintang Road, Worcester. GXL has new receiver working FB. HJR has been running around with transceiver in his car. ZB, our O.O., has new Het. meter.

Traffic: W1EOB 453 GZL 158 BVR 80 (WLG 367) DLH 78 COI-AWW 28 DCH 23 ARH 10 DUZ-GUO 8 ASY-DVW 3 HZK 2.

NEW HAMPSHIRE—SCM, Basil F. Cutting, W1APK—At last BPI-XR contacted AL., Mt. Washington to Hartford, 175 miles on 56 mc.! St. Paul's School has new club call, ILK. CCM's XYL is taking exam. HJJ has 1.75-mc. 'phone. IDY and HYO built an All-Star receiver. IDY has FB 56-mc. set on Jerimy Hill. GKE is two QSOs and two YLs ahead of HOV. DMI is back on the air. SK expects to put in 'phone. CUN has fine 'phone on 1.75 mc. IIV of the Twin State Radio Club had their many receivers stolen by vandals. FFL-WLGB handles plenty of traffic. DMD rolled up 15,198 points in the last O.R.S. contest. GHT is D.C.S. in state Army Net. AGO is building new receiver. IGI and HQE have two hour QSO's on 56 mc. HTO has a 1180 volt trans. for his 211. Ed. Neal IGBZ of WLNH has been appointed R.M. for Northern N. H. ET of Dartmouth is on with 300 watts from a 212-D; FZB pres., FHE secy., CVF treas. of Radio Club. EWF took Class A exam. H.P.X. has DX bug. HOU is experimenting. AVJ has RK20 driving a '52 on 14 mc. HTJ is new Concord ham. EAW increased power. IJB has O.R.S. No. 13, but Al is not afraid of numbers. AUW overhauled his rig. AVG's antenna came down again. FX has been busy at WLNH. BII has new shack. HPM has Harvey 56-mc. rig on Mt. Uncanoonuc. TA is busy with radio service. ANS is trying 56-mc. directive antenna "à la Hull." IDQ is on c.w. in Canaan with 50 watters. The S.C.M. doesn't believe in pushing message handling, but let's DELIVER all messages we receive. Fewer honest-to-goodness messages is much better than rubber-stamp kind in large quantity. Shall we have a N. H. hamfest next spring? Like last April? The N. H. Section has \$56 in the Manchester Savings Bank in reserve for Section activities. I believe our Section is one of the very few who has money in the bank in the name of their Section. This money was the profits of the last hamfest.

Traffic: W1DMD 130 FFL 80 (WLG 47) DMI 71 IIV 24 SK 28 FFZ 16 GHT 27 ET 13 CCM 4 HJI 8 IDY 4 IJB 8 APK 13 ERQ 354.

RHODE ISLAND—SCM, Albert J. King, W1QR—The Prov. Radio Ass'n has new club rooms in Olympia

Theatre. HRC is new Route Manager. GTN sends code practice on 3806 kc. CAB moved to North Prov.

Traffic: W1HRC 18 (WLGK 39) GTN 10 QR 9 HVK 2.

VERMONT—SCM, Harry Page, WIATF—FPS, Vermont's only O.B.S., is on 1884 kc. each night at 7:00 o'clock. B.J.P. R.M., uses remote control and uses "break-in" now. E.J.F. VE2IA, and TJ visited the R.M.'s shack. CGV reappeared on 3567 kc. GAE reports FB time at Schenectady hamfest Oct. 6th. A.A.J. FSV, FSW, and GAZ were also in attendance. AXN is newly appointed alternate S.C.S. for Vt. A.A.R.S. GNF is QRL chopping wood. ATF received visit from BD who installed c.c. on the OM's TNT.

Traffic: W1BD 22 (WLG 48) AXN 32 B.J.P 18 GGT 13 GNF 12 GAE 4 ATF 48.

NORTHWESTERN DIVISION

IDAHO—SCM, Don Oberbillig, W7AVP—DOH cussing I Power QRM. CMD is experimenting with 'phones. CGU, DAW, DMT, ASA, CSP, ABK and BRU took Class A exam. CGR, DSL and AVP took commercial exams. CGW is working at C.C.C. EOE is trying to get receiver to work. AHS is increasing power. CGR completed 500-watt 14-mc. rig. HK is building FB rig. BAR has new receiver. CHT lost antenna in high wind. EPU has harmonic troubles. DEB has new junior operator. BYW is QRL orchestra. BZJ thinks one KW would get him out in fine shape! JY moved back to 3.9-mc. 'phone. EFR fears for his nice new antenna masts. CFX took business trip to S.F. GL made trip to Boise. BAA is lining up his rag-chews for winter. AAJ belongs to Breakfast Club. DZO rebuilt new c.c. stage.

Traffic: W7NH 160 CHT 13 BMF 101 JY 3 AVP 149 BAA 25.

MONTANA—SCM, O. W. Viers, W7AAT—AOD and CRH are the only O.R.S. to report for two months. How about the rest of you fellows? The Roundup gang, CPY, BYE, CBY, BDS and EDJ are active. Active Anaconda stations are CME, EET, CUK and EQP. AHF and CDK are oping from C.C.C. camp near Belton. AFS is installing a '52 soon for that African. CEG will soon have a 50-watter on. ABT is visiting his father in eastern Canada. BNU is thinking of 'phone. AOD finally got W.A.C. by virtue of QSO with VQ4CRL in Kenya, Africa. FB, OM! COX has new a.c. receiver. AAT is gathering parts for high-powered amplifier.

Traffic: W7AOD 36 CME 20 CRH 5 BDS 3.

OREGON—SCM, Frank L. Black, W7AMF—UJ was appointed D.N.C.S. for Army Net and R.M. and A.R.R.L. on the same day. AXJ holds high traffic total for month. Hams at O.A.C. Corvallis, are CTL, COQ, CZD, BUF, DDG, ESH, AVB, EOY and EIG. P.A.M. AHZ says interest in 'phone activities is increasing rapidly. BWD is back after spending summer in Calif. WL makes W.A.C. second time in one month. CRK joined A.A.R.S. Multnomah County is now fifth district in Oregon in A.A.R.S. with WR as D.N.C.S. Some good operators are needed for members. Rebuilding: HD, MF, WLVO. ERG is new Scotts Mills ham. Don't forget to mail your report cards on the 16th of each month, fellows. DTG keeps six daily schedules. Hams at Oregon Tech are: ESG and ESP. Oregon has new YL op, ENU. She operates one half of a twin station; DIS, the O.M., works the other half.

Traffic: W7AXJ 169 (WLVP 32) DTG 121 BLN 101 MF 97 AYV 59 UJ 58 DP 19 WR 16 AMF 13 BWD 11 W.L 6 CTL-ABZ 5 CRK 4 CHB 1.

WASHINGTON—SCM, Stanley J. Belliveau, W7AYO—AYO leads Section for first time—been reporting four years. DGY was heard in New Zealand. AEA and DJJ are new O.R.S. . . . Congrats, OMs. Washington claims to have one of the best state nets in the country.

Traffic: W7AYO 309 CZY 297 CQI 218 APS 103 DGY 95 WY 93 AZI 61 CPK 43 BBK-RL 32 EPT 24 DRY 22 AHQ 21 BAZ 20 DDO 17 ELN 16 IG-AW 13 EKA 12 ALH-CPF-CQB 10 QI-APR 9 ELJ-BUQ-BEH 8 ECX-AG 7 RT-EP 5 RK-AIT-AVM-DZX 4 ENQ-BRT 3 BG-BOF-DRK 2 DJJ-DLN 1. QW 2 CND 33.

PACIFIC DIVISION

NEVADA—SCM, Keston L. Ramsey, W6EAD—BPO W.A.C.'ed 45 countries. GYX is on A.R.R.L. Trunk Line "B." AJP is rebuilding. HGL has new c.c. rig. IKJ has new 100-watt Collins transmitter. EGA has new 300-watt rig. AAX works Army and Navy drills. BYR has new transmitter. EEF has new Sargent receiver. KSL is attending U. of Nev. HGL's sister has license.

Traffic: W6BPO 126 GYX 78 AJP 58 HGL-UO 26 GGO 17.

LOS ANGELES—SCM, Howell C. Brown, W6BPU—Let's snap out of it, fellows, and get back where we belong. I am counting on you, and will be here to do my part from now on. AM has new 167-foot tower. Following make B.P.L.: ETL, EK (our YL O.R.S.), NF/CFN, AZU, CVF, HZT. CVF blew big bottle. GXM is going to rebuild. KBY has daily schedule with KAIJR. DWP has trouble with rig. ERT made 85-mile record on 56 mc. FUV is QRL law school. HDV made VS8AH "W.A.C." on 7-mc. 'phone. JNE is putting in c.c. AIF moved to North Hollywood. CUH has new station now without QD partner. Reports received from: ANN, BLS, BWE, CV, DZI, GK (Ex-9AFR), HMS (married and leaves section. Luck), IDZ, ILV, IRA, IFW (works TI2RC), KJE, WO. New hams: GLU, LKF. Welcome.

Traffic: W6ETL 752 (WLVG 386) EK 530 NF/CFN 448 AZU 308 CVF 327 GNM 285 HZT 146 IOX 71 GXM-JSK-KNP 51 DEP 45 AKW 40 FYW 34 KBY 26 DWP 24 ERT-HCN-IIK 17 HEW 16 EUV-GTE 12 PGT 9 INC 5 HDV 4 CVV-FMO 6 JNE 3 AIF-BGF-CUH 2 VO 1 AM 40.

SANTA CLARA VALLEY—SCM, Charles J. Camp, W6BMW—YX, Stanford Univ. Club, is back on; they have new micrometer frequency meter. BCF is getting under way. FBW sends an excellent report. JDV had a QSO with HB on 56 mc. IUZ has been trying grid modulation. JBB is on again. IXJ is trying to QSO So. Africa. BMW intends putting in 'phone rig. NX, an old-timer, is getting a 'phone together.

Traffic: W6FBW 72 BMW 60.

EAST BAY—SCM, P. W. Dann, W6ZX—Come on, fellows, send in your reports by the 16th so that S.C.M. can have something to work on. RJ is still QRL as aide to Capt. Woolverton. ITH centered his activities around rebuilding. RF is QRL U.S.N.R. unit; includes AEK, AHJ, ATT, FUG, INZ, CTX, CP, VS and ZJ. We understand Chief Grutz, CTX, is an Ensign now. EJA says new club at Richmond coming along fine. AHK has been working the South Africans. DHS works China and Guam consistently. AHI is QRL school. FS is QRL service work and A.A.R.S. The S.C.M. helped VS put up 265-foot Zepp.

Traffic: W6RJ 246 ITH 217 RF 124 EJA 67 AHK 27 HHM 16 DHS 10 AHI 8 FS 3.

SAN FRANCISCO—SCM, Byron Goodman, W6CAL—ZG, A.A.R.S. N.C.S. B.P.L.'s again. RH, new R.M., is going great guns. KJ reports for U.S.N.R. station NK. LIE is new O.R.S. on A.R.R.L. Trunk Line "B." SG has nightly schedule with K6DV. HJP now belongs to A.A.R.S. HSA has new Class A ticket. JNI is QRL U.S.N.R. work. JDG's final '46 wouldn't take 750 volts! WF is QRL U.S.N.R. HRY is new O.R.S. and proxy of A.R.A. ENM is priming for SS contest. AWA and BGW are knocking over plenty DX. DDO on 3.9-mc. 'phone wants O.P.S. KNQ seeks O.R.S. KBM has '03A final. JZJ has new Sargent 9-33. AZK is QRL Univ. of Calif. JVU has new c.c. rig. JQJ says, "Never any power, not much DX." GQK broke four crystals this summer. JMR worked CM, X, and VK. GIS is busy with construction work. JWM is back from C.C.C. camp. ERS reports from Tacoma. HPY knocks over PK and ZU with new 830 final. CAL is investigating antennas.

Traffic: W6ZG 2021 (WLV 508) RH 181 NK 103 LIE 69 SG 66 HJP-HSA 63 JNI 61 JDG 44 WF 28 HRY 27 ENM 26 AWA 22 DDO 14 KNQ 7 KBM 6 JZJ 5 AZK 4 JVU-JQJ 3 GQK-ERL 2 JMR 1.

SACRAMENTO VALLEY—SCM, George L. Woodington, W6DVE—The Sacramento Valley Radio Club

has a new lease on life with GZY as new president. A big fire burned out all GAC's competitors in the grocery business. Two new O.R.S.: DVD and ZS. JNB now has a comet pro. Those attending A.A.R.S. hamfest in Sacramento: ZG, RJ, EWB, KGO, HYF, HLJ, GZY, KAQ, CGM, EXH, ISX, CGJ, and DVD. DVD has been assigned to A.R.R.L. Trunk Line "F." GDJ, GZY and IZE are playing with 56 mc.

Traffic: W6DVD 63 GAC 32 CGJ 22 IZE-LGD 7 GZY 2 JNB 1.

ARIZONA—SCM, Ernest Mendoza, W6BJF-QC—ALU cancelled all schedules because of moving to new QRA. JHF is QRL at U. of A. KOL wants O.R.S. GW4 (W6QC army portable) has new motorcycle at Parker. IIG is alternate state N.C.S. for A.A.R.S. FZQ is rebuilding to RK-20 crystal osc., 861 final, 1000-w. input. IQY's DX antenna blew down. BFA has a '10 on 3.5 mc. and P.P. '10s on 7 mc. BLP works G and F on 14 mc. JYQ is getting ready for '52 installation. DPS is back from Los Angeles. LAB is now at Tucson. LDC is new Phoenix man. DOW moved to San Jose, Calif. KHS wants crystal on his rig. HCX is new A.A.R.S. JHV bagged one of the first deer. FKX is on 1.75-mc. 'phone. KGL is working at Ajo temporarily. BCD is police operator at KGZJ. GZU has excellent results on 14-mc. 'phone. BYD has new pair of "sky hooks." DKF is back from World's Fair. DSQ builds duplex garage, while not on 14-mc. 'phone! IZU is oh with an '11. KRU has 56-mc. rig. KOK is c.c. JFO is polishing rig for winter. GHC has new Patterson receiver. DCQ is completing last stage. LCI is new Globe ham. DRE, DKF, DJH are active on 56 mc. 8KNY and 8KDJ, from Ohio, settle in Phoenix. GFK, portable, visited S.C.M. at Parker. New officers of Phoenix Club: KGQ, pres.; DKF, vice-pres.; BRI, secy.; IIF, treas.; DJH, "bouncer." Second Arizona hamfest to be in late February or early March.

Traffic: W6ALU 262 (WLJB 586) JHF 125 KOL 65 QC 47 IIG-FZQ 20 IQY 6 BFA 29.

PHILIPPINES—SCM, N. E. Thompson, KA-XA—1WR, Harry Wright, left for the states October 29th. Captain A. B. Pitts, W3EGQ, is now IAP. Chief Radio-man Dez Goodman will operate KA1ST. Olongapo.

Traffic: KA1HR 1582 LG 344 SX 195 RC 173 CS 163 EE 156 JR 58 FS 56 XA 21. KA4GR 25. KA9WX 46. OM1TB 350. OM1RX 225.

SAN DIEGO—SCM, Harry A. Ambler, W6EOP—BMC reports the Trunk Line working fine. BHF works 'phone and c.w. FQU was appointed Radio Liaison Officer emergency committee, Veterans of Foreign Wars of the U. S. A. EFK will hold down San Diego end of A.R.R.L. Trunk Line "F." ACJ was made Chief in U.S.N.R. ROW called on S.C.M. BHV is back from east coast. HEX was in the VE/W Contest. AXN will take over the R.M. job for the Valley, as QA will not be with us for some time. IBK is rebuilding with 830 final. KBD reports GMU on 56 mc. CNK was visited by IEMV and IFGV. LD is rebuilding receiver and monitor. EOP was appointed Assistant Director, A.R.R.L., for San Diego Section. BLZ bought new SW3. JEZ is now on 3.9-mc. 'phone. FKT reports new club at Escondido. The San Diego Radio Club had a station at Electric Show and took over 700 messages.

Traffic: W6BMC 1435 (WLVH 45) BHF 1322 FQU 733 EFK 302 ACJ 17 BOW 80 BHV 57 HEX 24 AXN 12 IBK 11 KBD-CNK 9 LD-EOP 6 BLZ 4 FKT 2.

SAN JOAQUIN VALLEY—SCM, G. H. Lavender, W6DZN—BCR sold his 'phone rig. The Stockton Radio Club had a DX contest all its own. EXH is doing fine A.A.R.S. work. KGO is now O.R.S. FFU reports Modesto Radio Club experimenting with 56 mc. GQZ, our YL op, puts out some FB chicken feeds for the hams. SF has four tens in final. This will be my last report as S.C.M. of this section. I thank all who cooperated with me during my term and ask all of you to support the next S.C.M. as much as possible. So long, gang, and good luck—73.—Herb.

Traffic: W6EXH 107 FFU 57 AGV 49 DZN 47 KGO 37.

ROANOKE DIVISION

NORTH CAROLINA—SCM, G. H. Wright, Jr., W4AVT—Due to pressing business duties the S.C.M. has not had the time to put to amateur radio during the past two or three months. I am getting more "QRL" each month and for that reason this will be my last report. I want every ham in this Section to know that I appreciate the whole-hearted support I have had during my term as S.C.M. I shall give my successor my very best support. BTC, DW, and BRT turned in FB traffic reports. BV and AAU did splendid traffic relay work while the N.C. Cavalry was on duty at Concord during textile strike. The new club station, BVA, is on the air in Greensboro. CJP is QRL law school. ALK, FT, and VW are rebuilding. The new club station in Charlotte is nearly ready. BKS and BJV are doing FB DX work. AJS was just married. The 1.75-mc. 'phone net composed of AAU, BYA, BV, CEL, CDQ, CXI, CEL, CYB, CJQ, DCQ, DCX, and AZP is working very smoothly. To all hams everywhere: When you hear AVT on the air give me a call. Give Acting SCM, N. M. Patterson, W4EG, 2804 Hillsboro St., Raleigh, N. C., your full cooperation and reports, please.

Traffic: W4BTC 186 BRT 30 DW 34 BV 28 BRK 13 DQ 14 CQB 10 MR-BHR 9 BVA 6 ZH-CXC 5 BXF-BKS 3 BFB 1.

VIRGINIA—SCM, R. N. Eubank, W3AAJ—EGD has ENR as Asst. opr. AAJ is testing new type antenna. FE won 3rd prize in Roanoke Div. Contest. CFV schedules 4CWH. CNY is back on with swell 'phone. EVN is getting Gross CW 25. APF won Cathode Ray at convention. BFV has new e.c. freq. meter. BZE liked VE contest. BIG is new P.A.M. EPK and CYM are on 3.5 mc. BSB likes DX. ANT schedules K5AA and 6LBE daily. CJJ handled sick message and answer to Winnipeg. EHL is now O.R.S. BRY is our new S.C.M. ECQ operates at BRY. APU schedules BJX daily. CA did grand job as convention manager. EUL was visited by BRY, DZW. EBD has new receiver and rack transmitter. ELJ was heard in Germany on 3.5 mc. BSY operated portable at Shellfield. ELA is on 3532 and 7064 kcs. ALF is on 3814 at Appomattox. DBL club station at fair, operated by members. FJ has Hull 56-mc. full beam ant. on daily. AUG has rig on at Reserve Armory. DQB schedules CHE. EBK is adding P.P. '10s. EAP was on 56 mc. during summer. EEN is on 3790 kcs. APT visited ANT. EPW won crystal and holder in Roa. Div. Contest. AHQ is on 'phone 100%. AAF is 50% 'phone, 50% c.w. EDG is now O.R.S. MQ is now Pres. Norfolk Club. BJX keeps FB bunch of daily schedules. BIW won 801, 1st prize in Roa. Div. Contest. BYA is Va. station on Trunk Line "C." ELB kept schedule with HIW while at convention. AMB has FB signal on 3.5 mc. BEK hopes to be O.P.S. soon. Greatest convention in Division was held at Roanoke, with rain both days, too. A.C.M. IUE and YF visited S.C.M. AAJ and OM's went to convention. YF's spent time together. AEI visited World's Fair. BKJ is c.c. on 3535 and 7070 kcs. BTR blew 500-volt power supply. COO likes PR10 CQW is at C.C.C. Camp near Edinburg. EMX wants transformer: 1600 or 200 CT 300 m.a. ENO is building c.c. job. Experimenting takes most of GE's time. EXW is new ham at U. of Va. BEB got bad burn from high voltage. EOX has new FB7 and new 830. BGS is looking for Va. gang on Sundays, 3750 kcs. EOF is going to Emory-Henry College. ECR helped Wash'n Club with 56-mc. rigs at regatta. AVR is on 'phone mostly, 3922 kcs. CMN is operating at 3FJ until rig finished. BPI won RK20 at convention. BZ was burned quite bad; sorry missed convention. CFL is back on 3775 kcs. Ex-3AGH-CVU is rebuilding shack and rig. CYK is building 56-mc. rig. New calls: EXQ, Phoebus; EVE, EYD, Appalachia. Club news: Meetings: Petersburg Y.M.C.A. every Thursday; U. of Va., 1st & 3rd Fridays; Richmond, Tues., Y.M.C.A.

Traffic: W3EGD 272 AAJ 54 CYM 21 FE 20 CFV 11 CNY 9 EVN 8 APF 7 BFV 6 BZE 5 BIG 4 EPK 3 BSB 1 ANT 342 CJJ 23 EHL 14 BRY-ECQ 12 APU 8 CAEUL 7 ASK 6 EBD-ELJ 4 BSY-ELA 3 ALF 1 DBI 165

FJ 132 (WLQD 18) AUG 59 DQB 8 EBK-EAP 2 EEN 30 APT 24 EPW 56 ELH 8 AAF 5 EDG-MQ 5 BJX 134 BIW 95 BYA 206 ABQ 10 AMB 5 BEK-CYK 3 CHE 139.

WEST VIRGINIA—SCM, C. S. Hoffmann, Jr., W8HD—New ham club, Radio Communications Ass., was formed in Wheeling. Officers: HWT, Pres.; FVU, V.-Pres., Harry W. Maull, Secy.-Treas. ELO is QRL U.S.N.R. ANU attends Bethany College, near Wheeling. BTV attends Ohio State. BDD is going on 1.75-mc. 'phone. LTD worked 9PVZ with new rig. LSJ and LSK are installing c.c. Hamfest was held in Charleston, Oct. 6th. MQV is JWL's latest student, as result of his code class on 1.75 mc. EWM uses 1.75- and 3.9-mc. 'phone. MCL schedules 3AAF, 8EWM and 8MOP. EIK, ELJ, CHM, HI, JM, KKG, attended Roanoke Convention. MOP is new Bluefield station. MCR and FVU desire to join A.A.R.S. EYV uses 14-, 3.9- and 1.75-mc. 'phone. FQB uses portable at Morgantown. DSJ is operated from Morgantown Univ. KVL is rebuilding. KKG has FB traffic schedule with NY2AB. TI is installing RK-20. KWU schedules VP5AS weekly. New O.P.S.: JM. New stations: Grafton: MIS, MIT; Clarksburg: MIP; Wheeling: HWS. JM won 6-tube receiver given away by Mountaineer Amateur Radio Ass.; FQB and JKN won crystals. KSJ has 1st class BC opr. license. HD is back on air with schedules. FVU has baby girl. OK puts out FB sig with new RK-20.

