1933 Troubles CAN BE OVERCOME IN 1934 With QST BINDERS priced at $1.50 postpaid

American Radio Relay League West Hartford, Connecticut
W. Ross Hahn of Knoxville, Tennessee writes:

"Last Saturday, some chosen few of the gang went into a huddle and after a little discussion and much praise of its (the 800's) merits, we decided to put it through its paces. . . . .

The first CQ (3 calls, 3 signs) hooked a G6—in England, and, believe it or not, the next call got a Frenchman! 3:30 Sunday afternoon, not bad!! . . . . Oh yes, I forgot to say that . . . . the tube ran cold."

Not bad at all, Mr. Hahn. In fact, we feel that our pride in the 800 is justified. But we also feel that you and your gang as well as your transmitter and receiver, should take a bow. By the way, wasn't that receiver equipped with RCA Radiotrons?

To tell the truth, not all the people who have used the 800 have worked England and France, but they do agree that the 800 gives them unbelievable results.

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Address all general correspondence to the executive headquarters at West Hartford, Connecticut
Ten years ago this month there was a grave crisis at the QST Factory: we ran completely out of exclamation points! For many months our supply had been getting lower and lower under the necessity for reporting in every issue yet more startling accomplishments in amateur transmission. We amateurs were beginning to get the real hang of c.w. transmission. But the grandest and most inspiring event of that whole dramatic period, the one which reduced our inventory of exclamation points to zero and caused us to throw the office cat at the stenographer and crown the mail-boy with a waste-basket, was the first accomplishment of amateur two-way transocean communication! It happened just ten years ago.

Ten years is a long time in the life of amateur radio, an even more important part of the individual amateur's pursuit of this art. Many of you fellows have become old-timers in the brief space of three seasons. We have no idea that ten percent of the amateurs of to-day were in the game ten years ago. The amateur now entering his second season is a bit of a veteran, regarded with awe by the chaps just starting out, and when you encounter a ham who has been at it five years you have, figuratively a bearded patriarch whose whiskers drag the ground. You fellows who can do everything there is to do to-day and get scarcely a thrill from it: you ought to have been at it ten years ago. So severe were the thrills in that glamorous period that every amateur needed a king-truss on his spine, for those were "the days when".

Impossible as it to-day seems, there once was a time when we could not work across the ocean. In 1921 the A.R.R.L. and a British radio magazine ran the first transatlantic tests, in which twenty-five American amateurs transmitted while two hundred and fifty British amateurs listened. Those were the days of 200-meter spark signals, with an occasional early c.w. bird. Although some of the British amateurs used amplifiers of up to ten stages, or perhaps because of that fact, no signals were heard. Late that year the second tests were held and A.R.R.L. sent to Scotland the crack amateur receiving expert of those days, Paul F. Godley, who set up his gear and listened for ten days while American amateurs pounded brass. The outcome is one of the classic accomplishments of amateur radio. Even to-day we cannot read QST's account of "Paragon Paul's" expedition without feeling anew the tremendous kick that first surged through us at that history-making event. For we got across on schedule, and Godley copied half a dozen spark stations and twenty c.w. stations, the first amateur transocean reception at a land station! In the winter of 1922 the third A.R.R.L. transatlantic tests were held with profoundly inspiring results. Literally hundreds of American amateurs were heard in Europe, mostly in England and France, and we ourselves succeeded in hearing a few English and French amateurs for the first time. But still no one could work two-way, for the abilities to copy these extremely weak signals and to build a transmitter that would get across were not yet combined in one individual on each side of the water.