Traffic: W8HWT 24 ELO 2 BDD 98 LTD 9 LSJ 6 EWM 24 MCL 13 EIK 51 (WLHG 84) MCR 7 FQB-KWL 1 CMJ 9 KKG 210 CVX 6 KWU 5 HD 7.

ROCKY MOUNTAIN DIVISION

COLORADO—SCM, T. R. Becker, W9BTO—An FB hamfest was put on by the Greeley bunch. JON has new Tri-tet. PO is getting new rig. YAA, Physics Dept. at Colo. Teachers College, is FQJ's activity at present. SWM is new ham. OQL lost sky wire. ODS is repairing radios. OUI has lot of pep. IPH will soon be on 'phone. PVZ has clever QSL card. HIR sold his PR10. JRV has new SW3. PGS works lots of DX. IUH is married. YL returned from East. FG (ex-9BYC) came back to get his Master's degree. RKJ is portable at Boulder. RTQ has daily schedules with K6EWQ and W6EK. NSP is in circulation again. HQV sold his FB7. NRW attended hamfest. PTI were also present, as were MXM, MDN, DSB, KCG, NRR, JFD, LJD, OLL, LQO, OXR, SPS, REH. MKN says he will never be a 'phone man. FYY has a sick 50-watter. KGR is awaiting new PR12. GRI is going to have two rigs. IUH and EKQ helped the Army beat the Navy in Code Contest. ESA has started his FB reports again. PWU wins all the prizes, along with his YL. OTR is back in the fold. EGY keeps Auto Equipment on the map. FA won the Code Speed Contest. SEX, RHH, RNF, and EDM were active Saturday nite. Active: ODF, LYV, FHX. The San Isabel Amateur Radio Association elects new officers: NLD Pres., OTM Vice-Pres., PMF Secy. and Treas. SAU is a newcomer. PMF has c.c. OTM is rebuilding. NLN wants to know how to keep woodpeckers off his pole. NLD wants schedules on 1.75-mc. 'phone. SAU has new McMurdo Silver all-wave. The new club in Denver is putting out a paper. SND is C.C.R.A. Club station. SSJ is new Denver ham. GNK is on regularly again. EHC worked VK5RH. BYK has new antenna system. EMU has single '52 final. CJJ is building a radio room. BVZ has FB 3.9-mc. 'phone. GHY had a 50-watter go bad. DDF gets out FB on 1.75-mc. 'phone. BYY has rig finished as far as '10 Buffer. FRP has antenna troubles. BTO is waiting for new PR12. HQT is busy at KLZ. EYN is on in Denver. AAB has been on the sick list.

Traffic: W9GNK 279 PWU 15 ESA 1191 EHC 9 PGS 2 RTQ 95.

UTAH-WYOMING—SCM, Arty W. Clark, W6GQC-IDM—Appointments: Trunk Line, 6GQC—"B," 6DGR—"L"; O.R.S., 6FYR, 7DIE; O.P.S., 7ARK; Asst. S.C.M. for Wyoming, 7COH. Wyoming amateurs, please NOTE: Wyoming will function under the direction of T. J. Rigby, 7COH, Box 698, Midwest, Wyo. He will be

Assistant S.C.M. for the Utah-Wyoming Section. Wyoming amateurs, send your reports to him in the future. Utah: 6LCM meets fine fellows on air. DTB is up at Randolph. KRL moved to Ogden. 3BYK, ex-6PE, visited S.L.C. LCB is on with RK20. DPJ returned from Moose, Wyo. KDI keeps FB schedule with San Diego. GPJ made trip to Winnemucca, Nev. LBL is new station in S.L.C., LLH in Ogden. IAL is with N.B.C. in New York. Wyoming: 7AEC ended report in a hurry because dog chased skunk under the shack!!! MIM! BJS is rebuilding. DIE is taking on schedules. ASX is going c.c.

Traffic: W6GQC 330 KDI 200 DGR 49 GPJ 14 AFN 9 LCM 7 JVB 4. W7COH 202 DIE 10 AEC 4.

SOUTHEASTERN DIVISION

ALABAMA—SCM, L. D. Elwell, W4KP—The Mobile Convention went off with a bang. DS has the "Dixie-Dew Drop" Net going fine. ADI and portable 5LD are in the Muscle Shoals district. AJY reports 28 mc. gone dead. CIU helped talk up convention. BOU was heard on for O.R.S. party. APU reports from Atlanta. CYW tried 7 mc., but went back to 3.5 mc. for traffic. RS, ZS, AUP, BZG, BGO reported during A.A.R.S. 'Phone Net. BMM is to be P.A.M. for Alabama. The S.C.M. visited BJA.

Traffic: W4DS 69 BOU 44 APU 30 AJY 19 CYW 22 CIU 4 ADI 1 RS 24 AUP 6 BGO 19 BZG 6 KP 5.

EASTERN FLORIDA—SCM, Philip A. McMasters, W4BCZ—ASR applied for O.R.S. to keep his place on Trunk Line "C." BNI is new P.A.M. for 3.9-mc. 'phone band. CQZ resigned as Secy.-Treas. of St. Pete Club; he is moving to Lake City. All interested in joining Chapter 2 of "Meters of the Morning," writes P.A.M. CQZ at Lake City; limited to 1.75-mc. 'phone. QY portable is active in St. Pete. COV worked G5NF, ON4BNN and HAF3H with single '46. COW has trouble with c.c. CWR is new O.P.S. on 1.75 mc. American Legion Emergency Relief Net drills every Friday and gives weather observations to U. S. Bureau in Tampa and Miami. This is composed of 3.9- and 1.75-mc. 'phones. AIV is on 3.9-mc. 'phone. AKA is back from north. ANH has been converted to 'phone. DBA put up new 1.75-mc. Zepp with help of CQZ, BCZ, CWR, ANH, LF, DBF. St. Pete has Radio Widows Club, wives of active hams who won't talk to their family while trying to work DX; meet every Monday. CPG has new photo QSL to prove mast is in the Gulf. CQD applied for O.R.S. CDY has 56-mc. directional ant. CQK will be on 14 mc. when OM, CQJ puts up her pole. AQ is new 1.75-mc. 'phone in Tampa. BNR and AKJ are building superhets. ALP is rebuilding 3.9-mc. 'phone. ACZ went to Mobile Convention.

Traffic: W4BCZ 7 ASR 18 CQZ 3 CWR 5 COV 18 CSJ 4 BNR 19 AKJ 17 CQJ 9 BNI 7.

WESTERN FLORIDA—SCM, Eddie Collins, W4MS --R.M.'s. 4ACB, AUW. Congrats to KB on Class "A" license. AQY has been QRL State Road Dept. AXP is our most consistent reporter. CTZ has new Tri-tet rig. QR swears by Tri-tet. AUW increased power. CDE has everything in rack and panel. CMJ returned from trip up NAWTH. BKD has portable at Ga. Tech. BPI returned to U. of Fla. ACB installed Tri-tet. UW was visitor to the Section. BGA is busy getting U.S.N.R. station in shape. BFD visited 9USA. CSR promises complete overhaul. ASV ruined an ankle on U.S.N.R. cruise; fell down a ladder going from the mess hall to the radio shack! DAO is another with ankle trouble; has a poisoned foot. VR had his station soaked during recent rainy spell; 19 inches in 24 hours! QK gets out nicely on 7 mc. CSW is again active. CQP wants an SW3. CQF is holding U.S.N.R. fort at Crestview. BSI, AUW, CDE, CTZ and ACB made the Convention together. CTA is planning Tri-tet & la QST. MS has new Tri-tet in relay rack. COG makes a fine showing in Gulf Storm Net drills. Write the S.C.M. for data on Storm Net. G2BXX was a visitor to Pensacola stations; his name is C. Q. Marks! AGS and QU are pounding on 3.5 mc. CDE needs Asia for W.A.C. ACB, BSI and MS are planning

56-mc. beam ant. for sectional QSO's. BGA reports several prospective hams in Pensacola U.S.N.R. unit. CSR is building new frequency meter for O.O. work.

Traffic: W4CTZ 8 VR 4 AXP 14 COG 12 MS 8 BSI 10 ACB 3 QR-DAO-BFD-2 CTA 6.

GEORGIA-SOUTH CAROLINA-CUBA-ISLE OF PINES-PORTO RICO-VIRGIN ISLANDS—Acting SCM, Bannie L. Stewart, W4CE—South Carolina: ANK plans to add P.P. 830's. BAT believes in '46's for transmitter. BCY is active in Sumter. BDT wants O.R.S. BEN spent four weeks active duty in N.G. BJC and JT are QRL college. BNN had several ham visitors. BQM keeps schedules from Sumter. BZX is building 3.9-mc. 'phone. CF is old-timer in Anderson. CHD says Greenville more active now. OW has new rig. CWY gets good results from '46's. CE blew power transformer. DEE and DET are new in Charleston. Georgia: CRH is active in Augusta. DBP is new in Crawfordville.

Traffic: W4ANK 6 BZX 3 CYG 2 CE 4 BRG 50.

WEST GULF DIVISION

NORTHERN TEXAS—SCM, Glen E. Talbutt, N5AUL—BII wants to hear from traffic stations. DXA is trying for O.R.S. CCD is moving to Detroit, Mich. CPB is interested in A.A.R.S. AW is on 3.5 mc. DVD reports from Plainview. CPT says EFN is at Tech. ARS is going to shoot the S.C.M.! NW is QRL Directors' race. DUR QSO'd a ZL. BCW tells us that BJX is married. Congrats to Bill. CHJ is now O.R.S. EIM uses suppressor grid mod. BXA wants traffic for panhandle. CZR is a cinema-projectionist at Coleman. AUL, BXY, AUJ, QA and AZB are active in Abilene. SP will be on with new antenna mast.

Traffic: W5BII 198 DXA 107 EES 96 CCD-CPB 61 AW 56 DVD 42 CPT 25 ARS 18 NW 11 BCW-CHJ 10 EIM-BXA 2.

OKLAHOMA—SCM, Carter L. Simpson, W5CEZ—CEZ is preparing to put on a 242A to work Trunk K schedules. BQZ is doing good work as A.A.R.S. D.N.C.S. AMT is new L.N.C.S. in A.A.R.S. BKK plays in college band. BAR, Okla's new RM, is installing c.c. and running Oklahoma position on Trunk D. AJF is QRL college. EFK-CVA did interesting 58-mc. work at N.G. camp. BDX has private transcon line from N.Y.C. to Frisco and back to Washington, D. C., operating between 1:00 a.m. and 4:45 a.m. daily. DTC cream station and WX reports keep DTC busy. DZU pinch hits for BKK on WX reports. DDW has two c.c. rigs, one for 7 and one for 3.5 mc. ASQ is working hard on N.C.R. unit. BWN blew power transformer. BLJ qualifies for A.A.R.S. EMH is replacing e.c. osc. with c.c. ASW has a '52. ATB spends 100% time on 'phone. LR is club station of Ponca City Key Clickers. AIR operates at Police Station. AIA is new Watonga ham. EHS is going to school in Norman. CRS is rebuilding between shifts at KGFF. A.R.R.L. trunk lines "K" and "D" now run through OKLAHOMA. Give your traffic to 5BAR or 5CEZ to get it on either one or both of these fast lines.

Traffic: W5CEZ 889 BQZ 287 AMT 246 BKK 187 ASF 170 BAR 150 AJF 142 BJJ 111 EFK/CVA 83 BDX 66 DTC 43 DZU 25 DDW 24 ASQ 21 BWN 19 BLJ 15 EMH 13 ASW 5 ATB-LR 2.

SOUTHERN TEXAS—SCM, Bradfield A. Beard, W5ADZ—MN carries 13 traffic schedules! BFA reports San Angelo Club has new club house. BEF works 14, 7 and 3.5 mc. DWN will handle traffic for 1st Cavalry Horse Show. MS has new R.C.A. antenna system. DMK is installing '03A's final in 'phone. SY worked VK6HA with single '45. DTT says RST system helps make QSO's longer. PF is attending U. of Tex. AFV entered VK contest. BDI snags VK's with his '10's. CLZ has '10 final. CTP moved to K.C., Mo. EKJ is experimenting with 66 mc. BHO is on 'phone. EFS has type 19 tube on 1.7-mc. 'phone. DOM visits the gang. DTT is new O.O. EKN is DXing with '45s. ON is on 3.9-mc. 'phone. Following have sure fire traffic schedules: MN, BFA, BEF, BJ, DWN, AJY, MS. The H.A.R.C. is on every Friday night using DPA. ADZ DX's on 14 and 7 mc. Please get

your monthly reports in by the 18th. Applications for O.P.S. and good O.R.S. wanted. Active: AJY, ABQ, CVW. EIS rebuilt. On 14-mc. 'phone: SF, DCP, EBP.

Traffic: W50W 716 (WLJ 693) MN 505 BFA 213 BEF 74 BJ 46 DWN 45 AJY 32 CVQ 39 MS 18 ADZ-DPX 10 CVW 7 SY 5 PF 4 DTJ 3 AFV-EJZ 2 VLE 1 BWM 3.

NEW MEXICO—SCM, Dan W. De Lay, W5DUI—DUI is QRL Airways. 4CA-8UC has located at Pecos for the winter. ZM has four licensed operators. DLG is looking for schedules. CGJ is putting the gang through A.A.R.S. drills. AOP shot his rectifier. New appointments: AOP, O.B.S.; DLG, O.R.S.

Traffic: W5ZM 152 DLG 86 CGJ 56 (WLJE 36) DUI 51 AAX 20 AOP 23 EAO 14 DZY 9.

CANADA

MARITIME DIVISION

MARITIME—SCM, A. M. Crowell, VE1DQ—Nova Scotia: FT is new O.R.S. GL is c.c. on 3730 kc. EP is present. H.A.R.C. HH sports new bug. HG has QSO'd 26 countries on 14 mc. Congrats to AW and EK, now benedicts. DQ has been tuning up on 3.9 mc. FB is taking a swat at 14-mc. DX. GR's Class B 1.75-mc. 'phone gets out well. HJ and HK are new men on 3.5 mc. BX entered VE/W contest. EF is only Halifax 'phone on 3.9 mc. YL will in future sign from EK. AG is to annex a dynamotor. DC and BP recently visited Halifax gang. Newfoundland: VO8W is on 7 mc. regularly. VO8H has low-power record for this year—worked G5YH with 4 watts input to pair of '31's—photo and dope in *T & R Bulletin*. VO8HK is rebuilding. VO8K has pair '52's P.P., 300 w. input. VO8Y made 2511 points in VE/W contest.

Traffic: VE1FT 41 GL 34 EP 9 HH 11 EX 30. VO8W 21 VO8Y 23.

ONTARIO DIVISION

ONTARIO—SCM, S. B. Trainer, Jr., VE3GT—The Canadian Radiophone Association was founded at the 4th Canadian Division Convention, 3II pres., JB secy., AZ treas., and JI, KP, WW and NX vice-presidents for each of the four districts. II and KP applied for O.P.S. WX again takes traffic lead, making B.P.L. along with Chief R.M. JT. RK is R.M. for Eastern Ont. Good to get first reports from TF, EM, ABN, AAZ and ACC. MB was visited by 3JT, RK, SA, 2DU and 4CB. ER schedules VP5PZ. TM is taking Trunk Line "M," and JT taking "I." SA is new O.B.S. OR, LS visited DW, who moved to top of mountain! SZ got QSO No. 1000. FE is at CJTC. QK submits blank verse on VE/W contest. BZ has hot seat in shack. TN works all bands. BC rebuilt. NO, DU, SG, WK, WX, JT, GT, TM, RK, MB, FH, and 9AL are keeping schedules and can QSP traffic. ZV is the boy wonder. Welcome back to FO and IW. Congrats to Mr. and Mrs. WK. RQ offers to give code practice. 168 attended the Convention banquet. AU and DJ are back at school. Sunday morning on 3.5 mc. is the best time to work Ontario stations. The last Sunday of each month get in on the Ontario QSO party. An Ontario O.R.S.-R.M. Net has been formed. Any others interested in traffic are invited to get in touch with any O.R.S. or R.M. IB has built new porch.

Traffic: VE3WX 524 JT 250 QK 165 NO-DJ 149 GT 145 AK 139 TF 125 DU 114 UU 91 ER 80 WK 68 EM 62 IZ 46 MB 29 MX-ZV 21 BZ-SG 15 TM 14 GR 18 ABN 12 AU 6 WY-YZ 4 UF 3 ZE-AAZ 2 IW 1 IB 13 NU 6. VE9AL 23.

QUEBEC DIVISION

QUEBEC—SCM, J. A. Robertson, VE2GA—Thanks to all who helped make a success of A.R.R.L. booth at Montreal Radio Show. Special praise goes to 2CU, who lent his rig for the occasion and took charge of the exhibit. HO also did very good work. 280 messages were received from visitors and disposed of through efforts of EE, DR, HK, BU, GO, HT, IE and HF. BE and DU had enjoyable time at A.R.R.L. Convention in Toronto. AP is filming shacks of the gang: GO is new O.R.S. BU, DR and HK schedule Toronto. DG and IO now have c.c. CX had complete overhaul. CO has nice traffic list. HG needs Asia for W.A.C. BG burns out "at last" one of the first '03A's

sold. Nice letters from HH, DG, EC, IG, IN, CG. Be sure and listen to our OBS-2HK every Tuesday evening at 10:15 p.m.

Traffic: VE2HK 130 BU 107 GO 24 DR 381 DG 114 BG 13 GA 4 EE 252 HH 7 DU 21 CO 76 CU 280 CG 3 IG 45 EC 7.

VANALTA DIVISION

ALBERTA—SCM, J. Smalley, Jr., VE4GD—JK was heard in G on 14-mc. 'phone. EO lost sleep in W/VE contest. OG is in line for O.R.S. LG changed to c.c. QK moved into Calgary. KG is putting his shekles into high power. LX moved into town for winter. The area DX contest is to be staged from November 1st to December 31st. All hams desirous of entering must notify Tom Watson, 4NH, before November 15th. W7ABT was a visitor in Calgary and Medicine Hat.

Traffic: VE4OG 116 EO 19 LG 23 KG 5 QK 6.

BRITISH COLUMBIA—SCM, R. K. Town, VE5AC—HQ leads traffic reporters. The Kootenay boys report via EJ, who has idea of going 1.75-mc. 'phone. JI is putting in suppressor grid modulation. LB has 59 Tri-tet. FL decides to remain on 1.7 mc. for the winter. KP pops '45s keeping schedule with LB. DL increased power. DZ reports new receiver is FB. FN is reported on 56 mc. GX reports for first time. HP of Victoria is appointed Assistant S.C.M. for that district. 4NB comes to the coast and hopes for call 5NB. IC has nice note on 3.5 mc. GI works east coast regularly on 7 mc. IN has 110-foot tower. KY works a W9 on 1.7 mc. DF is QRL commercial operating. FM applies for O.R.S. MD is ex-4QD. HR handles Victoria end of chess game with Vancouver, scheduling FM daily. FH sports new Sargeant receiver. EP was appointed R.M. JK is QRL servicing. LZ has station at store during Radio Week. GT resumed schedule with Vancouver.

Traffic: VE6IC 3 GI 27 IN 1 KY 11 DF 45 FM 19 MD 13 HR 47 EU 26 AM 52 FH 8 KB 6 EP 9 HQ 151 JK 24 LZ 10 AL 31 JA 9 GT 20 AC 55.

PRAIRIE DIVISION

MANITOBA—SCM, Reg. Strong, VE4GC—AG has schedules west and south. MV keeps emergency schedule for American Consul. KU handled traffic from Montreal Show. GC takes traffic from Vancouver and Canadian National Exhibitions. KX has new rig. DJ and BG work DX. AE, LL, GL and DU get FB results on 14-mc. 'phone. IU, IA, QA, QY, LH, NM, MY and NZ are on 7 mc. TO and TZ are new 7-mc. stations. EK has Tri-tet and pair RK20's. UA has M.O.P.A. TJ has quite a 'phone. IT acquired two 50-watters. DU received W.A.C. RO has transmitter problem licked. The M.W.E.A. had annual general meeting with election of officers. The population of Ilford is about 33, and DK reports three new licensed hams. TP, TS and DK are the Ilford hams.

Traffic: VE4AG 45 MV 93 GC 41 KU 23.

SASKATCHEWAN—SCM, Wilfred Skaife, VE4EL—CM is well ahead in traffic. GR a good second, and FW, ND and QZ doing fine. New Saskatoon hams: TN, UE, UD, UC, UG, TI, PE and TN are building new receivers. RI has 1.75-mc. 'phone. PW was visited by SE, SQ and KB. QS and RD are building c.c. rigs, JB M.O.P.A. LI works 1.75-mc. 'phone and 3.5-mc. c.w. FW is going in for O.R.S. SY gets out well. KA works DX. QK is now at Calgary. IG worked 17 VKs. KJ had visits from OC, ES, QQ. QS has c.c. Tri-tet with '45s final. GA visits QS, FA, OW. BN worked some FB DX. MH is making extensive changes. MN fits to Beaufield. RZ purloins his plate and fil. voltages from a nearby BCL set. MZ has combination c.c. and m.g. note. IE is all set for 14-mc. 'phone. Ex-4GB, Bert Wilson, again gets his license.

Traffic: VE4CM 307 GR 123 ND 58 FW 54 QZ 30 GA 22 QK 20 IG 10 EL 9 LI 8 OM-OP 4 KJ 1 MH 70 AV 3.

Canal Zone: K5AF/WZAL continues to uphold the A.A.R.S. Traffic for Sept.-Oct. month, 201.

Alaska—SCM Richard J. Fox, K7PQ—ATT is on with a Gross transmitter and PR10. BOE boasts a new shack. Traffic: K7PQ 46 CHP 46 BNW 79 BOE 177.



CORRESPONDENCE

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

High Power QRM

26 Ridgewood Ter., Maplewood, N. J.
Editor, *QST*:

... After all, when you sit right down and think about it, is there such an awful lot of QRM on our bands? I have a 40-meter rig, '10 final and '10 oscillator with about 55 watts to the amplifier, perched right up among the high-power xtal boys on 7011 kc., and a Super Wasp receiver. I'll be darned if I can find all this terrific QRM that everyone's blowing about. Sure, sometimes I've had a QSO busted up by a high-powered fellow who blocked my detector out, but that's all in the game. We can't have Utopia. And, too, if some of these poor guys that are doing the yelling would learn to copy through QRM, it would be better. You don't have to copy every letter to get what the other fellow's telling you, you know.

—Robert Bramley, W2FLP

EDITOR'S NOTE.—To many dozens of controversial correspondents on high-power limitation, whether or no: lack of space prevents publication of more letters on this subject. To those who have unauthorizedly and unjustifiably stated that *QST* is sponsoring a movement for power reduction: attention is called to the line just beneath the heading of this department. *QST* engages in no campaigns except when ordered by A.R.R.L.'s Board of Directors. To amateurs in general: *QST* sponsors no movements, yet it maintains this open forum for all; herein the views of the many and any are subject to expression, the only requirement for publication, subject to space limitations, being general interest to the amateur fraternity.

R-S-T

734 Lewis St., Burlington, Wis.

Editor, *QST*:

RST449X! Logical, brief, and to the point. The biggest improvement in amateur operating practice for quite some time, and W2BSR is to be complimented on the new standard system of reporting signals.

Many times in the past I have been disgusted with the long lingo of "QSA 3 R 5 NDC with slight key thumps," and now we have a system that answers a very definite need, and one which

I trust every amateur will adopt immediately. I am for it 100%.

—M. F. Whitton, W9BXX

Box 185, Decker, Ind.

Editor, *QST*:

... This seems to come far nearer to filling the need of a comprehensive reporting system. Everyone knows the confusion existing thru the use of QSA and R. Very few amateurs knew the difference between the two but with the new R-S-T it is easy to be seen. However, the T system could be changed somewhat, and I would suggest T9 to mean "Purest d.c. xtal." It seems as if there has been too much stress on the a.c. ripple. Most signals of to-day are d.c.-p.d.c. or xtal, so why not make three or four of the T's for the a.c. and the rest for the d.c.-p.d.c. and xtal? . . .

—Edwin L. Robb, W9DGC

P. O. Box 143, Pt. Pleasant, N. J.

Editor, *QST*:

Congratulations on the article by W2BSR on his new system of reporting. I hope that it goes over RST559X! Hi! Ham radio needed something like this some time ago. . . .

—W. T. Sutphen, W2GPI

2030 Quenby Road, Houston, Texas

Editor, *QST*:

... I tried the new R-S-T system on a couple of fellows, and they thought I was insane. Hi! Still using it, though. . . .

—Bradfield A. Beard, W5ADZ

Box 411, Minden, La.

Editor, *QST*:

W5CMQ wanted to know if *QST* was trying to get all the hams streamlined by using R-S-T instead of the old method.

Tell W2BSR that I sure like the R-S-T system 100%, and am using it at all times.

—William T. Fritz, W5BZR

Power Input

3217 De Witt, Mattoon, Ill.

Editor, *QST*:

Perhaps the most illogical of all amateur regulations is the one limiting input to the final ampli-

fer to one kilowatt. It has been carried over unchanged from the age of self-excited oscillators and at present serves to put at a disadvantage those amateurs who desire to use, as a final amplifier, a linear unit, a grid-modulated amplifier or a suppressor-grid-modulated unit. The following are reasonable estimates of efficiency: (1) High-level modulated stage—70%; (2) Linear amplifier—33%; (3) Grid-bias modulated stage—22%; (4) Suppressor-grid-bias modulated stage—25%. This means that if one kilowatt input is used to a final stage of each type the following order of outputs will result: (1) 700 watts; (2) 330 watts; (3) 220 watts; (4) 250 watts. Output, not input counts. Therefore, in order that the last three types of amplifiers have an output of 700 watts, they must have inputs of respectively 2121, 3181 and 2800 watts.

Many amateurs who desire high power would like to use one of those three types, but to obtain full use of the 1-kw. input rule they must resort to high level modulation. Why not ask the government to permit the following inputs: (1) Linear amplifiers—2000 watts; (2) Grid bias modulated stages—3000 watts; (3) Suppressor grid modulated stages—2800 watts? . . .

—John Owen Weaver, W9QQ, ex-9AYB

EDITOR'S NOTE.—Often overlooked is the point that a 1-kw. 100% modulated 'phone transmitter actually has a power output 50% greater than a 1 kw. c.w. transmitter. Classifications, once established, could logically be forced to allow for this disparagement, for difference in efficiency between oscillators and amplifiers, perhaps even for difference in efficiency at various frequencies.

The signature of a letter on this subject published in the October issue incorrectly stated W2DLM to be the call of the writer, David Scott. Mr. Scott's call is actually W2CLM. The owner of W2DLM is anxious to make certain that the opinions expressed in that letter will not be ascribed to him by readers of the Correspondence Department.

Off the Map

Saigon, French Indo-China

Editor, QST:

First place I ever got into where I couldn't hear WIMK! Still have hopes, though.

73 to the gang.

—Clyde De Vinna, W60J

Camp SP-1, Wildwood, Pa.

Editor, QST:

Through the good offices of an article which you were kind enough to publish on page 46 of the April issue of QST, several amateurs have received employment, and the CCC net has profited by securing several good operators. The need for operators has again arisen, and it will be greatly appreciated if you will publish a similar article in the first available issue, giving information substantially as set forth herewith:

"Civilian Conservation Corps radio nets are now in operation in the States of Pennsylvania, Maryland, Virginia and the District of Columbia. The stations of these nets transmit official business during the day, and at night function as amateur stations, members of the Army Amateur Radio System. Due to the establishment of new stations, and occasional separation of present operators from the service for various reasons, additional operators are needed and enrolled from time to time. Requirements for operators are that they are residents of the states mentioned, possess a valid operators license, have the ability to send and receive code at not less than fifteen words per minute, have a good general education, and are otherwise able to qualify under CCC regulations.

"Amateurs residing in the State of Pennsylvania who are interested in joining the CCC should write to the Radio Supervisor, Pa. CCC Net, Camp SP-1, Wildwood, Pa. Those living in Maryland, Virginia and the District of Columbia should write to the Radio Supervisor, Va.-Md. CCC Net, Sperryville, Va. There are no known

openings for operators residing in states other than those mentioned."

Thank you for your cooperation in this matter.

—E. L. Skinner,
Captain, Signal Reserve,
Radio Supervisor, Pa. CCC Net

28-Mc. Hot

512 N. Main St., Wheaton, Ill.

Editor, QST:

You have done much good work in making unused bands more popular. But in view of the fact, as I understand it, that NBC finds 8 meters much superior to 5 meters in distance, volume and lack of shadows, why not suggest more use of 28 mc. for local 'phone, as well as 56 mc.? Ordinary ham apparatus can be used—antennas not much more difficult to erect—even beams—and it will put sigs on the air so that when the band does open up for DX, some one might be on the air at the right distance to work.

The Monday before the July 28-mc. tests, W2ADL, I believe, was working 28- to 56-mc. duplex, around 8 p.m. Some mid-west hams—including myself—heard him. The east coast heard the midwest—then we had a hot night on 28 mc. I worked five in 40 minutes, and, after the east coast passed out, I later heard quite a few W6 harmonics up to 11 p.m.—and still going. If W2AOL had not been on we should have missed the fun.

A few more local 28-mc. sigs for local work may help us in "figuring out" the 28-mc. band.

—Elmer H. Conklin, W9FM

Coöperation

Georgetown, Conn.

Editor, QST:

Some time ago I made a plea to the amateur fraternity to be more thoughtful of the new hams with weak questionable signals, myself being among that classification at the time.

There was a very nice response to my comments and I did begin to QSO with quite a degree of success. From the contacts I made, I was able to improve my rig so that I did not have to apologize for being on the air.

. . . Recalling my early struggles I have been trying to fish out all of the r.a.c. notes in the 80-meter band, and in answering them I have been trying to help with the small amount of knowledge I am able to muster. The main thing is to stay with them so they can make tests for the improvement of their outfits as well as their knowledge of the art.

—Frank Hawks, W1JJI

Cut 'em Right

4115 Iroquois Ave., Detroit, Mich.

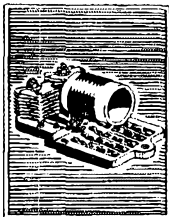
Editor, QST:

Recently I put up a 66' doublet transmitting antenna, 33' on a side, 33' feeders spaced at two inches and the whole works exactly 33' off the ground; all wires accurately measured and strung taut. Exciting this at its frequency, 7150 kc., I have worked a complete circle of a range of 500 miles with not less than an R7. Not much of a record, but consider the xmtr. Push-pull 45's with 250 volts at 75 miles! To date I have had to write three letters to verify the fact that my xmtr was just that. W2ANB still doesn't believe me, I guess, because this afternoon he gave me the welcome R9 plus!

I know what it is to have very little money for radio, a smaller amount of time, and an increasing desire to "get something consistent." You fellows in my class, I've found one way—a proper antenna, and there's no mystery about it, either.

—Walter A. Peterson, W8IXI

(Continued on page 70)



The HRO receiver has turned out to be a much more unusual receiver than we had hoped. We set out, of course, to provide every feature we thought the amateur would want, but we have had to go much further than that. That is why we did not have the set ready for delivery last month as we had expected.

For instance, we equipped the set with a new type of dial which logs directly to one part in 500. We promptly discovered that it would be necessary to correct for temperature changes to a degree we had not foreseen, because the slightest drift was magnified enormously. The solution of this little problem required, among other things, the use of air dielectric condensers throughout the H.F. Circuit each individually compensated for temperature error. This was done by using a combination of aluminum plates, brass spacers and steel studs, so proportioned that increased area, due to expansion of the plates, was balanced by increased spacing, due to expansion of the studs.

Furthermore, our fancy dial showed up errors in selectivity to an appalling degree. When the carrier width amounts to the thickness of a gnats eyebrow, as it does on a conventional dial even with band spreading, small errors in selectivity pass unnoticed. However, when the width of the carrier is an inch or so, due to the magnification of the dial and band-spread coils, then any variation becomes unpleasantly noticeable.

It perhaps would not be out of place to comment on the actual selectivity of the HRO. A visitor at our factory, speaking of a competitive receiver, told us that a carrier was completely detuned by moving the dial one division, and added, "That's selectivity for you!" May we point out that this does not mean selectivity, it merely means difficult tuning. We can explain this best by comparing the HRO and the FB-7. On 20 meter phone, using band-spread, a carrier covers about 3 divisions on the FB-7, and 10 divisions (nearly 3 inches!) on the HRO, yet the HRO is twice as selective as the FB-7. Specifically, the response of the HRO is down 60 db (1000 times weaker) at 10 KC off resonance, which is mighty selective performance. In short, band spreading, either electrical or mechanical, does not affect selectivity at all; it is a device to make tuning easy and accurate, and nothing more.

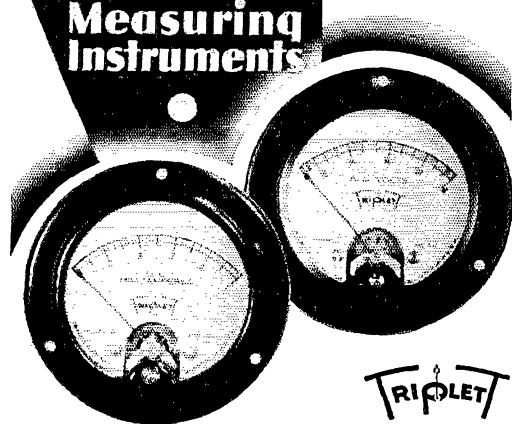
So much for that. First shipments of the HRO will probably be made about the time that you read this page. This is the reason why the HRO is late, and this is our apology. We are not sorry that our plans miscarried, in spite of all our headaches and heartaches, for we think the results are worth it. And when you try it out, we think you will find that the HRO was worth waiting for.

JAMES MILLEN



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Correspondence Department

(Continued from page 68)

International 'Phone Ethics

Viale XII Giugno 18, Bologna, Italy

Editor, QST:

May I suggest that the I.A.R.U. appoint in each European country one or two A1 amateurs to report in QST the calls of the wobulating 'phone stations? On tuning in the 7000-kc. band with a band-spread of 90% of the dial, one may hear something sounding like chirpy code; then, a few degrees further, a carrier starts going up and down for all it's worth, and a few grades on, at the zero beat, it happens to be (do you guess?) an amateur radiotelephone station! "Sex you!" One night, not long ago, with about FIVE of these ether busters on, there were only a few kcs. of the band left for decent traffic. I do not QSO, and can only listen in, but I think of the other hams trying to do so under these conditions. We need a "Wouff-Hong" over here, and how; but will a hint to international ham courtesy be enough?

—Rene Bregozzo

2302 Market Ave., Fort Worth, Texas

Editor, QST:

The amateur in all countries is generally very fair about keeping in harmony with international rules or codes of ethics, and it is generally conceded that the 7-mc. band is for c.w. operation only, yet there isn't an evening that I don't hear some of our friends in Mexico on 'phone.

What I'm trying to get at is just this: Why can't the Mexican amateur work his 'phone rig on 3.5 or 14 mc.? There is plenty of room for good 'phone in these bands.

—H. C. Christian, W6AAQ

Vast Open Spaces

Evanston, Ill.

Editor, QST:

The purpose of this letter is an urgent plea for more good operators using the high-frequency end of the 7-mc. band. Lately, I have been wondering why there are so very few first-class operators on that end of the band and wished to stir up a little interest in that good location.

During the daytime especially it is almost impossible to raise anyone who can send or receive more than about 15 w.p.m. For the few stations working that end of the band conditions are almost always perfect for high-speed QSO's. Due to the fact that I am the proud possessor of only one crystal and no electron-coupled oscillators, I must stick to my frequency of 7290 kc. and simply gnash my teeth while waiting for another good QSO. Another thing, just as important as the scarcity of xtals, is the fact that I use relatively low power, and so can hardly expect to crash through these mugs who insist on using a kilowatt or two on that QRM'y low-freq. end. I am firmly in favor of the stand made by the Staten Island Association as to reducing the power limitation of amateur stations to 100 watts, not because I cannot use high power but because conditions on all our bands would be astonishingly improved by such a limitation. . . .

—Larry Nelson, W9MCC

"Pure" Cream, Perhaps

108 South Poplar St., Pana, Ill.

Editor, QST:

I have a great problem I was just wondering if some of the boys could solve for me. The main trouble is that my little kitten has a terrible a.c. hum, and I was wondering what kind of a filtering system I could use to eliminate it.

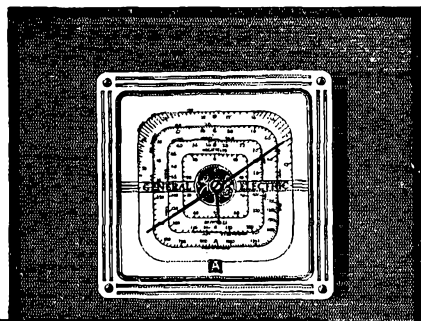
—James Murray, W9NET

Treat your station and yourself to this worthwhile *Christmas Gift* . . . and get an excellent set for home reception in the bargain

● The dial on this new General Electric All-wave Radio is divided into four frequency bands, covering 140-410 kilocycles, 540-1720 kilocycles, 1720-5400 kilocycles and 5400-18,000 kilocycles. Practically every service the amateur is interested in is included, with the range conveniently divided into these four bands. Never any question as to which band is in use—a visual band indicator tells you.

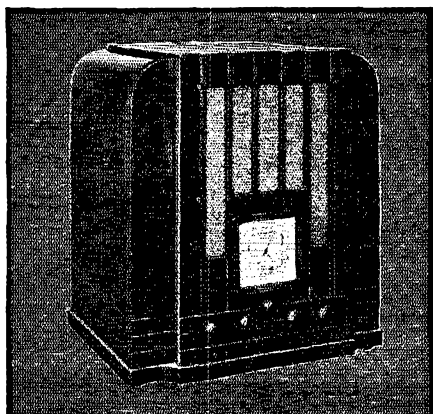
BAND-SPREAD TUNING

● Fine tuning with double-end needle and fully illuminated dial, giving excellent visibility. Two tuning ratios, 50 to 1 and 10 to 1, either instantly available. In addition, band-spread tuning is accomplished by an



C. W.

This set can be adapted for C. W. reception without changing chassis wiring. For complete instructions on this adaptation, write to the address below.



GENERAL ELECTRIC ALL-WAVE RECEIVER MODEL M-81

Price \$97.50 Complete

In addition a full line of all-wave models from \$44.95 to \$375.00. Prices slightly higher West, Mid-West and South. Subject to change without notice.

additional needle with separate scale. The band-spread needle is geared to the main needle, giving minute logging of the fine tuning obtained with the 50 to 1 ratio. Nine revolutions of band-spread needle to cover each frequency band. Thus, you locate desired frequencies more easily and rapidly. What's more, you can log short-wave stations accurately, and return to the desired frequency conveniently and quickly.

NOISE REDUCED

● The set is adapted for the use of double-doublet all-wave antenna, provision being made in the receiver for easy attachment.

TONE! POWER!

● High-gain, 6-watt audio system feeding a large built-in dynamic speaker. Plenty of volume for weak signals, and, at the same time, excellent fidelity for broadcast reception.

GENERAL  ELECTRIC

ALL-WAVE RADIO

MERCHANDISE DEPARTMENT, GENERAL ELECTRIC COMPANY, BRIDGEPORT, CONN.



~by the
"blindfold test"

*Simple, easy and, boy,
 how smooth!*

Whether you use the blindfold test to note its sure, smooth attenuation or hook it into the most complicated laboratory "third degree" the new RADIOHM will come up smiling.

And . . . a mere handful will give you practically any resistance value you'll ever need.



Change to
RADIOHMS

Every Radio Service Man
 should be a member of the
 Institute of Radio Service Men

Centralab

Division of Globe Union Mfg. Co.

MILWAUKEE

Sub-divide 7 Mc.?

115 Washington Ave., Haddonfield, N. J

Editor, *QST*:

. . . An idea has been sticking with me for quite a while regarding the 7000- to 7300-ke. band. It seems that there is considerable agitation toward widening it, if it be possible to do so. Well, why could not a portion of the band, preferably near one edge, be prohibited to amateurs in the U.S.A. but left open to hams of other nations, or perhaps of other continents? If we could get an extra 50- or 100-ke. slice, to what better purpose could it be put than that of furthering more reliable DX? After all, the 7-mc. band is used principally for DX work, and we could easily spare a few kc. to the cause—especially if we get an additional grant. What do others think?

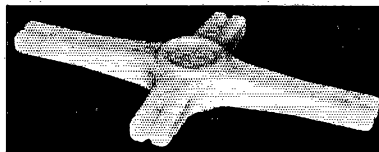
—P. Samuel Christaldi, *WSBHT-W2ENY*

**Get More QSOs — Double Your
 DX — Be Courteous**

C. W. telegraph operators are urged to confine adjustment of their stations to 14,000-14,150, 14,250-14,400, 3500-3900 and 1715-1800-ke. territory when working in these three bands, used by both telegraph and voice operated stations. This courtesy will not only help to avoid mutual interference between the different types of stations, but will make operation with other c.w. telegraphers doubly enjoyable and effective. Avoiding the parts of 20- 40- and 80-meter bands in which phones are permitted, will operate to make ham work more successful for telephone and telegraph work alike.

Universal Joint Antenna Insulator

EVIDENTLY one manufacturer decided to do something about that insulator suggestion in the Experimenters' Section in February *QST*. The result, in ceramic form, is shown herewith. The insulator measures approximately ten inches the long way and six inches along the cross-bar. The feeders, of course, are fastened to the latter, the antenna and supporting guy being connected



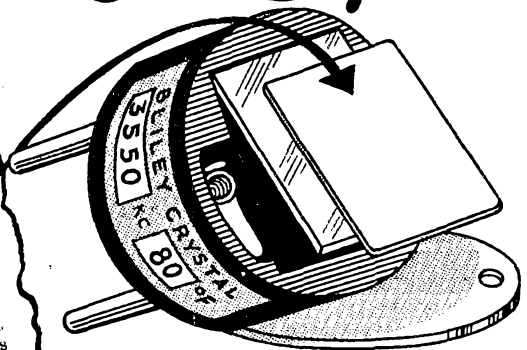
to the ends of the long piece. The arms are tapered towards the ends. The insulator is made of glazed porcelain, the lengths and thicknesses being sufficient to give long leakage paths and good mechanical strength.

The new "universal-joint" insulator is a product of Bud Radio, Inc., 1923 E. 55th Street, Cleveland, Ohio.

Here it is!

to the ideal 31-degree value that gives the simplified frequency response. Hence it is this A1 cut that has us all keyed up. While it still remains for crystal specialists to take care of the little matter of getting such crystals into the hands of amateurs (the cuts are obviously critical and require special equipment and skill), it is not difficult to foresee the potential benefits that will accrue to us with their availability. The zero temperature business means that we can have well-though perfectly fixed frequency, without the complexity of temperature-control gadgets, and the elimination of other modes of vibration, giving the crystal greater power-handling ability, means that crystals can be used to control larger oscillators without getting into trouble.

(FROM Q.S.T. OCT. PAGE 17)



The New BLILEY A-Cut Crystal (Type BC3A)

Here is a new type crystal—a product of the most accurate cutting and lapping processes. The Bliley BC3A A-cut crystal insures over 80% less frequency drift and a power capacity of approximately 200 milliamperes—three times that of an X-cut crystal.

These crystals are ground for the 80 and 160 meter bands by Bliley craftsmen using equipment specially designed for this purpose. Ask your distributor for these crystals by name—Bliley Type BC3A—to be sure that you are getting what you want.

A Complete Line of Crystals by BLILEY

General Communication Frequencies

Extremely critical workmanship and rigid inspection provides a fine degree of precision. Mounted in special type BC3 holder (or strong adjustable air-gap isolantite holder). Furnished to all general communication frequencies between 20Kc and 15Mc. Write for prices.

Single Signal Filter

A precision product that assures maximum efficiency of S.S. receivers. Supplied within 5Kc of 465, 500, or 525Kc completely mounted..... **\$5.90**



BC-3 Crystals 40-80-160 Meters

A new power-size X-cut mounted crystal. Can be run directly with the RK20. 0.03% precision. Frequency coefficient less than 23c/10°/°C. Supplied in 40 and 80 meter bands within 10Kc for only..... **\$3.95**

All progressive radio amateur distributors stock Bliley products. If he does not have your particular choice of frequency, he will get it for you without delay. Order from him.

Outstanding Features

- Approximately 4 cycles drift per million per °C.
- Frequency stability equal to an X-cut oven-mounted.
- Greater power capacity—excellent for triodes.
- 0.03% accuracy guaranteed in your equipment.
- Costs less than X-cut crystal and oven combination.
- Mounted in type BC-3 crystal holder.
- Supplied within 20Kc by your distributor for \$9.00, within 5Kc for \$11.00, to exact specified Kc, \$14.00.

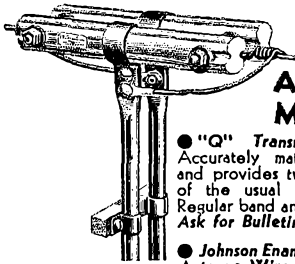


BLILEY ELECTRIC CO.
UNION STATION BUILDING
ERIE, PENNA.



DEPEND ON "JOHNSON"

Transmitting Equipment



ANTENNA MATERIAL

● **"Q" Transmitting Antenna.** Accurately matches impedances and provides twice the radiation of the usual half-wave system. Regular band and 5-meter models. Ask for Bulletin 100-101.

● **Johnson Enameled Copper Weld Antenna Wire.** A strong, stretch-

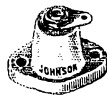
proof low-resistance wire for transmitting antennas. Best for Doublets, Beam-Reflector and all accurate-length systems. No. 14 lists at 1c per foot; No. 12 at 1½ c per foot. Get Bulletin 950.



● **Antenna and Line Insulators.** Airplane strain insulators, high tensile strength antenna insulators, feeder spreaders and transposition insulators for transmitting and receiving antennas. Properly designed, highly-efficient yet economical components. See Bulletin 933.