As we roam back through the QST's of ten years ago it is apparent that during 1923 there was the determination to do something about this situation. Our signals were getting out all right, not only were eastern amateurs often heard in Europe but west-coast amateurs were copied frequently in New Zealand and Australia, a much greater distance. But it wasn't reliable, the signals weren't good enough, and two-way work was still an impossibility. What to do? It is apparent from QST that there was the dawning conviction that perhaps the answer lay in this new business of using a shorter wavelength. Some of the pioneer fellows had been experimenting for a couple of years with the idea of making the wavelengths shorter and shorter and they found that the signals went right on up as this was done. Stronger signals were precisely what was needed for transocean work. So A.R.R.L. went at this 1923 job with great determination. The fourth A.R.R.L. transatlantic tests were organized for that winter, to commence on December 22nd in collaboration with the Radio Society of Great Britain and the French societies of those days. These were to be listening tests for us, not sending, for we knew we could get over. For twenty nights the French and British amateurs were to alternate in transmitting to us and then, from January 11th on, we were to attempt two-way communication with them.
How these plans were anticipated by private enterprise is now another of the real classic tales of amateur radio. It happens that during the summer of 1923 there came to this country the leading French amateur, partly to visit our second national convention but more expressly to prepare himself to become the first European amateur to engage in two-way communication with America. Yes, Léon Deloy, F8AB—do you remember him and his 25-cycle flutter? He was an old friend of our then traffic manager, Fred Schnell. They determined to attempt to work each other, and for advice they called upon that world-famous experimenter, John Reinartz, who had a new trick circuit that would go all the way down to 100 meters. Deloy returned home with enthusiasm and a Grebe receiver and many transmitting parts, and both he and Schnell prepared their transmitters according to the Reinartz dope. Deloy got ready first and cabled that he would transmit on November 25th. I was at Schnell’s station that night. The most goshawful-looking haywire receiver you ever saw had hurriedly been assembled and set at 110 meters per wavemeter. At the appointed hour there Deloy was, right from the first dot, readable all over the house. Wow, did this short-wave stuff work! Another day and Schnell’s transmitter was ready, and a cable to Deloy arranged a two-way try for the night of November 27th. The throaty gurgle of F8AB came in on schedule. A long call, and then the invitation to Schnell to GA. Four 50-watters started doing their stuff as he replied. Can you fellows imagine what it was like that first time? Were our American signals getting over? Would amateurs at last click across the Big Drink? He switches over, we hold our breaths. Deloy replies! But maybe it is only happenstance; perhaps he is just accidentally calling again at that time to say ND. Will the fellow never end his call and say something! Aha, he breaks! And then, my lads, came the first transocean R, R, R in all amateur history! Oh boy, oh boy, was that a thrill? Two-way transatlantic: Reinartz was on the air too, and at his first chance, within the hour, he also was in contact with F8AB. (Note, by the way, that all three of these first stations used that same Reinartz transmitting circuit. John must still find a lot of pride in that thought.)

With these transmissions international amateur radio was born, and by these astounding events the fourth A.R.R.L. transatlantic tests were completely scooped. Naturally these happenings created the greatest commotion in amateur ranks. How was it done? What must a fellow do to duplicate it? What was the circuit? Like wildfire (whatever that is) the word flew round, and amateur after amateur discovered that by reducing wavelength and working the old antenna well below its natural wavelength (as we said in those days) the deed could be done. For it must be remembered that that was before the time of low one-wire Hertz antennas. An antenna in those days was a real affair, a six-wire cage or flat-top say 75 feet high and 100 feet long, with a counterpoise under it preferably covering a half an acre. Kruse analyzed the results in 1924 and apparently granted no part of the improved performance to the change in frequency itself but rather attributed it to immensely increased radiation resistance by working the antenna well above its fundamental frequency. At any rate, the word spread on how to do it and in an incredibly short while a dozen hams had worked F8AB. In Europe the word similarly spread and on December 8th the first Anglo-American QSO occurred, between G2KF and Your Announcer. December 27th 2AGB worked the first Dutchman, PCII, and on the following day Canada and the motherland were first united between ClBQ and G5BV.

And that, OM’s, is how it all started. We read in QST that a month later there was a fellow who had worked no less than six different foreign amateurs in three different countries. Another month and we reported with pride that there were as many as thirteen European amateurs who had been in communication with this continent, while we had record of as many as seventeen Americans who had been in transocean QSO. But that was ten years ago, and ten years is a long time. Things change. Last year’s thrills are this year’s tears. Not the least thing that ten years will change is point of view. Last week we had a letter from a Young Squirt who in three months had worked sixty-six countries with a pair of 7½-watters and wondered what he could do next. Brother, can you spare a thrill?

K. B. W.

**THE M.I.T. AIRPLANE TESTS**

Bearing all the earmarks of a highly successful project, the M.I.T. 56-mc. tests are well under way as we go to press (Nov. 6). During the first five flights, the plane has pushed signals into and received signals from all New England states and has established a reliable "QSA5" range of at least 100 miles.