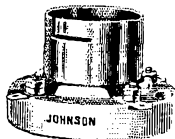
STAND-OFF INSULATORS



● A superior line of **Stand-Off, Thru-Panel and Jack-Type Insulators**—the result of ten years' experience following the original development of the "stand-off" by the E. F. Johnson Company. Described in *Bulletins 933 and 950.*

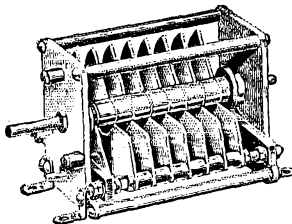
TUBE SOCKETS

● Specified by tube makers and used in commercial transmitters the world over, **Johnson "50 watt" and UX Sockets** are unequaled in quality though low in cost. Low resistance filament contacts and flash-over-proof construction. Request Bulletin 950.



TRANSMITTING CONDENSERS

● **Johnson Type "D" Condensers** are sturdy, compact, efficient—better! Mycalex insulated. A complete range of Single and Dual-Section models for every amateur transmitter. Fully described in Bulletin 200.



These and other JOHNSON products are available from your regular Distributor

E. F. JOHNSON COMPANY

Manufacturers of Radio Transmitting Equipment

WASECA, MINNESOTA, U. S. A.

What the League Is Doing

(Continued from page 27)

Financial Statement

From the business standpoint things "picked up" a little with the League in the third quarter of the year. One of the sections of our bankroll was, however, suddenly short-circuited in August when a water main broke near our office and flooded our cellar, completely destroying a large stock of Handbooks, binders and envelopes, with the loss of a couple thousand hard-earned buxx. For your information, and at the instructions of the Board, the figures are printed below.

STATEMENT OF REVENUES AND EXPENSES FOR THE THREE MONTHS ENDED SEPTEMBER 30, 1934

REVENUES	
Advertising sales, QST	\$15,755.20
News dealer sales, QST	11,830.48
Handbook sales	5,243.38
Booklet sales	1,849.97
Membership dues	11,993.39
Membership supply sales	1,873.28
Interest earned	731.93
Bad debts recovered	188.10
Cash discounts earned	150.31
	<hr/>
	\$49,616.04
Deduct:	
Returns and allowances	\$3,364.21
Exchange and collection charges	3.20
Cash discounts on sales	203.40
Increase of provision for newstand returns of QST	168.87
	<hr/>
	3,739.68
Net Revenues	<hr/>
	\$45,876.36

EXPENSES	
Publication expenses, QST	\$12,487.22
Publication expenses, Handbook	2,685.52
Publication expenses, Booklets	545.96
Membership supplies expenses	1,054.18
Salaries	18,284.50
QST forwarding expenses	686.61
Telephone and telegraph	470.63
Postage	1,295.92
Office supplies and general expenses	1,672.98
Rent, light and heat	807.09
Traveling expenses	1,198.07
Depreciation of fixed assets	236.51
Communications Dept. field expenses	118.71
Bad debts written off	2.01
Headquarters station expenses	84.39
Federal tax on checks drawn	5.84
	<hr/>
Total Expenses	41,636.12
Gain from Operations	\$4,240.24
Less loss from property damage by water	1,746.80
Net Gain	<hr/>
	\$2,493.44

Strays

SOME COIL-WINDING KINKS

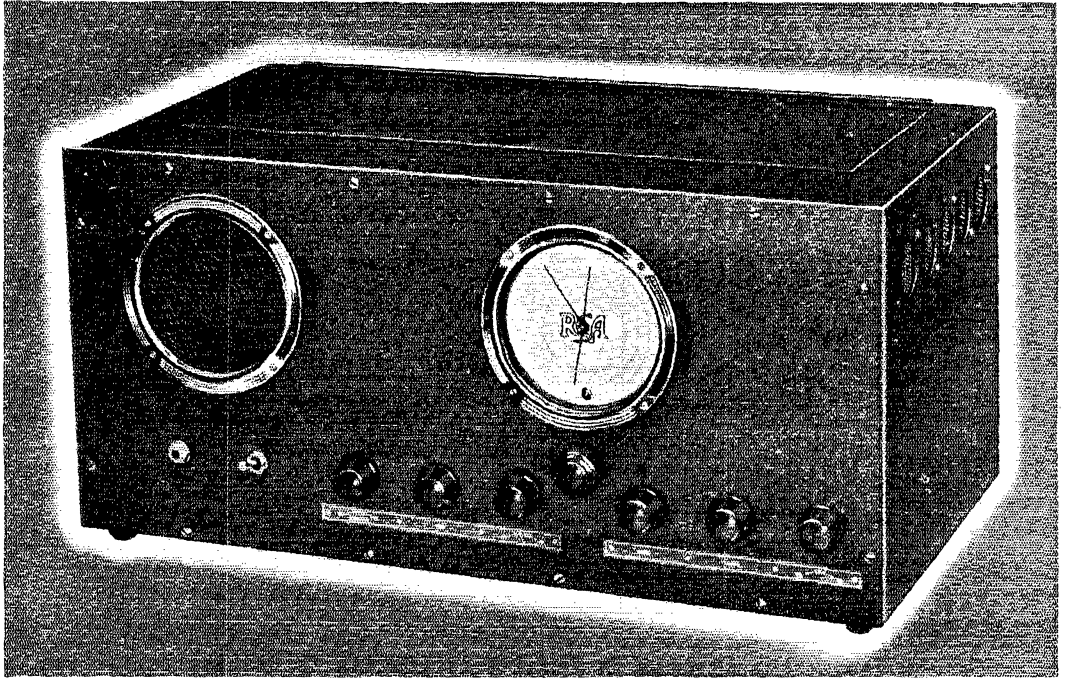
Here are some suggestions for making wire stay in place on tubing forms.

Those who try to wind heavy wire on an un-grooved form and keep the turns in place know it's quite a tough job. Not everyone has facilities for grooving a form, so here's a method



PRESENTS A COMMUNICATIONS RECEIVER

With features you have always wanted and at a price you can afford to pay—\$69.50 complete.



THE ACR-136

The ACR-136 is a seven-tube superheterodyne receiver covering from 540 to 18,000 kilocycles. Pre-selection, A.V.C., front-panel band-switching, and a mechanical band-spread system with calibrated dial and vernier pointer which permit positive logging of any station, are outstanding features of this new amateur receiver. Both r-f and a-f gain controls are provided to permit unusual flexibility in controlling background noise. The tone

quality is exceptional for this type of receiver. These features plus excellent sensitivity and selectivity make the ACR-136 an outstanding value. ★ ★ The ACR-136 is supplied complete with tubes, speaker and power-supply (self-contained). There is nothing else to buy, yet the net price to the amateur is only \$69.50, f. o. b. factory. ★ ★ For more complete information and the name of your nearest amateur sales outlet handling the ACR-136, write to:

AMATEUR RADIO SECTION

RCA VICTOR COMPANY, INC.

CAMDEN, NEW JERSEY

Say You Saw It in QST — It Identifies You and Helps QST

**Dependable
Distributors
Distribute
Dependable
Devices**

- BOSTON, MASS.**
Sager Electrical Supply Co.
- CLARKSBURG, W. VA.**
Professional Radio Service
- DES MOINES, IOWA**
Iowa Radio Corporation
- GRAND RAPIDS, MICH.**
Radio Distributing Co.
- JACKSONVILLE, FLA.**
Sound Service
- LANSING, MICH.**
Wm. Gram Distributing Co.
- LINCOLN, NEB.**
Super-Service Station
- PEORIA, ILL.**
Klaus Radio and Elect. Co.
- SCHENECTADY, N. Y.**
Maurice Schwartz and Son
- SPOKANE, WASH.**
Spokane Radio Corp.
- TOLEDO, OHIO**
Aitken Radio Corp.
- WINNIPEG, MAN.**
Spurling Sales Limited

which works well if smooth forms have to be used. The stunt is to wind a coil, just as copper tubing would be wound, on a small-diameter form such as a dry cell. The diameter of the finished coil will be slightly larger than the dry cell because of the "spring" of the wire. The permanent form to be used should be slightly larger than the coil just finished, the difference in diameter depending upon the size of wire used. About one-half inch is satisfactory for No. 8 wire. The end of the coil is forced apart to fit tightly over the form and the rest of the turns forced on by turning the coil on the form. Roughening the form with sandpaper helps make the coil stay in place.

—W2CWT

W2GEB makes a point of winding space-wound coils when the temperature is high and the wire expanded. Then when the temperature is back to normal the wire contracts and grips the form tightly. Warming the wire in an oven before winding should make the job independent of the weather.

Another method making use of the temperature coefficient of the wire is used by W9HTT. In making the coil the needed length of wire is first measured off and one end attached to a solid support. The other end is fastened to the form and the coil wound by "walking up" the wire. As the wire is wound on, a helper heats it with a blow-torch at a distance of about six inches from the form. On cooling, the contraction sets the turns firmly. W9HTT has wound coils of wire as large as No. 4 by this method and has had no trouble with turns loosening afterward.

Those who want to try unity-coupled circuits will find these hints of interest:

Some of the gang seem to be having trouble threading the grid-coil wire through the plate-coil tubing in unity-coupled outfits. Simply wind the wire to be used for the grid coil around a tube base or other small form so that when the form is removed the coil will be smaller than the plate coil. The wire then will push through the tubing and the end can be caught and pulled through the hole drilled at the center turn. I use No. 20 BBE (braid, braid, enamel) wire.

—W9PHY

If you have trouble drilling window glass to pass feeders through, one reader suggests trying a BB gun or a .22. The bullet will make a quarter-inch hole, and it is claimed that the chances of cracking the glass are less than in drilling. Be sure to have a back-stop!

Breathe a sigh of relief you of the "QSA5 R9 report from every DX station worked" complex. Many are the reports of American commercials that accompany foreign reports that are a mere QSA4 R4! And probably every DX man has received a report such as "louder than WIZ, and twice as consistent."

MEMORANDUM

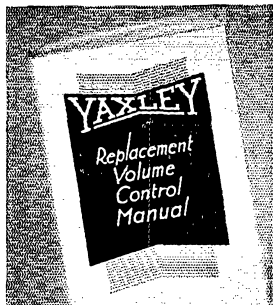
- ✓ You need a copy of the new 1935 Handbook.
- ✓ You need a binder for your 1934 QST's—and another for 1935.
- ✓ Xmas suggestion—give a membership subscription or a new Handbook.

DECEMBER, 1934



You Need the Kit You Need the Tool You Need the Book

Service men throughout America have heralded the appearance of a kit of six Yaxley Volume Controls that will service more than 2500 sets as *the greatest advance in volume controls* that the industry has ever seen. Service men in practically all States of the Union are saving time and making money with the beautifully finished Yaxley Wrench which is given FREE with every order for a Yaxley Kit or in exchange for six tops from any Yaxley Control cartons. You can't afford to be without the kit—you can't afford to be without the wrench. And you'll certainly want your free copy of the Yaxley Replacement Volume Control Manual—the most complete and authoritatively accurate service manual ever published, which tells all about the 30 new Yaxley Replacement Volume Controls that will service 98% of the 3200 set models now in existence. Mail the coupon now!



Here is the Most Complete Manual For Service Men Ever Published

YAXLEY MANUFACTURING COMPANY, INCORPORATED

Division of P. R. Mallory & Company, Incorporated

Indianapolis, Indiana

Cable Address: Palmallo

- Please send free copy of Replacement Manual.
 I enclose 6 carton tops for FREE Wrench.
 I enclose \$3.60 (which is 40% less than regular list price of Individual Controls) for Kit of 6 volume controls which entitles me to FREE Wrench.

Name.....

Address.....

My Jobber's Name is.....

Say You Saw It in QST — It Identifies You and Helps QST

RAYTHEON

TRADE-MARK

Wishes You A Merry Christmas

and Hopes, Too, That Someone —
Mother, Dad or Ex YL — Will Make It
So With New Tubes For Your Outfit

By way of suggestion, attention may be called to the RK-20 transmitters described in August and October *QST* or to the RK-20 equipped Lear Airplane Transmitter used by Col. Roscoe Turner and Clyde Pangborn on their flight from England to Australia. It is pictured on page 30 of November *QST*.

Or, you may be interested in a new small edition of the RK-20 now available. It is designed for the crystal controlled or electron coupled oscillator or R.F. amplifier. As in the RK-20, no neutralization is required. For your convenience this new tube is furnished with either one of two heater ratings. Type numbers and general ratings follow:

RK-23.....	2.5 Volt 2.0 Ampere
RK-25.....	6.3 Volt 0.800 Ampere
Max. Plate Voltage.....	400 Volts
Max. Screen Voltage.....	200 Volts
Power Output as Oscillator or Amplifier, Class C.....	10 Watts
Power Output as Suppressor Grid Modulated Oscillator or Ampli- fier, Average Carrier, Class B.....	3 Watts
Amateur Net Price.....	\$5.95

For additional information on these and other Raytheon tubes for the amateur see your dealer or write to the office near you

RAYTHEON PRODUCTION CORPORATION

30 E. 42nd Street, New York, N. Y.

San Francisco or Chicago Newton, Mass.

Screened Pentode Transmitting Tubes

(Continued from page 34)

shielding inside the tube, which distinguishes this type from the 59 and similar multi-element tubes, is connected to the suppressor grid.

The RCA tube, the type number of which has not yet been assigned, has the following ratings:

Heater voltage.....	6.3 volts
Heater current.....	0.8 amps
D.c. plate voltage.....	400 volts
D.c. plate current.....	50 ma.
D.c. screen voltage.....	250 volts
Plate dissipation.....	10 watts
Nominal r.f. output.....	10 watts

No data given on the interelectrode capacitances, although they are probably of the same order as those of the RK-23. In this tube the extra internal shielding is not connected to any working element, but is brought out to a separate pin on the 7-prong base. The plate connection is made to a cap on top of the tube. The tubes are not yet in production, but it is expected that they will be available by the first of the year.

The desirability of tubes of this type for the Tri-tet oscillator and as amplifiers and doublers in exciter units will be quickly appreciated. Naturally a pair of them also can be used as amplifiers in low-power transmitters to have a power output comparable to the popular pair of 46's or 45's. Practical dope on operating the tubes in the next issue.

—G. G.

Polish DX Contest

(Continued from page 28)

and Southern Rhodesia); Arabia; Persia; Afghanistan; India; Iceland; Canada (except VE5); United States W1, W2, W3, W4, W8; Labrador; Newfoundland; Bermuda; Madeira and Australia.

5 points: Cape Verde Islands; Union of South Africa; Southern Rhodesia; Angola; Brazil; Argentina; Porto Rico; Mexico; United States W5 and W9; Greenland; Martinique; Barbados; Macao; Bolivia; Paraguay; Haiti; Dominican Republic; Cuba; Chile; China; Hong Kong; Java; Sumatra; Ceylon; New Zealand; Uruguay; Peru; Canal Zone; Panama; Jamaica; Guiana and Tasmania.

6 points: Philippines; Japan; Colombia; Honduras; Guatemala; Costa Rica; Indo-China; Siam; Malay States; Madagascar; Nicaragua; Salvador; Curacao; Sarawak; Venezuela; Ecuador; United States W6 and W7; Canada VE5; Formosa; Netherlands Indies (except Java and Sumatra).

8 points: Guam; Cook Islands; Samoa; Tahiti; Fanning Islands; Reunion Islands; New Caledonia and Fiji Islands.

10 points: Hawaii; Alaska, Kuergulen Islands.

For any contacts on the 28-mc. band, multiply by 4. If a group number is not received or badly received, or QSL card is not sent, the QSO for



Santa Claus wears Furs in Finland and Chiffon in Chile. Regardless of your QRA MERRY CHRISTMAS and A HAPPY NEW YEAR



ANNOUNCING

New Low Crystal Prices

LEEDS X cut
160 and 80 meter
1 inch crystals.
= 1KC of speci-
fied frequency.
Now.....\$3.00



LEEDS X cut 40
meter crystals.
= 3 KC of specified frequency.
Now.....\$4.25

Unconditional guarantee as to satis-
factory performance.
Monitor socket type xtal holder,
National vertical mt. holder,
\$1.00

National vertical mt. holder,
\$1.50

Bellefonte Radio Engineering 80
meter "A" cut power crystals 250
cycles of specified frequency drift
within 125 cycles over 45°C.; priced
at.....\$12.00

LEEDS TUBES



are going out in fine style
and what pleases us most,
is, that they are staying out.
Type 866 heavy duty recti-
fier.....\$1.50
Type 250.....1.20
Type 281.....1.10
Type 210.....1.15

The type 210-HF is par-
ticularly suited for ultra high
frequency work, as lava in-
sulation is used internally

and a ceramic base eliminates the losses
encountered in moulded base tubes, \$1.65.
All Leeds tubes carry our regular 30-day
guarantee.

Navy Type Telegraph Key

List \$3.60. Navy knob — 3/8" Tungsten
contacts.....\$1.15
With regular knob......95

JEWELL Metal case 2" AC VOLTME-
TERS. 0-8; 0-10; 0-15; special.....\$2.95

The New SYLVANIA

thoriated filament Type 10 Tube is
going like hot cakes and
why not, at.....\$2.50
LIST

RCA No. 955 acorn tubes in stock. \$3.75

Racks, panels, bases, boxes, freq-
meters, power supplies, analyzers,
5 meter gear, mixing panels, modu-
lators, wavemeters and many special
items. Our bulletin B-73 tells all;
5c brings it to you post haste.

GENERAL RADIO

Amateur accessories are always in
stock. Here are two handy forms for
that multiband xmitter.

Type 677-U — 21 turns, 2 3/4"
diameter, resonant on 3.5 mc with
100 mfd capacity; weight 2 lbs.
Price.....50c

Type 677-Y — 30 turns 4" diame-
ter, resonant 1.7 mc with 100 mfd
capacity. Weight 3 lbs. Price.....75c

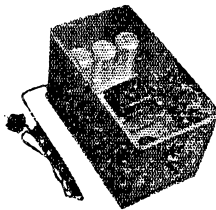
Also 7-pin base to fit above forms at
70c and a matching base with jacks
at 65c.

SPECIAL

Split Stator Condensers

General Radio, large receiving, \$1.25
spacing; 80 mmf effective capacity

LEEDS Type 1-E POWER SUPPLY



200 volts
DC, 2 1/2 volt,
3 amp AC.
Ideal for
freqmeters,
receivers,
etc.

\$6.50

Sub chassis mounting R C A chokes
18 Henries, 125 MA. Special each,
49c

LYNCH "Hi-Fi" simplex and du-
plex antenna systems in stock.
Complete details on request.

ACME-DELTA

for de luxe power equipment. We
carry the complete line in stock.



LEADS THE FIELD

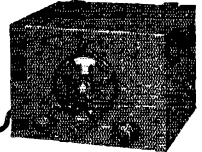
World Wide Service to Amateurs

45 Vesey Street
New York City

Cable Address, "RADLEEDS"

The NATIONAL SW-3

is still the pacesetter after 3
years in the
T R F receiver
field. 2 3/4 volt
AC. 6 volt AC.
DC and 2
volt models
in stock at



\$19.50

Band spread and general coverage short
wave coils, per range.....\$3.00
All National products as advertised in
October QST always on hand for immedi-
ate shipment.

National Steel Cabinets

Crystalline black finish with sub-base and
bottom cover. Type C-SRR...\$2.10 Type C-PSK...\$3.60
Type C-SW3...3.30 Type C-FB7...4.20

National Transmitting Condensers

Low power — compact; all 2 3/4" length
TMS — 100 mmf 1000 v.....\$1.35
TMS — 150 mmf 1000 v.....1.50
TMS — 250 mmf 1000 v.....1.65
TMS — 50-50 mmf (dual) 1000 v.....2.10
TMS — 100-100 mmf 1000 v.....2.55
TMSA — 35 mmf 2000 v.....1.65
TMSA — 50 mmf 2000 v.....1.80

Hard Drawn Wire for Hertz Antennas
No. 12 tinned copper wire, 100 ft.....55c
No. 10 tinned copper wire, 100 ft.....85c
No. 12 phosphor bronze wire, 100 ft.....75c
No. 10 phosphor bronze wire, 100 ft.....\$1.25
Other lengths in proportion

We can also supply soft drawn tinned
copper wire for coil winding.

No. 12, 100 ft., 55c No. 10, 100 ft., 85c

MAGNET WIRE

All even sizes from No. 14 to No. 38 in
enamel, double cotton, or double silk on
25c spools. Prices on larger quantities are
yours for the asking.

Super Special Hardwick-Hindle

200-watt vitrious resistors, 69 ohms, 1000
ohms, 6500 ohms; in these
sizes only; each.....39c

2000-ohm 100 watt 6 taps.....39c
2 size 20,000 ohm tapped at every 5000
ohm, 85 watt.....39c

WARD LEONARD

100-watt vitrious resistors; 400 ohms, 800
ohms, 1000 ohms, 1500 ohms.
Each.....25c

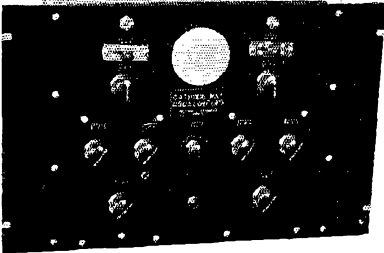
Leeds 5-Meter Receiver

Fully described in June QST. It pays to read
this over again. Receiver less tubes....\$13.75

A thin dime brings our bulletin B-73
and 25 manufacturers folders. There
is a wealth of information of interest
to builders in this collection of data.
Send for yours today.

THE IMPROVED CATHODE-RAY OSCILLOSCOPE

Linear sweep model for broadcast stations and advanced amateurs, physics labs., etc.



★ Controlled linear sweep. ★ Controlled external sweep. ★ Freq. locking device for sweep frequency. ★ Picture centering adjustments. ★ Wide range focus adjustments. ★ Complete component shielding. ★ Unit is self contained and includes batteries and 110V-60 cycle power supply. ★ Tubes RCA 906-885-234-281-280. ★ This instrument embodies all features ordinarily contained in only the highest priced Cathode Ray equipment.

**Completely Equipped Ready to Use
F.O.B. Newark — \$97.50**

Literature now available

Thordarson Specials

FILTER CHOKE \$2.75
250ma — 12h — 110 ohms

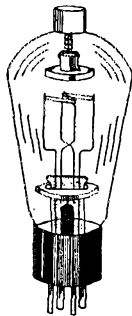
POWER TRANSFORMER \$3.35
600-600-200ma
2½ V. @ 10A; 5 V. @ 3A; 7½ V. @ 4A.
A Real Husky Transformer

TUBES

210
15W

Large
Plate

\$1.15

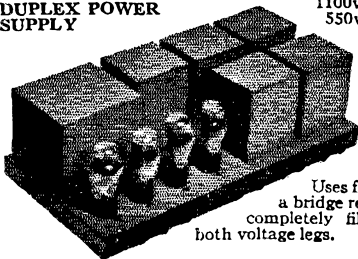


866
1000 hr.
Guarantee

New
Construction
\$1.35

DUPLEX POWER SUPPLY

1100v. 250ma.
550v. 250ma.



Uses for 83's in a bridge rectifier—completely filtered in both voltage legs.

\$35.00

These units can be had on special order in any size mounting or form.

We are specializing in transmitter construction to customers' orders and specification. Write for quotation on your favorite transmitter.

Special code classes for beginners. No charge. Telephone for appointment.

KALTMAN & ROMANDER
62 Court St. Newark, N. J.

both parties is annulled. Only one contact with a Polish station will count.

The competitor gaining the greatest number of scores in his country will get a diploma. The three foreign competitors gaining the greatest number of points of all foreign countries will get special diplomas.

Those who took part in the VK contest last month will verify the good time they had. Give the SP hams some signals to work with, gang. QSL whether you are in the contest or not, otherwise you penalize a competing station.

Standard Frequency Transmissions

Date	Schedule	Station	Date	Schedule	Station
Dec. 1	BX	W6XX	Dec. 30	C	W6XX
Dec. 2	C	W6XX	Jan. 4	A	W6XX
Dec. 7	A	W6XX	Jan. 11	B	W9XAN
Dec. 14	B	W9XAN		B	W6XX
	B	W6XX	Jan. 16	C	W9XAN
Dec. 19	C	W9XAN	Jan. 18	B	W9XAN
Dec. 21	B	W9XAN		A	W6XX
	A	W6XX	Jan. 23	BB	W9XAN
Dec. 26	BB	W9XAN	Jan. 25	BB	W6XX
Dec. 28	BB	W6XX		A	W9XAN
	A	W9XAN	Jan. 26	BX	W6XX
Dec. 29	BX	W6XX	Jan. 27	C	W6XX

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 W6XX, 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 W6XX 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.

W6XX: Don Lee Broadcasting System, Los Angeles Calif., Harold Peery in charge.

WWV 5000-Kc. Transmissions

The 5000-kc. transmissions of the Bureau of Standards' station, WWV, are given every Tuesday continuously from 12:00 noon to 2:00 p.m.,



T. R. McElroy

World's Fastest Radio Telegrapher*

OFFICIAL RECORD—
(never equalled)

56½ WPM

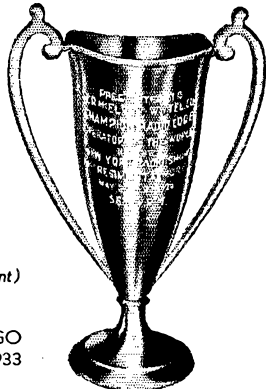
CHICAGO
1922



AUTHENTIC RECORD—
(not in tournament)

73 WPM

CHICAGO
1933



Announces the **MAC-KEY** the perfect *Semi-Automatic and Straight Key*

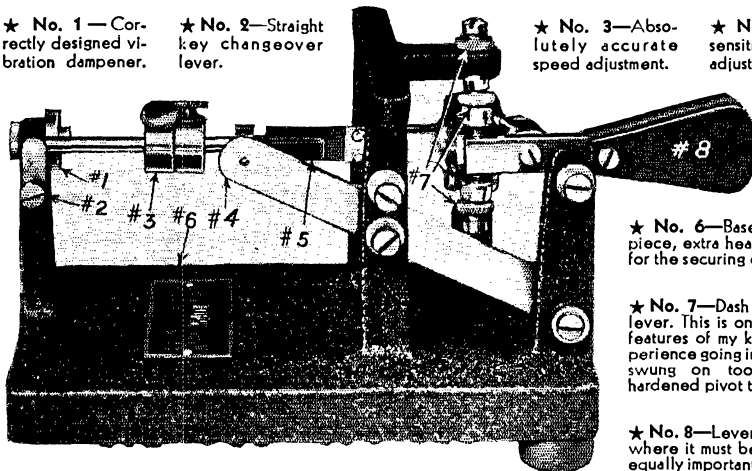
"I'll not write a lot of bunk about my key. I'll tell you these truths: Each Mac-Key is adjusted by myself and shows perfect speeds 8 wpm to 45 wpm; each is an exact duplicate of the key with which I've established records in sending Morse & Continental code these past 15 years. Each is sold with my guarantee that you can send better with a Mac-Key than with any other instrument made—or your money refunded after 5 days trial."

★ No. 1—Correctly designed vibration dampener.

★ No. 2—Straight key changeover lever.

★ No. 3—Absolutely accurate speed adjustment.

★ No. 4—Extremely costly and sensitive platinum contact points, adjustable without changing faces.



★ No. 5—Main spring selected after costly metallurgical research and personal painstaking experimental work.

★ No. 6—Base end superstructure, one piece, extra heavy casting. Rigidity necessary for the securing of smooth rhythmical sending.

★ No. 7—Dash lever suspended from main lever. This is one of the two most important features of my key. Remember, 15 years' experience going into each Mac-Key. All levers swung on tool steel pinions between hardened pivot trunnions.

★ No. 8—Lever full hand width above table where it must be for correct sending. This is equally important when used as a straight key.

EMPHATICALLY assert that my key is the only one made with which it is possible to send perfect Continental code with its multiple dash figures and letters.

Price \$17.50 f.o.b. Boston. Temporarily subject to 40% discount.

Whether I can continue this customary discount depends upon

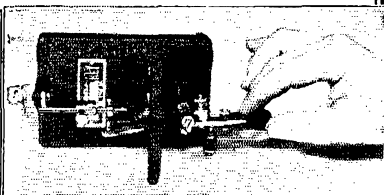
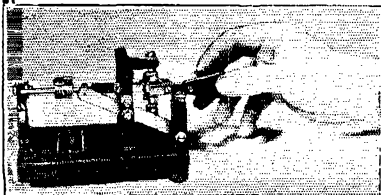
volume. Take another peek at my guarantee. Then see your local dealer or write me direct enclosing money order for \$10.50. If you think you've been enjoying ham radio heretofore, wait! If you try a Mac-Key and hear code you never dreamed yourself capable of turning out. But do it now, please. I've put my whole life into my key. Honestly, it is marvelous.

Won't you please justify my faith in ham operators and order NOW if you can dig up the ten fifty. 73'S EVERYBODY, AND I REALLY MEAN IT.

T. R. McELROY, 23 Bayside Street, Upham's Corner P. O., Boston, Mass.

*Official champion of the world, 1922 to 1933.

Distributed in metropolitan Boston by the **RADIO SHACK, 46 Brattle St., Boston**



Why OIL-FILLED CAPACITORS?



With unparalleled experience gained through countless units supplied for radio and industrial uses, Aerovox now offers you oil-impregnated, oil-filled capacitors, featuring:



- Compact round or square metal containers.
- High-tension insulator terminals for ample protection against high-potential breakdowns.
- Thoroughly dehydrated sections, oil impregnated, and finally placed in bath of oil. No air pockets.
- Sections constructed to resist strains, plate flutter and capacity variations.
- Hermetically sealed metal containers, absolutely seepage-proof.
- Design insures proper circulation of oil through section as it heats and expands under load, and contracts when load is removed, for adequate cooling and maintained insulation.

SEND FOR DATA on complete line of Aerovox condensers and resistors. Also free copy of Aerovox Research Worker — a monthly batch of practical dope.



CORPORATION

73 Washington Street * * Brooklyn, N. Y.

RADIO

ENGINEERING, broadcasting, aviation and radio telegraphy and telephony, police radio, servicing, marine accounting taught thoroughly. Morse telegraphy and railway work. School established 1874. All expenses low. Catalog free. DODGE'S INSTITUTE, Day Street, Valparaiso, Indiana

STUART W. SEELEY (W8ZC)

Development Engineer, Sparks-Withington, writes:

"I GOT THE SURPRISE OF MY LIFE

with

LYNCH
GIANT KILLER

TRANSMISSION-LINE CABLE"

"In using 600 ft. of your GIANT KILLER CABLE, I find I can work "Duplex" to within 15 kc. of my own frequency. Because of the fact that the receiving antenna is some 300 ft. from the nearest house or power wires, there is absolutely no man-made interference present.

If the whole arrangement had worked one quarter as well as it does, I would have been more than satisfied. I stayed up until about 3 o'clock on a Sunday morning, and several of the fellows in the 80 meter phone band had the surprise of their life when I told them they could break in on any of my transmissions even though they were only 20 kc. off my frequency of 3970."

LYNCH GIANT KILLER CABLE

is being used on transmitters and receivers with surprising results. If you haven't read the *Lynch Ham Antenna Bulletin*, you've missed a lot.

It's FREE AT YOUR DEALERS, or from

ARTHUR H. LYNCH, INC.

227 Fulton Street New York, N. Y.

The Pioneer of Noise-Reducing Aerials

and from 10:00 p.m. to midnight, E.S.T. These transmissions are accurate to $\frac{1}{2}$ cycle (one in ten million).
— J. J. L.

I.A.R.U. News

(Continued from page 49)

oles began the publication of its own independent official organ. The magazine was titled "URE," and was a success from the start. Averaging thirty pages or so of well-printed, well-illustrated coated paper, its appearance is as commendable as the material it contains. It is produced under the active direction of Angel Uriarte, EA4AD, President of U.R.E. Technical information overbalances the average issue; local and international news comprise the remainder. The per copy price is 2 pesetas, the annual subscription rate 20 pesetas, or, at the date of writing, \$2.75. The address: U.R.E., Apartado 262, Madrid, Spain.

W9AUH

(Continued from page 47)

concentrating on ORS parties and SS contests, "Moss" is an enthusiastic member of the NCR, is interested in ten-meter experimenting (he's out for the ten-meter trophy, incidentally) and has a couple of 56-mc. rigs.

In sending in a few lines about himself and the station, "Moss" writes that he is sales manager of a firm wholesaling radio parts and takes a postman's holiday with W9AUH because he "likes radio." The evidence certainly supports it!

Quartz Crystal Fundamentals

(Continued from page 40)

With modern temperature and pressure control equipment, frequency variations may be controlled to within one part in ten million, and apparatus having this stability has actually been constructed.

Quartz resonators are becoming increasingly important in other electrical circuits. Many functions can be performed by them that could be achieved only with great difficulty, or perhaps not at all, by other means. Such applications have been made in electric wave filters, equalizing networks, and other communication circuits. Crystals used for this work are generally of the perpendicular-cut type, since they have certain inherent properties which make them more suitable for this work than the parallel-cut type.

Another application of quartz crystals is in the measurement of the explosion pressure in big guns. To do this, several round quartz plates are placed in a hole made in the barrel of the gun, with a suitable plunger and electrode arrangement for transmitting the pressure to the crystal plates. A recording galvanometer measures the charge on the crystal.

WE
PRESENT

PATTERSON

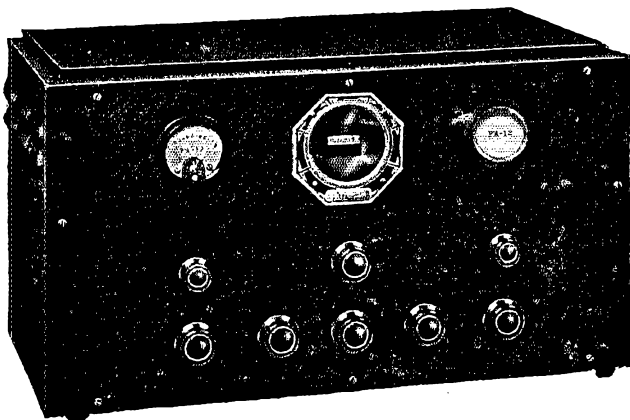


All-Wave Radio

IT'S
READY

THE NEW PR-12 PROFESSIONAL RECEIVER

—PATTERSON'S MASTERPIECE—THE ULTIMATE FOR 1935
IN THE SCIENCE OF DX COMMUNICATION



- 8 to 550 Meters
- Shielded 100%
- Preselector Stage
- Self Contained Power Supply
- Large 10½ Inch Dynamic Speaker
- Crystal Filter
- SS CW Tuning
- Chromium Plated Chassis 18-gauge

- New 6 Section Tuning Condenser
- Three Stages AF Amplification
- Doublet or Marconi Antenna Connection
- Monitor Switch
- Modulation Meter And "R" Meter
- Litz Wound IF Transformers
- 6 Months Guarantee

TUBE LINE UP

- | | | | |
|---------|---------------------------------------|---------|--------------------------------|
| 1 — 6D6 | Radio Frequency Amplifier | 2 — 42 | Class A Prime Output |
| 1 — 6A7 | Combination Oscillator & 1st Detector | 1 — 5Z3 | Rectifier |
| 2 — 6D6 | Intermediate Amplifiers | 1 — 6D6 | Beat Frequency Oscillator |
| 1 — 75 | Diode Detector | 1 — 6D6 | Modulation Meter and "R" Meter |
| 1 — 75 | First Audio Amplifier | | |
| 1 — 76 | Second Audio Amplifier | | |

PRODUCTION OF THIS CUSTOM BUILT RECEIVER WILL BE STRICTLY LIMITED. ORDERS WILL BE FILLED IN THE ORDER OF RECEIPT. ORDER AT ONCE TO AVOID DELAY.

F.O.B. WILMINGTON, DEL.
OR LOS ANGELES, CALIF.

PRICES COMPLETE
ABSOLUTELY NOTHING ELSE TO BUY

NO TIME PAYMENTS
OUTSIDE U.S.A.

	List	Net Cash	Time	Down P'mt	Monthly 5 P'mts
Chassis, Tubes and Speaker without Crystal	\$129.50	\$77.70	\$84.18	\$34.18	\$10.00
Chassis, Tubes and Speaker with Crystal	139.50	83.70	90.75	35.75	11.00
Metal Case, Complete, without Crystal	139.50	83.70	90.75	35.75	11.00
Metal Case, Complete, with Crystal	149.50	89.70	97.25	37.25	12.00
Console, Complete, without Crystal	169.50	101.70	110.20	46.20	13.00
Console, Complete, with Crystal	179.50	107.70	116.70	46.70	14.00

DELAWARE RADIO SALES CO.

405 DELAWARE AVENUE

Eastern Distributors

WILMINGTON, DELAWARE

ESTABLISHED 1920

Cable Address: DELRAD

ATTENTION W3DQ

(Prices and Terms Subject to Change Without Notice)

Compare
Them with
RACKS
Selling at
Any Price

Constructed of very heavy gauge steel (about $\frac{3}{8}$ " thick). Finished thruout in black Shrivel Lacquer — Complete with all panels. Made in two sizes.

Type R7: — with 7 panels $8\frac{3}{4}$ " x 19". Overall size 21 $\frac{1}{2}$ " wide 66" high.
Price.....\$16.95

Type R4: — with 4 panels $8\frac{3}{4}$ " x 19". Overall size 21 $\frac{1}{2}$ " wide 39" high.
Price.....\$11.45

DUE TO EXTREME LOW SELLING PRICE, PLEASE INCLUDE 75 CENTS FOR PACKING CHARGE



866 TUBES 99c

Isolanite tops — Heavy duty rectifiers.

A SPECIAL buy makes it possible for us to give you at this price the same tube we previously sold for \$2.15. These also carry our full guarantee.

THORDARSON CASED TRANSFORMER

600 volts each side of C.T. 200 MA 2 $\frac{1}{2}$ V. 10 amps. C.T., 5 V. 3 amps., 7 $\frac{1}{2}$ V. 3 amps.
C.T.

\$2.99

THORD. CHOKE 12 H 250 MA. \$1.99

NATICO TR-1 BATTERY MODEL TRANSCEIVER

(See Sept. QST, p. 66)\$9.70

GROSS CASED GLASS "B" TRANSFORMERS

For use with two 46 tubes, per pr.\$3.95

SPECIAL 10-12 V 7.5 A. Filament transf. \$8.85

GLASS "B" TRANSF. — 19 Tubes, per pr.\$2.90

OIL FILLED CASED CONDENSERS

2mfd 2000 V. Working.\$3.95 2mfd 1000 V.\$2.10

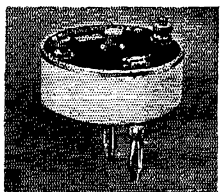
HOYT ANTENNA METER

Hot wire antenna meters. 2 $\frac{1}{4}$ " mounting hole, flange 3" diameter, supplied in 1 $\frac{1}{2}$, 3 and 5 ampere ranges. Why work without antenna meters when you can buy them at this special price? **\$2.75**

NEW!!

Gross Crystal Holder

WHITE CERAMIC commercial type crystal holder — priced at less than ordinary holders. Adjustable pressure, dust proof, no tools required to open. Takes crystal to 1 $\frac{1}{4}$ " square. Plus standard $\frac{1}{8}$ " spacing. **\$1.00**
Most efficient job yet.



GROSS RADIO, INC., 51 VESEY ST., N. Y. CITY

Quartz crystals have been used as a source of high frequency sound in the Pierce Acoustic Interferometer for the determination of the velocity and absorption of sound in various media.

There are many other special applications of quartz crystals, and the fact that a small piece of rock can be substituted for a highly resonant electric circuit element, and in many cases give an improved performance, makes the use of quartz unique in the electrical art.

PREPARATION OF CRYSTALS

Let us now consider the more practical side, that of the actual preparation of the quartz plate from the raw material. An entirely perfect quartz crystal is rare, but fortunately a crystal need not be perfect in its entirety to obtain several good plates. A good crystal may be rough and dirty on the outside, but should be clear on the inside when viewed by the naked eye, showing no smoky or dark regions and no colors. It must also be free from bubbles and cracks. Usual specifications are that it shall be free from twinning, have no flaws, and be of optical quality.

In cases where apparatus is not available for redetermining the axes of the crystal plate when cut, it is good practice in grinding to retain at least one of its natural hexagonal faces as a reference. An ordinary crystal has six hexagonal faces and a pyramidal point on one end; the opposite end is generally broken off in mining and is full of flaws. Heading this article is a picture of a crystal as it appears in nature, with a picture of a prepared X-cut crystal superimposed upon it.

Manufacturers equipped for cutting and grinding crystals which have to meet exacting demands use the polariscope and the X-ray for determining the various axes, the latter determination being based on ray reflection. By these methods the axes may be determined within several minutes of arc of their true value.

Since quartz is very hard (hardness=7) special cutting and grinding equipment is required. Copper or brass discs revolving in a pan of carborundum powder and water, with a small quantity of soap added to prevent chattering, are used. The soft metal discs are far superior to steel because steel will readily be ground off, whereas if copper or brass is used the carborundum grains imbed themselves in the metal and give a good grinding surface.

After the rough cutting operations, the quartz must be examined for twinning. This is done by putting the slabs in a bath of hydrofluoric acid (HF); any twinning in the plate will be shown by a variation in the amount of quartz dissolved. Plates having the slightest amount of twinning must be discarded, since they will not oscillate.

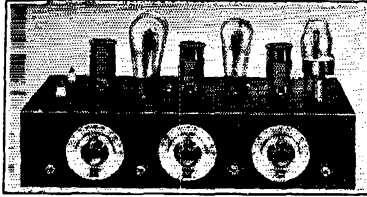
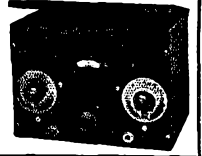
The thickness grinding is done on a soft iron plate revolving in a horizontal plane, special forms being used to hold the crystals in position. Great care must be taken so that the two faces of the plate are accurately parallel, and that the faces are orientated properly with respect to the axes. A small variation from the true value may

QUALITY • VALUE • SERVICE

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. See March or April 1933 QST for full description of this most excellent value in short wave receivers.

"Eagle" completely wired and tested.. \$11.95 Three tubes tested in your receiver.. \$3.00



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. **\$13.95**
Complete kit, less tubes and crystal

Johnson Airplane Strain Insulators \$0.05
White or black 1/2" and 1" Standoffs, doz. \$0.50
White or Brown Beehive Ins., doz. .45
Isolantite spreaders 3" long, 10 for. .35

FILAMENT TRANSFORMER FOR BRIDGE RECTIFIERS

Using 83 tubes 5 v-5 v-5 at 3 amps C.T. — 3000 v insulation. \$2.25
For 866 tubes 2 1/2 V.-2 1/2 V.-2 1/2 V. C.T. 10,000 volt insulation. \$4.50

Thord. Choke 15 H 250 MA. \$2.95
Gross Cased Choke 30 H 125 MA. \$1.95
Gross Cased Choke 30 H 200 MA. \$1.94
Gross Cased Choke 20 H 350 MA. \$4.95

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

GROSS CASSED POWER TRANSFORMERS

650 v ea. side C.T. 350 ma fila. 2-7 1/2 v C.T. and 1-5 v will give 500 v with choke input using 83 or 523 tubes. You can run your entire R.F. and class B off this trans. \$5.50
750 v ea. side C.T. 300 ma fila. 2-7 1/2 v C.T. and 1-5 v. \$5.75
750-1000 v ea. side of C.T. 300 watts. \$6.65
850-1350-1500 v ea. side of C.T. 400 watts. \$8.70
(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

EXTRA SPECIAL MOUNTED, UNCASED TRANSFORMERS

500-750-1000 volt each side of C.T. 300 watts. \$5.50
400-800 volts each side of C.T. 160 ma. \$3.40

MOUNTED CENTER TAPPED FILAMENT TRANSFORMERS

2 1/2 v 8 a — 2 1/2 v 3 a — 5 v 3 a. \$1.29
2 1/2 v 4 a — 7 1/2 v 2 1/2 a — 7 1/2 v 2 1/2 a. \$1.29
2 1/2 v 4 a — 5 v 3 a — 7 1/2 v 2 1/2 a. 1.29
5 v 3 a — 7 1/2 v 2 1/2 a — 7 1/2 v 2 1/2 a. 1.29
2 1/2 v 6 a — CT (midget). .74
5 v 3 a — CT (midget). .74
6.3 v 1.5 a — CT (midget). .69
7 1/2 v 3 a — CT (midget). .89

A FEW OF THE LEADING LINES WE CARRY IN STOCK

For immediate delivery — Aerovox, Beede, Birnbach, Billey, Cardwell, Electrad, Hammariund, Johnson, Kenyon, RCA de Forest, Raytheon, Sangamo, Shure, Signal, Thordarson, United Transformer, Universal, Vibroplex, Ward Leonard, Westinghouse, Yaxley.

200 WATT VITREOUS RESISTORS With Variable Sliders

1000 ohms. \$0.99
2500 ohms. 1.05
5000 ohms. 1.05
10000 ohms. 1.11
15000 ohms. 1.20
25000 ohms. 1.29
35000 ohms. 1.35
50000 ohms. 1.44
60000 ohms. 1.49
80000 ohms. 1.59
100000 ohms. 1.65

Porcelain Base 50 Watt sockets (side wiping contacts) \$0.99

Midget Double Spaced 50 mmf neut. cond. \$0.59

Midget Double Spaced 35 mmf neut. cond. \$0.49

UNIVERSAL ANTENNA COUPLING SYSTEM INDUCTANCES

Wound on threaded double X natural bakelite tubing, can easily be tapped, with clip supplied, ea. \$1.50

(Use one coil for single-wire feed and two coils for two-wire systems)

Low C 40-80-160 Meter Amplifier Coils

(See transmitter by GRAMMER page 46 May QST) Plug-in, wound on threaded natural bakelite tubing, will tune with 50 or 60 mmf. condenser, any size, each. \$1.75

NEW!!! BEEDE BAKELITE

Cased, 3 1/2" Meters. 0-5 to 0-1000 MA. In all standard ranges. \$3.35

BLANK CHASSIS

Ideal for mounting power supplies, RF units, etc. 18-gauge metal — welded corners — black telephone finish inside and out. Complete with bottom dust covers.
8" x 3" x 8 1/2" \$0.65
10" x 3" x 8 1/2" .75
17" x 3" x 4" .85
17" x 3" x 8" 1.15
17" x 3" x 10" 1.30

GROSS ADJUSTABLE DESK STAND. \$3.95

NEW!!

Martin Vibroplex Jr. \$10.00

GO-DEVIL AUTOMATIC KEY \$6.00

SPECIAL TUBES!!