The complete story of the tests is planned for January QST. In it we hope to include a full list of stations heard in the plane.

We offer our thanks to the amateurs who are cooperating. We make a plea, however, for that particular brand of cooperation involved in sending logs of all reception to Headquarters. It must be remembered that the tests are made possible only by a large expenditure of time, effort and money. Only by the collection of massive data can this expenditure be justified. Send in your logs, gang!
Pre-Selection and Image Rejection in Short-Wave Superhets

Practical Methods Applied to Amateur-Band Receivers

By James J. Lamb and F. E. Handy

Image-frequency interference, caused by the beating of the high-frequency oscillator with signals twice intermediate frequency removed from the desired signal, has become a problem of general concern with the popular adoption by amateurs of the economical type of short-wave superheterodyne receiver in which there is but one tuned circuit between the antenna input and the first detector. Usually the oscillator in these receivers operates intermediate-frequency higher than the desired-signal frequency, commonly 465 or 500 kc. above, so that the image signals are some 930 or 1000 kc. higher than the frequency to which the receiver ostensibly is tuned. This frequency difference is seemingly quite large, and almost any kind of tuned circuit might be thought adequate to discriminate against the image. On the lower-frequency bands, 1750-kc. and 3500-kc., this is generally so. But on the higher-frequency bands, 7- and 14-mc., the arithmetical ("absolute kilocycle") selectivity becoming progressively less, the image trouble is experienced—especially on 14 mc.

The "close-up" selectivity and sensitivity of these receivers (QST S.S. Five, Hammarlund Comet Pro, National FB7 A, etc.) being adequate, there is no special need for additional selectivity to discriminate against neighboring signals or for further amplification. Therefore, first consideration can be given to means for reducing image response, with but secondary consideration for the additional "hop" and "close-up" selectivity that may be realized in the process. Of course, pre-selection also will reduce pick-up of intermediate-frequency noise (static) and of low-frequency signals that, sometimes, get through the first detector into the r.f. circuits by stray coupling.

Several general methods of attack suggest themselves. The simpler and more direct is particular rejection of the image. Another is additional selection of the desired signal, which also reduces pick-up of i.f. noise and low-frequency signals through the first detector. Reduction of stray capacity coupling, by a Faraday shield, also helps. All of these methods have their particular merits. The following practical applications, adapted to typical receivers, tell the story.

WaveTrap Image Rejectors

One simple and inexpensive method of suppressing images that is fairly effective and entirely practical is a wavetrap placed in the antenna circuit, introducing high impedance right at the unwanted (image) frequency. It is easy to install, as shown in Fig. 1. For the usual i.f. of approximately 500 kc. the images are about 1000 kc. higher than the desired-signal frequency. Thus a trap circuit resonating 1000 kc. above the signal frequency can be used, introducing only low values of impedance at the amateur-band frequency. Such a trap is broad enough so that it...
seldom requires adjustment if once set at the center of the frequency range it is desired to eliminate. It can be tuned easily for maximum suppression of any particular frequency, however. It produces an improvement of at least several times in the signal-to-image ratio.

"Low loss" construction should be employed to make the resonance curve as sharp as possible. Properly working, the desired signal should not drop appreciably when the undesired signal is reduced some 80% in strength. The wavetrap can be coupled into a turn or two in the antenna lead as shown in Fig. 1-B, to improve sharpness of tuning, but it is usually sufficiently satisfactory connected right in the antenna lead with a shorting switch to cut it out when not in use. When a pre-selector stage. A trap circuit can, at best, only improve the wanted to undesired signal ratio, introducing some loss at the desired-signal frequency—although suitable precautions to sharpen trap tuning will make this loss small. A pre-selector amplifier stage has the positive advantage that no signal strength need be lost—some gain may be added at the signal frequency—and, at the same time, images are substantially reduced in strength. The objective should be not so much to add gain but rather to hold the gain constant, and to use loose coupling and sharp tuning in the pre-selector so that its full benefit can be realized.

Pre-selectors can take a number of different forms. The one illustrated, simply a tuned r.f. placed in the same compartment with other components additional shielding of the trap circuit may be necessary to prevent undesired stray couplings. Where the receiver is well shielded it may be simplest to apply the trap externally, as suggested in the illustration.