CARBON PLATE 203-A \$8.75
CARBON PLATE 800. \$4.90

510-A tube — Thoriated Tungsten Filament Graphite Plate — Isolantite Base. \$2.45
210 tube — Thoriated Tungsten Filament Special. \$1.15
1/2 and 1 watt Neon Bulbs. \$0.29

RAYTHEON RK-20

The New RF Pentode Power Amplifier Tube in stock. \$15.00
(see page 14 June QST)

SOLID ENAMELED ANTENNA WIRE

No. 14 (any length) per 100 ft. \$0.35
No. 12 (any length) per 100 ft. .55
No. 10 (any length) per 100 ft. .90
No. 8 (any length) per 100 ft. 1.30

Hard Drawn Tinned Copper Antenna Wire
No. 12 (any length) per 100 ft. \$0.55
No. 14 (any length) per 100 ft. .35

Hoyt Milliameters and Voltmeters

Perfectly damped meters at a price. These are not to be confused with the usual inexpensive meters. 2" mounting hole, flange 2 3/8" diameter, supplied in the following sizes: 10 ma, 25 ma, 50 ma, 100 ma, 150 ma, 250 ma, 300 ma, 4 V, AC, 10 V, AC, 15 V, AC, 10 V, DC. Price each \$1.30, 3 for \$3.60

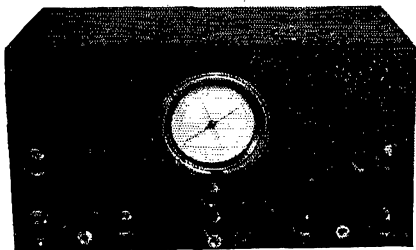
20% DEPOSIT WITH ALL C. O. D. ORDERS. REMIT BY M. O. INCLUDE POSTAGE

GROSS RADIO, INC., 51 VESEY STREET, NEW YORK CITY

ED WILCOX: W9DDE

now offers

McMurdo-Silver's famous 5C SINGLE SIGNAL SUPER



Here's your chance to bring your station up to the minute for the winter's radio activities. The 5C is the improved model of the 5B... used exclusively at W9USA at the World's Fair.

Illinois Amateurs! \$10 down puts this equipment in your station. Balance small monthly payments.

WILCOX RADIO SALES

"CHICAGO HEADQUARTERS FOR AMATEUR PARTS"

506 S. WABASH AVE., WEBster 4101, Chicago, Ill.

Merry Christmas!

SEE PAGE 96

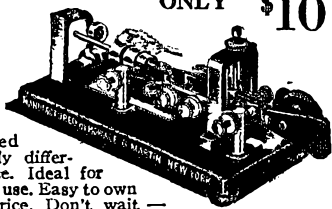
Here It Is!

MARTIN
JUNIOR

For Limited Time
ONLY \$10

Think of it!
A Genuine
MARTIN
Vibroplex
for only \$10

All standard features. Heavy contact points. 2 3/4 pound black japanned base. The only difference is in size. Ideal for radio. Easy to use. Easy to own at this low price. Don't wait — order **YOURS NOW!** Remit by money order or registered mail.



OTHER VIBROPLEX MODELS

Famous Improved Vibroplex, Black or Colored, \$17; Nickel-Plated, \$19. Easy-Working Vibroplex No. 6, Black or Colored, \$17; Nickel-Plated, \$19. Write for catalog.

THE VIBROPLEX CO., INC.

825 Broadway

New York, N. Y.

cause one axis to be shortened and another lengthened, resulting in wide deviations of the elements from the formulas given. This is especially true with X-cut crystals, in which the mechanical axis is quite long and the electrical axis small.

For very high frequencies polishing rouge is sometimes used for the final grinding operations and frequency adjustments.

Convention Highlights

(Continued from page 38)

W. K. McCulla of McCulla Manufacturing Company talked on "ham" receivers. Dr. Andres, Yaxley Manufacturing Company, had a good technical talk, properly illustrated. Mr. Johnson of RCA was listened to attentively. R. J. Kryter, of Esterline-Angus Company, talked on a non-radio subject, explaining Einstein's relativity.

At the forum meeting, led by A. A. Hebert, everyone had a chance to hear SCM Mossbarger (Kentucky); SCM Irvine (Ohio) and SCM Hinds (Illinois). Many A.R.R.L. problems were discussed.

One of the outstanding events was the big smoker late Friday night, but it did not compare with the banquet Saturday night. John Reinartz acted as the toastmaster and gave the speakers only three minutes for the after-dinner talks. This allowed more time for the program of music, dancing and singing; and also gave the prize committee an opportunity to make the distribution of well-worth prizes to the big gathering of YL's, OW's and OM's. The convention closed on Sunday with trips to WBNS and the airport. A well-conducted convention and the thanks of all to F. R. Gibb, W8IJ, the general chairman and his very efficient committee. —A. A. H.

Canadian Convention

THERE is considerable metropolitan rivalry in Canada, but even the most rabid of the King's subjects in Ottawa and Montreal were forced to concede that Toronto proved the ideal setting for the fourth annual Canadian Convention, held at the King Edward Hotel on October 5th and 6th. With a total attendance of 166, the gathering ranked high both in point of numbers and in the whole-hearted and widespread display of good fellowship.

Things got going at 2:30, Friday afternoon, with greetings to the assembled delegates by Samuel B. Trainer, VE3GT, committee chairman. The high spot of the afternoon session was the address by W. A. Shane, engineer in charge of CRCT and owner of VE3BW, on "Some Problems in the Development of Amateur 'Phone Transmitters."

The Friday evening program opened promptly at 8:00 with an address by G. H. Baldwin of the Canadian Westinghouse Co., Ltd., on "The Double Doublet Antenna for Short Wave Reception." This was followed by two 16-mm. talkie

ASK THE FELLOW WHO OWNS ONE *Gross CB-25*

Radiophone and C.W. Transmitter

Quantity production has made it possible for us to sell this laboratory constructed and wired transmitter at the new extraordinarily low price.

BUILT TO THE HIGHEST STANDARDS OF QUALITY AND PERFORMANCE

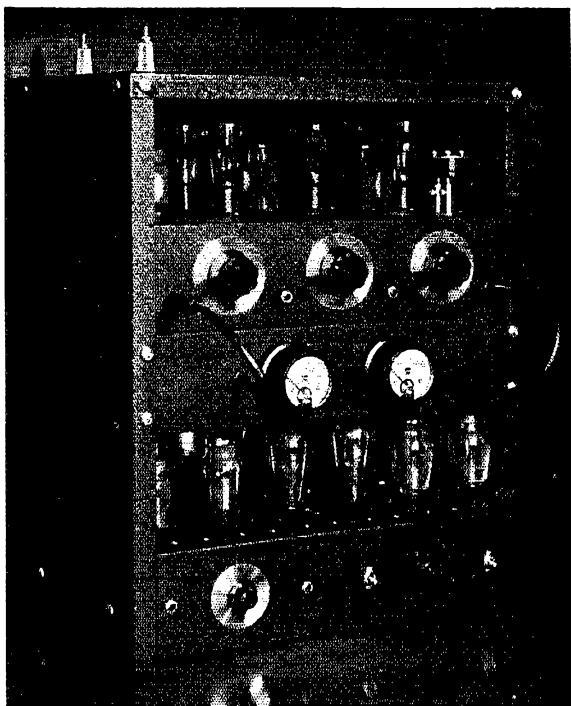
By fortunate combination of ingenious design and skillful construction, Gross transmitters offer a degree of perfection which we believe is unexcelled. Enthusiastic users in this and foreign countries testify to their high order of satisfactory performance. Literature descriptive of this outstanding transmitter will be sent upon request.

Output 25 to 28 watts — 100% Class B modulation — operates on all amateur frequencies — uses two 46's in Class C Stage and two 46's in Class B — entirely self contained from microphone jack to antenna coupling coil.

Price, Less Tubes, \$90

GROSS RADIO, INC.

51 VESEY STREET ■ NEW YORK



"NEW (A) CUT QUARTZ CRYSTALS"

FEATURES OF THIS NEW PLATE:

Temperature-frequency coefficient practically zero.

Greater activity allowing clamped plates for Mobile and Aircraft purposes.

Greater oscillator input power.

A-CUT CLASS A

Frequencies between

400-5,000 KC

5,000-10,000 KC

Max. drift over 45.0° C

50 cycles or less

50 cycles or less

Price

\$60.00 mounted

\$75.00 mounted

Other Commercial frequency prices upon request

Prices on plates having less than 10 cycles drift upon application

A-CUT CLASS B

160-80 meter Amateur bands, max. drift over 45.0° C, 125 cycles or less, plate same as above except for temperature-frequency coefficient. Ground to within 500 cycles of frequency stated, mounted \$25.00 each. Unmounted \$15.00.

40 meter band, mounted \$30.00 each. Unmounted \$20.00 each.

NOTE—This guarantee of temperature-frequency coefficient does not apply unless the plate is mounted in a low temperature coefficient holder.

Clamp type variable air gap low temperature coefficient holder, each \$10.00.

"X" and "Y" cut plate prices upon application

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BELLEFONTE, PENNA.



Learn the Wireless Code

Here is a popular, low priced and well made wireless practice set. It is just the instrument for learning the code. Send for a circular showing our complete line.

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OFFICES IN PRINCIPAL CITIES

SIGNAL
MANUFACTURERS OF ELECTRICAL APPLIANCES

"Faster than a Short circuit"

LITTELFUSES

- INSTRUMENT LITTELFUSES, for meters, 1/400 amp. up.
- HI-VOLT. LITTELFUSES for transmitters, etc., 1,000, 5,000 & 10,000 volt ranges, 1/4 amp. up.
- NEON VOLTAGE FUSES & Indicators (TATTELITES), 100, 250, 500, 1,000 & 2,000 volt ratings.
- AIRCRAFT FUSES, AUTO FUSES, FUSE MOUNTINGS, etc. Get new Cat. No. 6.

Littelfuse Labs., 4509 Ravenswood Ave., Chicago, Ill.

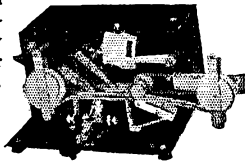
READ AND SEND CODE

Learn Easily at Home This Quicker Way

No experience needed. Beginners read code quickly, copy accurately. If already an op, speed up your wpm with this approved amazing New Master Teleplex. Only instrument ever produced which records your sending in visible dots and dashes—then sends back to you audibly through headphones. Fascinating, fool-proof; gets results because you learn by HEARING as well as seeing. Used by U. S. Army and Navy, R. C. A., A. T. & T., and others. We furnish Complete Course, lend you the New Master Teleplex, and give you personal instruction with a MONEY-BACK GUARANTEE. Low cost, easy terms. Write today for folder Q. 24, no obligation.

TELEPLEX CO.

76 Corlandt St.
NEW YORK, N. Y.



films dramatically evaluating modern telephone equipment, supplied by the Canadian Bell people. The concluding address of the evening was by Allan B. Oxley, of Philco Products of Canada, Ltd., who explored the realm of unrealized possibilities for inventive and research genius under the title, "Untrodden Paths." At the stroke of midnight the ritual of the Royal Order of the Wouff Hong was ably presented to 57 assembled novices, under the direction of Frank W. Hartley, VE3JT.

Saturday morning found the gang assembled at the Radio College of Canada on Bay Street, competing for the Burgess Code Speed Trophy. Gowan, ex-VE3DS, won the cup. The afternoon opened off with a traffic meeting chairmanned by SCM Trainer, followed by a 'phone meeting led by Dr. B. T. Simpson, W8CPC. Clint De Soto, of Hq., talked on "Audio Frequency Technique," following which the entire assembly congregated at the eastern entrance of the King Edward Hotel for a photograph. Then F. E. Wenger, chief engineer of Triplett, described the construction, functions, and uses of instruments in amateur work. The Saturday afternoon session concluded with an address and demonstration by H. S. Dawson, of Rogers Radio Tubes, Ltd., on "Detecting and Analyzing Distortion in Vacuum Tube Equipment," presenting an interesting concept of the mechanics of distortion.

Following an excellent banquet, Canadian General Manager Alex Reid took charge as master of ceremonies. He called on Clinton B. De Soto, who informally discussed "International Amateur Radio"; A. H. Keith-Russell, sometime C.G.M. and for many years holder of the Burgess Code Speed trophy, who presented the cup to the victor; Dr. Simpson, W8CPC; Noel Wright, VE2DU, of Montreal, who inspiringly adjured those present to "Never Say Never"; committee members Trainer, Hartley, and L. W. Mitchell, VE3AZ; and numerous prominent hams from the larger cities of the two provinces represented. But most pleasing of all, when the convention adjourned at midnight nearly every one went away with a well worth-while prize.

Sunday saw a fishing party headed north led by Jack Staley, VE3GR, and several foursomes of VE golfers challenging for a special cup awarded in connection with a tournament at the Weston Golf and Country Club, under VE3GT. As for us, we headed homeward, replete with good Canadian ale and memories of a gentlemanly, convivial, and rousing good convention.

—C. B. D.

The Roanoke Division Convention

THE 1934 Roanoke Division Convention was held at Hotel Roanoke, Roanoke, Va., on October 5th and 6th. The Convention was a success in every sense of the word. The Convention Committee was fortunate, indeed, in selecting Hotel Roanoke as Convention Headquarters since the hotel, under the able management of

1934

Troubles



CAN BE
OVERCOME

IN

1935

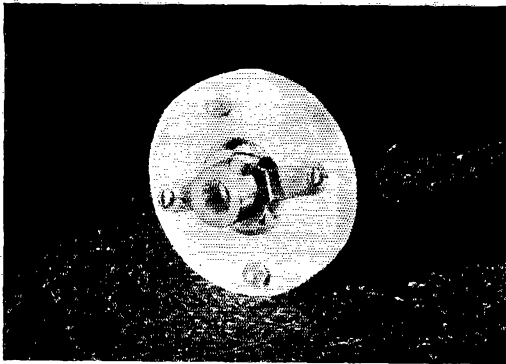
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QST
BINDERS

priced at
\$1.50
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American Radio Relay League
West Hartford, Connecticut



COUPLING: Extremely practical where space is limited, this coupling has Steatite insulation that will not char under flash over and does not absorb moisture. Equally important, it possesses high electrical efficiency as well as the mechanical rigidity so lacking in couplings of the fibre disk type. Catalog Symbol TX-9.

List Price \$1.00

Usual Discounts apply

NATIONAL COMPANY, INC.
MALDEN, MASS.

PEAK PRE-SELECTOR

IN STOCK **\$19.80** IMMEDIATE DELIVERY

SHIPPED PREPAID If Full Purchase Price Accompanies Your Order

L. I. MARINE & ELECTRIC CO.

"Everything for the Ham"

163-18 Jamaica Ave.

Jamaica, N. Y.

"SIGNAL HOP"

Beyond Fondest Hopes Is Yours With the New PEAK PRE-SELECTOR

A consistently efficient phone and CW pre-selector and pre-amplifier. This unit, using 2 stages of high gain 58's, greatly increases signal input to ANY Short Wave Receiver, TRF or SUPER (whether they have RF or not) and boosts weak signals to R9 and R9 plus. Electron coupled variable regeneration. With PEAK you get:

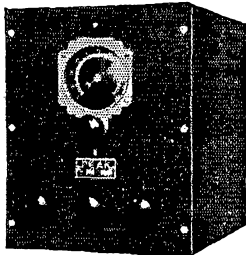
- 1— Tremendous increase in signal strength.
- 2— Consequent increase in sensitivity.
- 3— ABSOLUTE rejection of image.
- 4— Considerable increase in selectivity.
- 5— Reduction of noise to signal ratio.

BUILT IN COILS covering 14-200 M; selector switch; airplane dial; smooth regeneration; self contained filament supply; heavy gauge black crystal steel chassis and cabinet.

ATTENTION!

Price \$33.00 List with 40% discount to Hams. **YOUR PRICE \$19.80** less tubes. Write for literature. On sale at leading dealers and Mail Order Houses.

110-120V. 50-60Cy.



EASTERN RADIO SPECIALTY CO.

Makers of PEAK PRODUCTS

1845 Broadway Dept. Q114 New York, N. Y.

(Note new address—larger quarters)

Kenneth R. Hyde, proved to be ideally suited for the purpose, and a splendid spirit of cooperation was in evidence throughout the meeting.

The Convention was formally opened by Director Caveness at 1:30 p.m., Friday. Mr. Moomaw of the Roanoke Chamber of Commerce welcomed the amateurs to the city, and Mr. Hebert of A.R.R.L. responded to the address of welcome. The technical part of the program for the afternoon included talks as follows: Lt.-Comdr. Rogers on "The Naval Reserve"; Mr. John Shanklin on "Beam Antennas"; Mr. E. L. Battey on "A.R.R.L. Organization."

At the evening session Prof. Haynes of VP1 gave a lecture on "Noises," illustrating with equipment brought from the Institute; Mr. Roy Corderman of Washington answered questions; Mr. Bob Avery of WDBJ ably discussed "Speech Amplifiers"; Mr. Fox of the National Carbon Co. made an interesting talk on "Soaring," showing a motion picture of a soaring meet and explaining the part that five-meter radio equipment played in it. Mr. R. N. Eubank of WRVA demonstrated quite a few of the many things one can do with an oscilloscope.

Saturday morning was devoted to trips through the Norfolk and Western Railway Shops, where the amateurs were shown how a locomotive is built. Saturday afternoon we had the opportunity of hearing talks by the following: Mr. Stewart, vice-president of A.R.R.L., on "The Madrid Convention"; Mr. Fred Schnell, W9UZ, on "Antennas"; Sgt. Day of Washington on "The Army Amateur Radio System"; Mr. Hebert on "The A.R.R.L."; Director Woodruff of State College, Pa., on "Radio Building Blocks"; and Mr. Quaintance of the F.C.C. in Washington on "Changes in the Regulations."

Special meetings were arranged for the ladies on both Friday and Saturday, and they enjoyed card playing and a shopping tour through the business section of the city.

The banquet hall of the hotel was the scene of all activity Saturday night. Director Caveness acted as toastmaster, and the usual after-dinner talks, limited to five minutes, were thoroughly enjoyed. The speakers included: Mr. Wohlford, W3CA, Chairman of the Convention Committee; Director Woodruff, W8CMP; Vice-president Stewart, W3ZS; Mr. Hebert, W1ES; Mr. Battey, W1UE; Mr. Schnell, W9UZ; Mr. Fox, W2AHH; Mr. Corderman, W3ZD; Mr. Quaintance, W3JQ; Mr. Avery, ex-W3FF; Miss Elizabeth Zandonini, W3CDQ; Mr. Eubank, W3AAJ; and Lt.-Comdr. Rogers, W3AAV. Mr. Hebert showed a motion picture of the A.R.R.L. Directors in action at their last meeting and of the headquarters establishment. The drawing of prizes ended the meeting, and the amateurs of the Roanoke Division are now referring to the Convention in Roanoke as "the best we've ever had," and they are thoroughly appreciative of the hard work that W3CA and the other members of the Roanoke Amateur Radio Club did to make it such a Convention.

—H. L. C., W4DW

New and Redesigned A.R.R.L. OPERATING FORMS

AMATEUR RADIO STATION LOG

Input power to last stage, _____ watts
 Frequency, _____
 Type of emission, _____

If operating as portable or portable-mobile:
 Approximate location, _____
 Type of vehicle or mobile unit in which installed, _____

DATE TIME	STATION CALLED	CALLED BY	STATION HEARD OR WORKED			IF QSO RESULTED:		CHANGES FROM PREVIOUSLY RECORDED DATA, MESSAGES, REMARKS, ETC.
			KC. OR DIAL	R	E	T	R	

The new A.R.R.L. LOG BOOK is designed for maximum ease and simplicity in keeping a record of station activities. If properly filled in it covers every technicality, insuring compliance with F.C.C. rules.

**40c each
3 for \$1.00**

**THE AMERICAN RADIO RELAY LEAGUE
RADIOGRAM**

LIA AMATEUR RADIO

TO: _____
 FROM: _____
 SUBJECT: _____

REC'D _____
 TIME _____
 DATE _____

RADIOGRAM

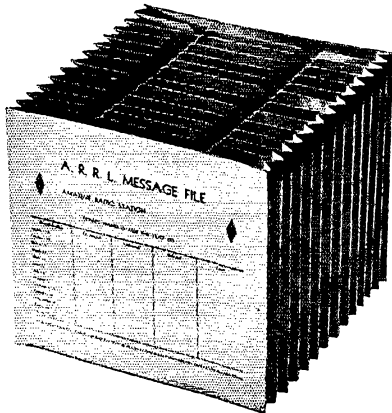
The radiogram blank has been revamped to allow for that much needed room for the body of the message and to facilitate copying of messages. 7½ x 8½ sheet padded 100 sheets to the pad.

**35c each
3 for \$1.00**

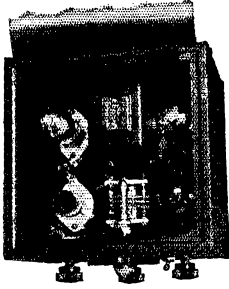
MESSAGE FILE

The F. C. C. requires amateurs to keep messages handled for a period of one year. The message file has been designed to facilitate compliance with that regulation. An expanding file of thirteen compartments (one for each month and one for extra papers), it provides for more messages per month than the average station will handle. On the face of the FILE, space is provided for a complete and accurate record of traffic handled. It will accommodate a year's traffic. For a practical and convenient solution of the regulation, you can't beat it.

40c each 3 for \$1.00



AMERICAN RADIO RELAY LEAGUE, WEST HARTFORD, CONNECTICUT



SRR 56 MC RECEIVER

A Non-Radiating Super-Regenerator Receiver ideally suited to 56 M.C. Beam Communication.

NATIONAL COMPANY, Inc.
MALDEN, MASS.



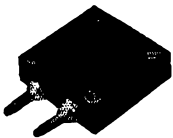
ANTENNAS

built to your
SPECIFICATIONS

for 20-40-80-160 meters for transmitting and receiving. Lynch materials used exclusively. When writing give specifications.

AMPLIVOX LABORATORIES, 227 Q Fulton Street, New York, N. Y.

'AT' CUT CRYSTALS



Crystal Holder

The 'AT' cut crystal recently developed has a very low frequency drift with temperature variations and will handle more power than ordinary crystals. One inch square 'AT' cut PRECISION Crystals supplied within 0.1% of your specified frequency and calibrated accurate to 0.03% are priced as follows: 1750 and 3500 kc. bands — \$6.00 each. 7000 kc. — \$9.00. (Add \$1.00 if holder is desired.)

'X' cut PRECISION Crystals, one-inch square from the highest grade of Brazilian quartz and carefully ground for maximum power output supplied within 0.1% of your specified frequency and calibrated accurate to within 0.03% are priced as follows: 1750 and 3500 kc. bands — \$3.00 each. 7000 kc. band — \$3.50 each. (Add \$1.00 if holder is desired.) Jacks to plug holder into — \$.15 pair.

Crystals and ovens for commercial use quoted on at your request. When ordering our product you are assured of the finest obtainable. Now in our fifth year of business.

PRECISION PIEZO SERVICE
427 Asia Street Baton Rouge, La.

Kansas A.R.R.L. Convention

ATTENDANCE records were broken at the eighth annual Kansas State A.R.R.L. Convention, held at the Hotel Kansan in Topeka, October 13th and 14th. One hundred seventy-five OM's, OW's and YL's were there, and found their two-day stay in the capital city chock full of technical information and fun — also of prize equipment supplied by manufacturer-patrons of QST.

The speaking program provided by the convention hosts, the Kaw Valley Radio Club, Topeka, included a section A.R.R.L. report by O. J. Spetter, W9FLG, SCM for Kansas; the League's message to Kansas amateurs, by Director H. W. Kerr, W9DZW-GP; and talks by Capt. W. A. Beasley, W9FRC, Topeka; Everett Dillard, W9BKO, Kansas City, Mo.; E. Crockett, Jr., W9KKG, Kansas City, Kan.; Dana Pratt, W9BGL, Topeka; Guy Wilson, W9EL, Kansas City, Mo.; and representatives of Burstein-Applebee Co., Kansas City; Radio Laboratories, Kansas City; and the Midwest Grunow Co., Kansas City.

Award of the historic Kansas Wouff-Hong trophy, made from wood from a spar of "Old Ironsides," was to Capt. Beasley, W9FRC, president of the host club, as the state's outstanding amateur for the year 1934. Presentation, together with award of Wouff-Hong certificates to the previous holders, O. J. Spetter, W9FLG, Topeka, for 1932, and William Obrist, W9BEZ, Wichita, for 1933, was at the concluding banquet, when prize awards were also made.

While the OM's were in technical sessions, including the general meetings and the round tables for c.w. and 'phone men, the OW's were entertained in a special program with KVRC OW's as hostesses, attending a talkie and the banquets, and sightseeing and shopping.

The Kansas gang showed due appreciation of the veteran Kansas convention attendant, Director Kerr. Labeled "To Gramp," an indestructible, weatherproof certificate of merit (made from a linoleum mat and oil paint) was presented to him at the closing banquet.

A 56-Mc. Transmitter Hunt

(Continued from page 32)

which of the two points 180 degrees apart the sigs were coming.

"Nat" Pomeranz and "Bun" Blanchard, using a loop and plenty of dead reckoning, crashed through the bushes surrounding the h.t. at 11:15 a.m. These were the only successful crews, although there were many hopeful ones nearby.

At 3:30 p.m. the h.t. divulged its location in a general announcement, and the remainder of the gang poured onto the site as if by magic.

16 m.m. movies taken of the winners as they arrived and of the whole crowd lined up with their cars were shown at the following meeting of the local club and these, together with the personal experiences of each contestant, proved thoroughly enjoyable to the club members and guests.

1935 + TWELFTH EDITION OF THE RADIO AMATEUR'S HANDBOOK

SWEEPING changes in short-wave radio technique have been made since publication of the last edition. These changes have called for a drastic revision of the book. The chapters devoted to apparatus design and construction have been rewritten all through, with new illustrations and new circuit diagrams. Needless to say, the new methods and technique which have so recently almost revolutionized ultra-high frequency working have been treated in full detail.

The twelfth edition is more than half as large again as the first edition. The chapter on receivers, for instance, has been enlarged and rewritten to cover all the recent developments; while the chapter on transmitters has been expanded to permit discussion of all the new methods devised during the last year. New circuits and layouts are given and a special attempt made to treat all possible problems which could be faced in designing or adjusting transmitting equipment. Drastic changes in circuit arrangements for the ultra-high

frequencies have meant a complete rewriting of the chapter devoted to that subject. New transmitters and receivers employing new circuits are described for all three of the ultra-high frequency bands. Full details are also given of directive antenna systems for these bands. All of the chapters have had their share of attention to bring the book up to the minute. The chapters on antennas, keying, power supplies, have all been revamped so that all equipment and circuits can truly be said to represent the best in current practice.

In other words, our policy of leaving nothing in the book that does not represent the very latest practice has been maintained to the letter.

268 PAGES — 237 ILLUSTRATIONS

**AT ANY PRICE, AN AMATEUR COULD
ILL AFFORD TO BE WITHOUT IT**

• **Postpaid**

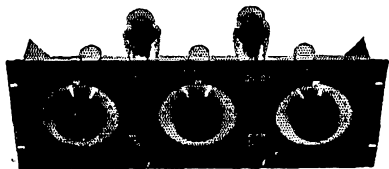
\$1

(BUCKRAM BOUND, \$2.00)

THE AMERICAN RADIO RELAY LEAGUE, INC.

WEST HARTFORD, CONNECTICUT

POPULAR DEMAND has now made possible a reduction in the price of
THE HARVEY TRITET



Each unit is constructed of heavy gauge aluminum with front panel finished in black wrinkle lacquer properly engraved. Uses two 5Y tubes combined with the highest quality parts, and also incorporates a switch for selecting either crystal or electron-coupled control. REMEMBER that no other tube lineup, using low cost, low voltage tubes can equal this type exciter unit when furnishing power at 8 times the fundamental frequency of the crystal. Price fully wired and tested with one set of coils, less tubes and crystal. **\$42.50**

ALSO AVAILABLE—Tritet front panel, sides and base properly drilled and engraved.....\$10.50
 Same as above but with blank front panel.....\$8.50

TYPE HF-3 5 meter, non-radiating receiver.....\$23.50
 TYPE MO-45 5 meter, 10 watt transmitter.....\$29.50

TRANSCIEVERS 2-volt \$18.75 6-volt \$17.95

Write for Latest Bulletin

HARVEY RADIO LABORATORIES

12 Boylston St., Brookline, Mass.

New QUIET VOLUME CONTROLS and RESISTORS for Every Amateur Purpose

Write Dept. Q for Catalog.

175 Varick St., New York, N.Y.
ELECTRAD

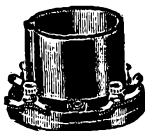
HERE'S what you have been looking for !



4955V



LV2



450

Don't sacrifice the low-loss properties of the new Acorn tube with poor insulation. Use the ultimate in low-loss insulation — VICTRON "AA", whose power factor at R.F. is only 0.0002. Everything you need for maintaining extreme low loss in r.f. circuits is available — Condensers, Coils, Sockets, Insulators, etc.

Cat. No.	List Price
4995V Acorn Tube Socket (Victron "AA")	\$1.50
702RV 2 1/2 m.h. choke Victron insulated	.70
705RV Five-meter choke Victron insulated	.70
72V Victron stand-off insulator	.35
LV2 Liquid Victron coil dope per can	.35
C-140 C-50 C-15 mmf. Victron variable condensers	2.50, 2.40, 2.30
704SWS 13 to 200 meter coil set (Victron)	2.00
450 50-watt high-quality molded socket	1.00
Victron sockets, coil forms, coil selectors, etc.	

Don't fail to write today sure for our new 16-page catalog showing wound coils of all kinds, short-wave, broadcast, long-wave, band-spread, etc. A wide variety of plugs and connectors, adapters of every description, switches, modern testing equipment, mike and power cables, dials, knobs, etc.



ALDEN PRODUCTS CO., DEPT. Q
 715 Centre St. Brockton, Mass.

With the Clubs

(Continued from page 31)

Allentown Amateur Radio League

The first anniversary meeting of the Allentown (Pa.) Amateur Radio League was held on November 2nd. A club transmitter has been completed using a single RK-20 on 3855 kcs. The rig will later be modulated on 1.75 and 3.9-mc. 'phone. The call is W3EJC and QSOs with other club stations are desired. The first year of the A.A.R.L.'s existence has been most successful and the new president, W3DOV, intends to keep things on that basis.

Cleveland Heights Amateur Radio Club

The Cleveland Heights (Ohio) High School Amateur Radio Club was organized in 1931. During the summer school vacation period an auxiliary club functioned, known as the Cleveland Heights Amateur Radio Club meeting at the home of one of the members. In the fall a club station was put on the air at the school, W8FJE. About this time the club ran into some of the difficulties that confront most all amateur radio clubs sooner or later, difficulties that waste time, accomplish nothing and benefit no one, namely arguments on politics, how to spend dues, parliamentary law, etc. Many hours were wasted arguing technical points of conducting meetings. Some thought the money in the treasury should be spent, others thought it should be saved. Holding office in the club meant a bit of prestige so politics entered the picture; campaigns were staged by candidates and petty rumors as to the character of other candidates were spread. Friendships were strained, club organization tottered. For three years the club went through just such things. And there are few clubs that don't go through such a period! But the Cleveland boys learned their lesson; they realized that such procedure was N.G. With graduation breaking the gang up rather badly in 1933 the need for a new club became evident; it must be not only a summer club but one to run the year 'round. So, benefiting by past experience, the Cleveland Heights Amateur Radio Club was reorganized. All unnecessary trouble-making elements were eliminated. First, it was decided not to have any officers, each meeting to be conducted by a volunteer, who is responsible for a good program. Second, dues were eliminated. To become a member one must attend three meetings. A meeting place was furnished by W8FFK. This idea of a club run on a very plain, simple basis has been a success from the start. The membership has grown, everyone has a good time, there are no enmities; it is a really fraternal gathering. The club has a paper, the Broadcaster, which keeps the gang informed of "doings" around the locality. Meeting activities include technical discussions, movies, hamfests, experiments and social activities. If refreshments are desired, everyone present chips in. The one outstanding thing is that everyone has a good time, at the same time

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A pair of EIMAC 50-Ts in Class B Audio will give 150 watts of audio power output at 1000 volts, 200 watts at 2000 volts and 250 watts output with 3000 volts on the plates.



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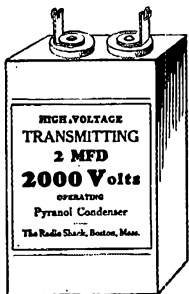
CHARACTERISTICS	EIMAC-50T	EIMAC-150T
Filament volts	5 V	5 V
Filament current	6 A	10 A
Filament watts	30 W	50 W
Amplification factor	13	13
Normal maximum plate dissipation	50 W	150 W
Normal maximum plate current	100 MA	200 MA
Normal Power output class C (75% eff.)		
plate voltage 1000	75 W	150 W
plate voltage 2000	150 W	300 W
plate voltage 3000	250 W*	450 W
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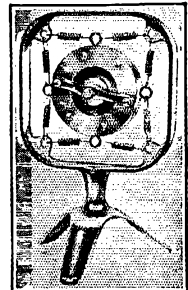
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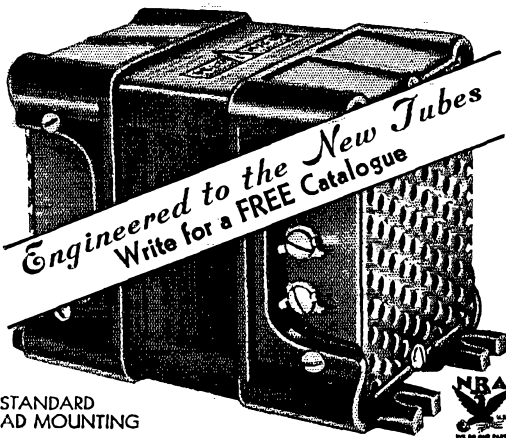
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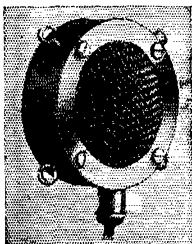


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each member benefits by association with the others. What more should a "ham radio" club desire? We are indebted to W8EFW for this information on a truly "different" radio club.

Miscellany

The South Town Amateur Radio Association, Chicago, is conducting a membership drive . . . over 150 new members are expected by the end of the first year! . . . The Western Massachusetts Amateur Radio Association, Springfield, is sending code practice each Friday night from 7:30 to 8:00 E.S.T. This is on 56 mc. i.c.w. . . . The Lakewood (Ohio) Radio Club announces the results of its recent QSO Contest: First, W8MOH #7 mc.; Second, W8GUL 3.5 mc.; Third, W8DRB 7 mc. The club station W8IMJ, is on the air on 7030-kcs. . . . A code class on 3766-kcs. has been started from W2JC, station of the Bloomfield (N. J.) Radio Club, Wednesdays at 8:00 p.m., Sundays at 9:00 a.m., E.S.T. The Indianapolis Radio Operator's Club is located at Indianapolis, Indiana, not Beech Grove, Indiana as reported in November QST. . . .

Visit the Clubs

One good feature of the majority of ham clubs is that they don't require a visiting ham to produce a long list of credentials before entering the club portals. By and large, any ham is welcome at any ham club, so don't be bashful about dropping around to your local society. Clubs are splendid places to get acquainted with other amateurs and to participate in interesting discussions on amateur radio. At headquarters we have recorded the addresses of the several hundred amateur radio clubs affiliated with A.R.R.L., their places and times of meeting. Do you want to be put in touch with a club in your vicinity? Would you like to attend a club meeting in another city you are visiting? Address the Communications Manager (enclosing 3¢ stamp, please) for data on Affiliated Clubs in your vicinity.

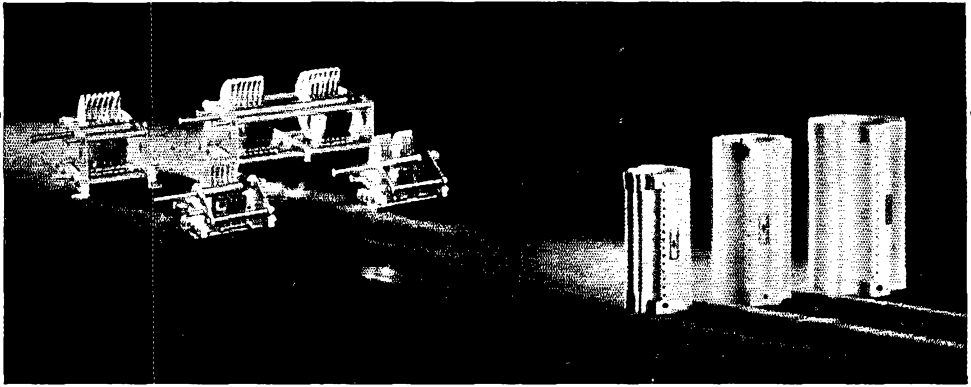
— E. L. B.

Band Switching for the Transmitter

(Continued from page 29)

same kind of wire used in winding the coils. The only other precaution necessary is to connect the screen by-pass condensers directly from the tube socket terminal (grid), to chassis (B minus).

As indicated above, the unit may be used as an exciter unit to drive higher powered tetrode stages employing the same principles of coil padding and shorting, thus providing greater power output with the same ease of control. Of course, the unit is ideal as a low-powered transmitter also. It may easily be connected to an antenna impedance-matching network, circuit constants of which are given in Fig. 2. It will be noted that a two-turn link is provided to couple to the final tank circuit. This coil should be sufficiently small in size to fit inside the final tank coil near the cold end. Ample coupling is obtained by this means, which also eliminates the necessity for changing clips on the plate tank. It is apparent that if a panel-operated switch, similar to those used in



● A new line of transmitter parts for new conditions are offered by National. The transmitting condensers illustrated above are the new type TMC and TMS units, compact, efficient and inexpensive. They are of standard National Quality, in spite of their low price, and have sturdy aluminum plates and frames, and low loss Steatite insulation.

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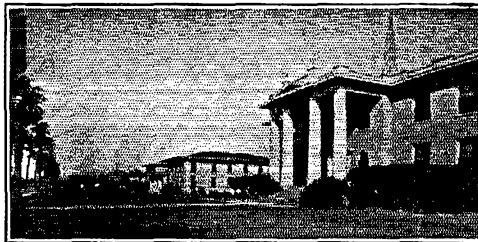
SEE PAGE 89

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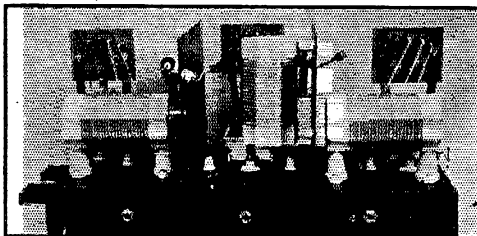
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the transmitter, is used to short circuit the turns in the antenna unit, all the transmitter controls will be on the panel right at the finger tips.

OPERATION

Keying methods are not shown in the diagram, since center-tap, grid-blocking, and screen-grid keying (using a relay) will all work satisfactorily. Successful operation of the transmitter only requires ability to keep the plate-meter readings at the lowest value and the antenna current at the highest. For maximum output, the final stage should be operated as a straight amplifier, using



A REAR VIEW, SHOWING THE TAPS CONNECTED TO THE COILS

Baffle shielding between stages is sufficient to prevent feedback and oscillation. Miscellaneous by-pass condensers and resistors are underneath the chassis. The jacks are for plate-current readings.

the first 859 as a doubler when doubling is required. For telephony, the screen voltage on the final should be secured through a 50,000-ohm dropping resistor from the high-voltage tap so that both screen and plate will be modulated simultaneously. A pair of 46 tubes in Class-B are recommended to modulate one 859, and 210's in Class B where two tubes in parallel are used in the final amplifier.

To sum up, it is obvious that the outfit will do just about everything we can expect from a transmitter in the line of fool-proof flexible operation. Perhaps some other inspired kilocycle juggler can figure out how to get full output on 1.7 mc. with a 7-mc. crystal. Then it will be truly complete.

A 10-Watt P. A. System

(Continued from page 20)

method of construction has been adequately taken care of in the design. The one principal objection, that of having the gain control right at the speaker, can be overcome if necessary by using an auxiliary gain control located at the microphone or head amplifier.

The chassis is made of 24-gauge sheet iron, the dimensions being 12½ by 23½ by 1-inch high. It was made by cutting a section of metal 15½ by 26½, and first bending over a ½-inch lip on each side to lend rigidity. Then the one-inch sides were bent down, and the corners carefully and securely soldered. The result is a chassis which it is possible to warp out of shape with sufficient pressure, but which is more than sufficiently rigid

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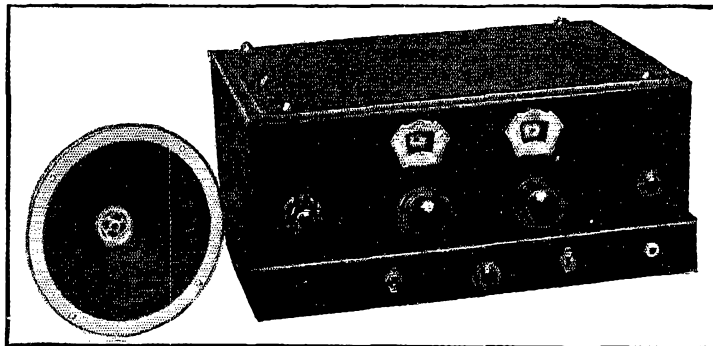
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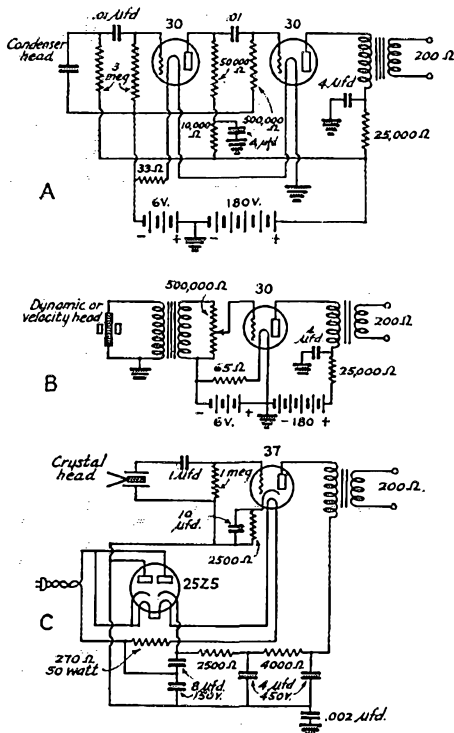


FIG. 2—SUGGESTED HEAD AMPLIFIERS

A is a two-stage battery-operated affair for condenser microphones. The circuit is standard; the amplifier should be built into a shielded case along with the condenser head.

B is a single-stage battery amplifier for either dynamic, velocity, or crystal microphones. For dynamic or velocity microphones the input transformer can be made by removing the primary from a standard audio transformer, and substituting ten turns of heavy wire. For crystal microphones, the grid input circuit shown at C should be used.

C is an a.c. substitute for B. Some care in mechanical construction may be necessary to eliminate hum. No part of the circuit should be connected to the metal chassis or box, except through the 0.002- μ d. mica condenser. A separate by-pass condenser of the same capacity right at the microphone head may be helpful.

The output transformer in each case is a standard tube-to-line unit, and is coupled through a shielded cable to one of the 200-ohm sections on the p.a. system input transformer.

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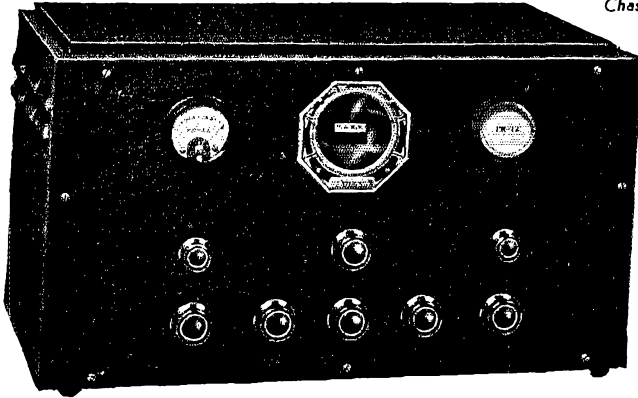
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Prepare for the new Government Radio Operating license examinations; Radio Operator, Marine and Broadcasting. Also Radio Amateur Telegraph and Telephone. Resident courses.

Write for Booklet

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4 West 63rd Street, New York City

bility of accidental damage. In transit, the entire cone opening is covered by a flat rectangle of heavy fibre, secured to the wall of the case by four baggage clips.

The entire back of the case is removable, but the amplifier is usually used with it in place, the top clasps alone being fastened in order that the power and microphone cables can be brought out below. This cover aids in bringing out heavy note response, and also reduces acoustical feedback.

In conclusion, perhaps a word or two about performance would be in order. The average 1000-seat auditorium can be comfortably filled with sound without resorting to full output; in fact, up to the present we have encountered no indoor installation in which full volume was required. Outdoors, in a fairly noisy suburban business district, speech is usefully audible at a block away—with quality that is pleasing, crisp and clear.

Amateur Radio Enjoys a Holiday

(Continued from page 25)

field. Other antennas are used for miscellaneous work. One of the club members makes his residence at the shack.

One amateur in expressing his thanks wrote, "Not since the good old spark days have I attended a ham gathering that made me feel that I was part of a live-wire, progressive bunch that was going places and doing things. Saturday's performance certainly revived my faith in the art."

Among some of the DX amateurs present were: W7AOB, W1HRX, W1SZ, W1BES, W8NE, W4AKW, W4MU, W4LU, W3DQ, W2KR, K4SA, X1G, W1EYF, W2DC, W8CPC, W2KE, W7BIX, W5ACF, VE3WA, W5DJB, K5AD, W4AEZ, W7EM, W2AYN, W5ZA, and a W6 who neglected to sign the register.

Our hats off to members of the Lakeside Radio Club: Thorne Donnelley, W9NKH; Wm. P. Hilliard, W9PZ; J. B. Swanson, W9IKV; Orland Murphy; Paul H. Davis, W9GES; Lewis B. Gilmer, W9MTC; Wm. Schrader, W9EIP; Ralph W. Jenkins, W9IQA; George E. Joyce, W9RA; Pat Paulson, W9MPT; C. A. Petrie, ex-W8AWN; P. C. Sandretto, ex-W9BIG; Ralph Glover.