The design shown in Fig. 1-B is suggested for eliminating the bother of changing coils. There is room for a small tapped coil and a midget condenser near the antenna post inside most manufactured supers. A 3-point switch, 150-µfd. midget condenser and a 1½-inch tube with 14-turn coil tapped at 6 turns are suggested for the built-in trap, covering 7- and 14-mc. requirements. The trap may be coupled to a two-turn antenna coil wound on the same form about ½-inch from the wavetrap coil, or the trap itself may be wired between the antenna post and first detector, as the builder prefers.

A PRE-SELECTOR AMPLIFIER

The second suggestion for image elimination is stage, was built integral with the receiver since a single receiving unit is more convenient to handle than a collection of boxes and gadgets. A 6" X 12" X 8" crackle-finish box matches the dimensions and finish of the FBXA receiver. This is also large enough so that a wavetrap may be built in the rear section, with control switch on the right side of the box.

Using standard parts, the construction is simplicity itself. Additional standard National detector coil assemblies were obtained, one for each amateur band. A 2-inch hole in the lower center of the box is cut to mount the Type XC coil shield; the 100-µfd. tuning condenser is mounted just above; then the socket and shield for the 58 are bolted, on pillar bushings, to the bottom of the box behind the coil. Two binding posts for the antenna coil and one for ground connection are mounted on the right side, and three ¾-inch holes are drilled on the left side so that output and A-B-power wires can be pulled through to the
receiver proper when the pre-selector box is bolted in place and we are ready for final connections. In assembling, the coil mounting is fixed in place first. The coil socket is taken out of its can from the rear and the five wires soldered and brought out at the points provided in the back cover of the shield-can. The circuit of the r.f. stage is given in Fig. 2, connections of detector coils in Fig. 3.

ADAPTING THE RECEIVER CIRCUIT

A few changes in the receiver wiring make it ready to attach the pre-selector unit. In addition to providing the necessary "B" and filament supplies for the added circuit, these changes include provision for gain control on the pre-r.f. tube and first detector, with substitution of a 58 first detector for the regular 57. This tube change is recommended for the reason that cross-modulation is considerably reduced with the 58 first detector. The drop in conversion gain or sensitivity with the 58, as compared to the 57, is compensated by the additional gain of the r.f. stage, so that the net result is a real improvement. The essential changes are designated by the letters in the diagram of Fig. 2, and are as follows:

A—Remove the 100-µfd. antenna series condenser and connect antenna post direct to one side of antenna coil. This is necessary for series feed to the pre-selector plate through the receiver’s antenna coil.

B—Disconnect ground post from chassis and connect to positive plate supply in receiver, picking up the “plus B” on the load side of the “B” switch.

C—Connect the 0.01-µfd. r.f. bypass condenser from ground post to chassis (-B).

D—Remove 20,000-ohm detector cathode resistor and replace with one of 2500 ohms. This improves weak-signal sensitivity of the first detector.

E—Connect the “ground” end of the detector cathode resistor to the cathode terminal of the volume control, along with lead to i.f. cathodes and to cathode resistor of pre-selector tube. This applies variable-bias (volume) control to all stages preceding the second detector and makes possible the complete elimination of blocking effects on strong signals.

F—Replace Type 57 first detector with a 58.

G—Connect twisted-pair filament leads for the pre-selector stage across receiver filament circuit wherever most convenient.

H—Modify primary windings of plug-in coils to reduce coupling, thus sharpening selectivity and improving gain. The operation is quite simple and can be performed without opening up the coils. Pull off the black bakelite coil protection of the National form. A twist will loosen the cement. Next, two ¾-inch holes should be drilled in the slot, opposite the respective antenna socket pins of the base. (See Fig. 3 for identification.) Now cut the primary coil at the top turn, close to where it disappears inside the form. Then, with a hook made of a short piece of No. 26 wire, the leads may be “fished” out through the ¾-inch holes, the wire re-wound in the slot and soldered to the leads, without the necessity of getting at the base pins or of taking off the top of the coil form. The number of turns is 2 for the 14-mc. coils, 3 for the 7-mc. coils and 5 for the 3.5-mc. coils. The objective is, of course, to reduce the coupling, especially the capacity coupling, between primary and secondary. As the coils are built there is probably as much capacitive as magnetic coupling, especially at 7 and 14 mc. This distributed coupling tends to reduce the selectivity. Although it makes for high gain, it has the undesirable effect of aggravating image response on the high-frequency bands.