Amateur Radio at Air Races

(Continued from page 21)

table that the newspaper officials who used our facilities did not see fit to give credit to the amateurs for the services they had performed.

No end of credit must be given to local and other amateurs for their splendid cooperation in "standing by" for the air race group during their operations. No QRM whatever was experienced.

A meeting of those who participated in this work was held after the races, and every man expressed his pleasure in having had a part in the

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W3BMS

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PRECISION LABS.

VELOCITY MIKE

A broadcast type ribbon mike at a price that is right. A beautiful job. Not to be confused with cheap units of doubtful performance. Desk type housed in heavy cast case assuring perfect shielding. Output transformer mounted in base. Frequency response: 30 to 10,000 cycles. Output impedance: 200 ohms. Furnished complete with cable and plug.

SPECIAL \$17.50

SPECIALS

Taylor 866 tubes \$1.65
866 filament transformer, 2.5V c.t. @
12 amps., 3000 volt insulation 1.95
30 Henry 250 mill cased choke 1.89

New high frequency type 10 tube thoriated filament, ceramic bridge support, widely spaced leads. A nationally known make **\$1.35**

Ward Leonard 100-watt Bleeder-divider 22,440 ohms \$29
Single button stretched diaphragm hand mike 1.75
Cadmium plated steel chassis. Bases undrilled. Sizes for all needs. A real value.

5" x 9 1/2" x 1 3/4"44
7 1/2" x 11" x 2 3/4"49
10" x 12" x 3"39
10" x 17" x 3" 1.03
10" x 23" x 3" 1.18

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THE NEW

TAYLOR HD203A

Heavy duty 203A tube. 1750 volts at 250 mills. Carbon plate. Plate lead brought out top. 10 volt, 4 amp. filament.

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A tube you have been waiting for

New HAIGIS Transceiver

Latest development of the Haigis Laboratories. A compact efficient 5-meter transceiver. Room for all batteries. Uses a 30 and a 33 tube. **\$13.50**
Less tubes and batteries....

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The greatest threat to the nation's health is tuberculosis. It is the chief killer of men in industry between the ages of 15 and 45—20,000 men in this group alone die of it every year. No one is safe from the disease until every case has been found and placed under treatment. Help protect yourself and your family by using Christmas Seals on your holiday letters and packages. The funds they provide finance a program of prevention, discovery, and treatment of tuberculosis throughout the entire year.



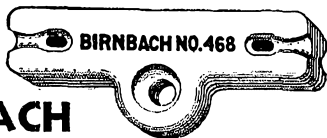
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EFFICIENT reception and transmission are greatly aided by these new BIRNBACH Navy-Type Insulators. Highly-glazed, high-resistance ceramic. Great strength. Well-rounded edges and holes. Center hole provides firm anchor for transmission line. BIRNBACH makes the largest line of standoffs and other insulators. Write for Bulletin Q-12.

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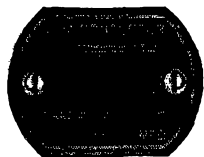


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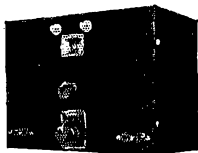
Available in 5000 volt construction for use in short wave transmitters

Write for catalog sheet

SANGAMO ELECTRIC CO.
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28 and 56 M.C. TWIN-TRIODE

- TRANSCEIVERS
- DUPLEX UNIT TRANSMITTER-RECEIVERS



TRANSCEIVERS, each employing push-pull oscillator, Class B modulator, 19 or 53 tubes. 10" x 7" x 5".

\$22.50 and \$26.50

COMBINATION-TRANSMITTER-RECEIVER UNITS, each with push-pull oscillator, Class B modulator transmitter and separate receiver employing r.f. stage. Built-in dynamic speaker. 10" x 14" x 5". 19 or 53 tubes.

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Bulletins on Request

RADIO TRANSCIEVER LABORATORIES
8427-105 St. Richmond Hill, N. Y.

radio work of the 1934 National Air Races. All are looking forward to next year's event when, no doubt, amateurs will be called upon to duplicate this year's job.

International 28-Mc. Contest

(Continued from page 9)

V. One point will be score 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. (A.R.R.L. contestants must present a log summary with distances and claimed score, at the conclusion of the contest to receive points under (3); also a paper on development work to rate credits under (2) above.)

VI. In computing his final score a competitor may claim points for each different station worked once during each calendar month. Proof of contact in writing may be required by the contest committee.

VII. *Re R.S.G.B. Award.* (a) The decision of the president of the R.S.G.B. will be final in all cases of dispute. (b) Entries must reach the Secretary, R.S.G.B., 53 Victoria Street, London, S. W. 1, not later than November 15, 1935.

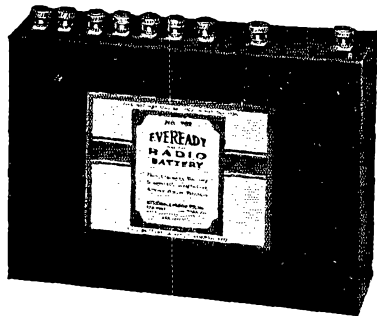
VIII. *An A.R.R.L. Award Committee* shall consider the file of reports and data submitted by competitors. Its decision based on (1) The number of weekly reports to A.R.R.L. on 28-mc. work, 25%. (2) Equipment description and development work on same, 25%. (3) Number of points in accordance with Rule 5, 50% will determine the 28-mc. Achievement Award. Entries (from W/VE) must all be received at A.R.R.L. on or before October 15, 1935.

From March until early August the 28-mc. band gave excellent results, 1000- and 1500-mile work becoming quite common. Since then conditions have been poor. Last year, in late November and December, this band was quite "alive," and we hope similar conditions may obtain this year. Interest in the 28-mc. contest is running high. According to the reports received VE2AC, W6CAL, W9NY, W9GFZ, W7ACS and W1ZB are about tied for honors. Harmonics of some stations in other amateur bands, and some local QSOs have been made, but the reports themselves are thus far the predominating factor in the A.R.R.L. 28-mc. competition. W1BSF, W8CFT/9, W9AGV, W3CEE, W9FFQ, W8MDL, W1CCH, and W1CRO-DAE are actively interested in the contest and all have reports on record in their favor.

Strays

Recent graduates who want to have their pictures on QSL cards probably can get the half-tones of their year-book photographs by going to the printer for them. The suggestion comes from W3COK, who got his simply for the asking.

SPECIAL BATTERIES FOR PORTABLES SMALL SPACE—LIGHT WEIGHT



← Eveready No. 769 "B" and "C" Battery.
7 1/8" high, 9 15/16" long, 2 7/8" thick.
Weighs only 10 lbs. 13 oz.

144 volts over all. "B" side—plus 22½—
45—67½—135 V. "C" side—minus 1½—3—
4½—9 volts. Insulated Terminals.
Special shock-proof, moisture-proof
construction. List price \$7.25.

No. 4 Columbia Miniature Dry Cell. 4 1/8" high, 1 5/8" dia. →
Weighs only 7½ oz. 1½ volts. List price 50¢.



Your dealer will get these for you at usual amateur discounts.

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Parts and Kits in stock at all times

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Simply send in your order now with name and
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be sent, giving the name of the donor. We'll do
the rest—see to it that the new **HANDBOOK**
reaches destination on or before December 25.
A suitable gift card will be sent with each copy.
Swell idea, huh?

Paper-covered edition \$1
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(Postage included)

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West Hartford, Conn.

HAM-ADS

(1) Advertising shall pertain to radio and shall be of nature of interest to radio amateurs or experimenter 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 15c 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 26th of the second month preceding publication date.

(6) A special rate of 7c 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 7c rate. An attempt to deal in apparatus in quantity for profit, even if by an individual, is commercial and takes the 15c 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.

MICROPHONE and meter repairs. Low prices. Quick service. Sound Engineering Corp., 416 N. Leavitt St., Chicago, Ill.

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.

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.

QSLs, W8AXD, Smethport, Pa.

QSLs, SWLs, W6DOU, Hayward, Calif.

WANTED—back numbers of *QST* from beginning of publication to January, 1924. Kindly quote each volume of twelve issues separately and state condition of copies and lowest cash price. Sumner B. Young, 705 First National, Soo Line Bldg., Minneapolis, Minn.

1000W transformers (GE) 1100-2200-4400 volts each side centertap. Same as hundreds sold A.R.R.L. members. Dawson, 5740 Woodrow, Detroit, Mich. \$13.50.

QSLs, 75¢ a 100. W9DGH, 1816 5th Ave., N., Minneapolis, Minn.

QSLs! Best values! Inquire! W6FZQ, Box 1804, Phoenix, Arizona.

WANTED! Burnt out meters. W6FZQ.

868's \$1.49, 1000 hour guarantee; carbon 210's \$4.95; Twelve other types. Panels; chassis; custom-built transmitters. Howard Radio, 5648 Race Ave., Chicago.

SELL complete 50 watt fone transmitter for particulars, write Snyder, 9194 Frankstown Rd., Pittsburgh, Pa.

QSLs, SWLs, 200 \$1. Soooooo. W8ESN, 1827 Cone, Toledo, Ohio.

GENERAL Electric 24/1500 volt dynamotors \$35. 24/750 \$25. Westinghouse 27½/350 with complete filter system meter etc. \$15. 500 cycle 500 watt 110-220 volts \$7.50. 6/15 volts 500 watts with aircraft propeller \$7.50. Esco 110 DC to AC \$20. Henry Kienzle, 501 East 84th Street, New York.

CRYSTALS, 160-80 meter. Trade for tubes, meters, transformers. Bill Threm, W8FN, 4021 Davis Ave., Cheviot, Ohio.

RADIO logs—Latest thing, saves unnecessary writing, RST system, 100 sheets, printed with your call letters and address, with heavy cover, \$1.00 postpaid. Send for samples. W8DRA, Jesse Smith, Knox, Penna.

TRANSCEIVERS \$8.10. W8EFW.

QSLs! Best of 'em all. Two color, 75¢ per hundred. Blanks and stationery. Free samples. W2FJE, 145 Lafayette Ave., Brooklyn, N. Y.

PATTERSON PR-12-8—550 meters. 12 tubes. 2 stages pre-selection. Complete \$32.00; with Crystal \$87.90; In console \$107.50. In Stock—Immediate Shipment. See our display ad this issue. Sargent 8-34 Super-het 15-560 meters, Complete \$49.50 Marine model 15—1500 meters \$57.50. Peak Pre-Selector \$19.80. French Type Hand Set—2000 ohm receiver, single button mike \$8.00; double button \$9.00. Turner Crystal Mike \$11.76. RK-24 \$2.25. RK-20 \$14.70. All Shipped Prepaid. "Everything for the Ham" Catalogs. L. I. Marine & Electric Co., 163-18 Jamaica Avenue, Jamaica, N. Y.

2500 volt D.C. one kilowatt double commutator motor generator 110/220 A.C. including field rheostat \$195, same but 500 volts half kilowatt including field rheostat \$45, National AGSX receiver, tubes, crystal, power supply, all coils fourteen to 200 meters also 20, 40, 80 amateur band coils \$145 wholesale cost \$222.90, 6 DCSW3 receiver complete same sets coils \$20.00. All above perfect condition fob John Wells, Southbridge, Mass.

1 kw transformer, 2000, 2500, 300 volt each side, \$11.50 watt 1100 and 1500 each side, \$7. High power class B transformers. W3CGA.

WANT microphone. W2DNN, Ossining, N. Y.

No. 12 hard drawn 51¢ 100 ft; B and C batteries in stock; DB mike transformers, \$1.18; 600 volt peak 8 mfd. Electro-Lytics 32¢; power-transformers, 4 tube, 99¢. Hatry & Young, Hartford.

NEW RCA—Victor amateur receiver; National parts, receivers; Hammarlund, Cardwell, Electrad, Aerovox, Yaxley, RCA-DeForest "Acorns," 800, 801 in stock; RK-20, RK-18; Thor, Kenyon, Sprague, Bliley; Aerial wire, insulators, etc. Hatry & Young, Hartford.

"WAZ"—worked all (40) zones—new DX "yardstick," true performance index. "W35Z" compares progress toward WAZ. Country controversies eliminated. Full details November "R/9," 20¢; foreign, 25¢. \$1.50 yearly, U.S.A. and Americas (except Canada). Elsewhere, \$2.25. "R/9," 1455 Glenville, Los Angeles.

SELL, trade: ACSW5 with 20-40-80 coils, \$17.50 Supreme 400-B diaphragm, \$35, Weston oscillator and output meter, \$35, General Radio \$695 standard frequency crystal oscillator, temperature control, and heat-control outfit, \$195, WE251A 1000 watt tubes, \$50. Want Leica or Contax camera. W9ARA, Butler, Mo.

CASH prizes—equipment for QSL designs. Send 4¢ stamps for details. Capital Advertising Service, Harrisburg, Penna.

QSLs, SWLs that stand out. Unusual colors. Samples! Cowan-Printing, Bridgeton, N. J. W3PJ.

CHRISTMAS Special! 18-item ham library, \$2.75: "Radio Handbook" (most complete yet published), "Kruse's Radio-Phone Guide," "R9 Sigs—Angle Radiation," "5-Meter Radiotelephony," "Amateur and Short Wave Antennas," "Amateur and Short Wave Receivers," 12 issues of "R/9." Those you don't need make excellent gifts. Foreign rates on request. "R/9," 1455 Glenville, Los Angeles.

THIRTY-item library! Above items and twelve issues of "Radio," \$3.95!

WANTED—for cash or trade. Silver 5B, 5C, National SW3, other used receivers. Write giving prices. Virgil Darnell, Emerson, Ga.

POWER equipment for the exceptional station. Power, filament, class B, welding transformers, reactors, Edison B headquarters, relay racks. See May display. October and other hamads. Rectifier Engineering Service.

\$4.95—25W transmitters. Radio Service Labs., Fort Wayne, Ind.

CRYSTALS x cut 1" sq. 90-160 meters within 3-ko. of frequency ordered. Ransom & Horn Lab., No. Syracuse, N. Y.

FBX-A used 10 hours complete with 40M. B.S. coils, tubes, and H.D. power supply. \$60.00 cash. Write for list of xmitting parts also. Walt Hardgrave, Box 3205, Amarillo, Texas.

WANTED—IP500 or SE type receiver, loading coils and amplifier tuning 175 to 25,000 meters or Kennedy Universal receiver, type 110, tuning 175 to 28,000 meters, with type 525 amplifier. Sumner B. Young, 705 First National Soo Line Bldg., Minneapolis.

AMATEUR equipment manufactured to order. Holmes C. Miller, Box 105, Palo Alto, Calif.

SELL—swap. FB7A, 212Ds, sockets transformers, two radio-Phone transmitters, dynatron. Want power transformer. W8IV, Argyle, N. Y.

CRYSTALS 1", x or y, prompt service. Guaranteed. \$1.35. W9HWE.

CRYSTALS: See previous QST 5-ke. of specified \$1.25. Holders 75¢. Ed. M. Hlavaty, Western Springs, Ill.

QSL by W2AEY. Samples on request.

CRYSTALS—guaranteed 160, 80 meters, \$1. Blanks 50¢. W8FAV, 235 Southern Ave., Muskegon, Mich.

BLACK crackle enamel for transmitters, receivers. Half pint, 75 cents. Primer for porous surfaces, 65 cents. Radio Specialty Labs., 340 Monroe St., Brooklyn, N. Y.

CRYSTALS: 80-160, 1" "X" within three kilocycles. Unconditionally guaranteed, \$1.95. Bakelite holders \$1.75. "Ham Crystals," 1104 Lincoln Place, Brooklyn, N. Y.

QSLs by Maleco. Finest in country. Free samples. Maleco, 1512 Eastern Parkway, Brooklyn, N. Y.

TRADE or sell: 204A, 845, 261A, FBXA and G.E. K64 receivers. Jensen Ortho dynamic speaker. Complete 50 watt cw and fone 20, 40, 80 meter transmitter, relay rack mounted. Wanted SW3. W8DCE, Hamilton, Ohio.

CRYSTALS: Guaranteed excellent oscillators, 160 or 80 meters, your approximate frequency \$1.35 postpaid. Crystal Maker's blanks 1"–85¢, dozen \$6.00. Irregular shapes 25¢. Improved dust-proof Bakelite holders, non-exposed 1½" silvered electrodes, plugs into G.R. or tube socket mountings, any position, 75¢. Fisher Laboratory, 4522 Norwood, San Diego, California. "Pioneers of low priced crystals."

CRYSTALS—160–80 meters, within three kc., \$1.50. Guaranteed strong oscillators. Vollmer Radio Lab., 5126–35th St., San Diego, Calif.

RCA UX852s, unused, perfect, \$12.50. RCA UV204As, used less than 50 hours, perfect condition, \$20. A few used slightly more \$15. These tubes have been thoroughly tested and are guaranteed as represented. Cash or deposit. D. C. Akers, W2FL, 181 Greenwood Ave., East Orange, N. J.

QSLs, samples. 2143 Indiana Ave., Columbus, Ohio.

CRYSTALS, guaranteed excellent oscillators. 80, 160 bands, your approximate frequency, \$1 postpaid. W9FHS, 4433 North Kilbourn, Chicago.

WANTED—big transmitting tube. Make best offer. W1GBM.

SELL—FB7A tuner, RCA tubes, power supply, coils for 160, 80, 20, \$45. W8KRB, 609 Stratford Drive, Ann Arbor, Mich.

CRYSTALS: \$1.35 Hipower oscillators 3500–1700 Kc Bands, close to your specified frequency. 7000 Kc Band \$4.25. Crystal blanks 65¢. No waiting. Hipower type M holder, a bargain, say satisfied users. Made of molded bakelite, has threaded top cap, plugs in tube socket. Holder complete with socket, only \$1.00. Immediate delivery. New price list and descriptive literature, free, write. Price of crystals for Broadcast and commercial use, supplied on condition. Hipower Crystal Co., 3607 North Luna Ave., Chicago, Illinois. You cannot buy a better crystal than Hipower at any price.

CLASS B transformers—Universal for two or four 46's, 210's, 800's, RK18's, etc., \$7.75 pair postpaid anywhere in United States. 70 watts of audio from 46's. Write for details. W8UD, Douglas, Michigan.

SELL large used transmitting tubes very cheap. W1EBM.

2000 volt R.E.L. power supply, also 1000 volt 300 mil ESCO generator. Both new condition. Cash or trade for xmtr tubes. W2CEN, Greenport, L. I., N. Y.

SELL, trade, \$100 condenser mike head. \$80 Eaco dynamotor, 12 to 600 meters. Amertran transformers. WE25B amplifier. RCA high quality theatre or PA amplifiers. All new, 75% off. Use National or Hammarlund receiver. Canady, 19570 So. Sagamore Rd., Cleveland, Ohio.

QSLs! QSLs! World's Finest! Anything c.o.d. Samples? Stamp. Sell Callbooks. W8DED, Holland, Michigan.

RECEIVER for sale (W.A.C.) W8DED.

TRANSFORMERS—250 watt 600–800 each side, \$6.75. Quotations given. Frank Greben, W9CES, 2012 S. Peoria St., Chicago, Ill.

SELL—three used RCA852s, \$35. T. Galbraith, W1GCQ, Chatham, Mass.

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

CRYSTALS, guaranteed. 160–80 meter, less than 1", X or Y, within 10 kc., \$1.35. 1", within 2 kc., \$2.25, oscillating blanks 75¢, blanks from the saw 50¢, grinding instructions 25¢, plug-in holders, \$1. Wm. Threm, W8FN, 4021 Davis Ave., Cheviot, Ohio.

QSLs, free samples. Printer, Corwith, Iowa.

WANTED—Teleplex or Instructograph. Cash or trade. C. W. Read, W9LUS, 3401 Parnell Ave., Chicago.

COLLINS 30FX transmitter tubes and mike all in original boxes, never used; cost \$325, sell \$275. W2GIF.

COMPLETE training for amateur radio operator's license, \$1.50 weekly, or \$20 for full course. N. Y. Wireless School, 4 West 105 St., Phone Clarkson 2-7456.

FOR sale—Latest ACSW3, 4 sets coils, tubes, power supply, headphones, \$25. Cecil Smith, W9JUT, Coffeyville, Kans.

CALLBOOKS—new Fall 1934 Radio Amateur Call Books, hundreds of new DX hams, many pages of late W and VE calls is yours for \$1.10. Four issues for \$3.65 (in foreign countries \$1.20 and \$3.90, postpaid). W9FO-610 S. Dearborn, Chicago.

SELLING out. Send for list. W2EYE, Paterson, N. J.

WICKF selling surplus equipment. RCA852 and WE212D with socket, etc. Want RK-20.

ASSORTED RF, IF and choke coils, surplus material, value up to \$5. Send 50¢ coin or stamps for package containing six to ten units. Include parcel post charges for two pounds. H. F. Oliver, 133 Hillside Ave., West Springfield, Mass.

SWAP—Bosch Vibro-Power Car Radio, model 150 complete, good condition for medium powered transmitting equipment. Write offers. W3BTQ.

WANTED—Wireless Specialty Co type IP 501 receiver complete with Audio Amplifier and IP 503 Long Wave Loading Unit. Navy Type SE-143 Radio Receiver complete with Detector-Amplifier unit and loading unit. Must be in good working condition and priced within reason. Cash sale for parts taken. George X. M. Collier, Anoka, Minn. W9CWI.

USED FB7A and RF 20, 40, 80 coils, 5897 power pack tubes, factory test before shipped, \$89; 4 navy .004 12,500 volt mica condensers, \$2. each; Westinghouse MG 500 volt d.c. 200 mils from 110 a.c. mounted, \$12; 2 oil G.E. 1.7 mfd 2,800 volt, 1 Westinghouse 1 mfd 3,500 volt condensers, \$12. each; Westinghouse mercury arc keepalive solenoid auto relay complete, rectify to 3,000 volts, \$35. F.O.B. W1KM, 2 Park Ave., Malden, Mass.

SELL AAA1 Supreme Diagonmeter 1932, perfect condition, fifty dollars. W2EDW.

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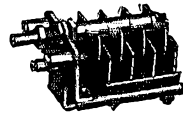
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18, July	29, Sept.	20, Nov.	



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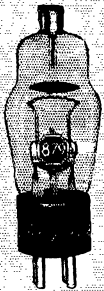


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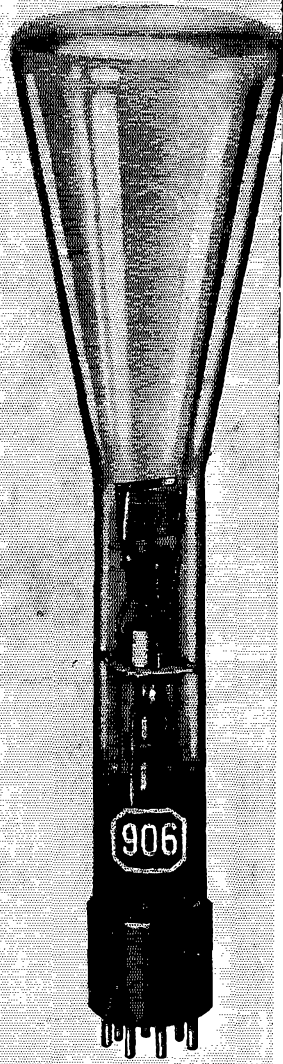
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