To make the i.f. filter controls accessible, a 1¼-inch space should be allowed between the two
cabinets, to permit one to reach the crystal filter switch knob; or this knob can be drilled and tapped, and a 4-inch brass rod added as an extension handle. The ½-inch holes drilled low in the right side of the receiver proper permit pulling all wires from the p.s. unit right under the chassis, after the unit has been bolted in place. The receiver cabinet has holes drilled in the rear which will take 6-32 bolts. When wiring of the p.s. unit in accordance with the diagram shown has been completed, drill two similar holes ⅞-inch in from the front and at the same height as the two holes at the back of the cabinets. Then complete the bolting and pull the wires through.

ALIGNMENT OF THE CIRCUITS

We are now ready to give the p.s. a tryout. A slight adjustment of the padding condenser in parallel with the first detector tuning condenser, inside the set, and a touching up of the padding across the individual first-detector coils, too, may be necessary to compensate for slight changes in circuit values.

It is important that the operator go about making these adjustments, or any other adjustments of the receiver, with understanding of what he is trying to accomplish. First, study carefully the instructions that came with the receiver. Do this before starting, not after the circuits have been gotten all out of whack. More "defective" receivers result from blind tinkering with circuit-adjusting set-screws than ever come from the factory that way. This applies especially to the i.f. adjustments, on top of the i.f. transformers. Leave them alone until you know what you are about.

For circuit alignment, all the way through the receiver, it is best to use some kind of visual indicating instrument to show "peaking." With the FB7-series of receivers, a 0–1 d.c. milliammeter connected in series with the "phones is as good as anything. With a steady signal from a local unmodulated oscillator tuned in, the meter will indicate maximum upward deflection at peak tuning. The maximum current should be kept below 0.5 ma., by adjustment of the volume control, to avoid detector overload and to give most precise indication. Lacking a meter, the less accurate listening test can be used. For this it is preferable to tune for peak receiver noise ("rush"), at low volume level, rather than for peak audio (sound) with a signal. The ear is less able to detect the actual peak setting on a signal.

No changes should be necessary in the oscillator coils of the receiver, and these coils should not be touched except when necessary to center the band range on the main tuning scale. For adjusting the pre-selector coils, set the receiver tuning for center-of-band reception; tune the p.s. knob to half scale. Set the 100-mfd. p.s. padding condenser to about ½ full capacity and adjust the individual coil padding condenser for peak output. With this adjustment completed the pre-selector should track nicely over the amateur bands. It is not essential to use the p.s. knob continually in tuning, but only at an auxiliary and final adjustment in bringing any signal to peak strength.

A FURTHER AID

The capacity coupling to the antenna, previously mentioned as a prime means of image input to the receiver, also can be reduced by proper electrostatic shielding between the antenna input coil and the receiver input circuit. This is especially effective for coupling transmission-line feeders to the receiver, to give "balanced" input. Note that this shield must be electrostatic, not electromagnetic—which means that it must be of a type free from eddy-current (short-circuited-turn) effects. A solid sheet of copper, or even a copper-mesh screen, will not do. This shield, of the type sometimes called a "Faraday screen," must be in the form of a grid of parallel wires, insulated from each other except for inter-connection at one point on each wire. This common connection is grounded.

Convenient material for making up this type of screen is the Hammarlund self-supporting space-wound coilng popularly used in short-wave receivers some years ago, before the tube-base era. To make the screen, a piece of the coil is "doped" the winding heavily with clear Duco or collodion. The cardboard form is removed when the winding is thoroughly dry and the operation is completed as described above. (Continued on page 76)
An Efficient C.W. and 'Phone Transmitter Using the New Tubes and Circuits

Multi-Band Operation—Tri-Tet Crystal Control—100- to 150-watt Output
With Type 800 Tubes

In Two Parts—Part I*

By L. C. Waller, W2BRO**

Even a casual glance at the article in last month's QST on the new Type 800 must have convinced most amateurs that this tube has remarkable possibilities. As much as 65 watts r.f. output per tube and, especially attractive to anyone interested in 'phone, 100 watts of audio with a pair of relatively small tubes in Class B — here was something worth investigating.

Since tinkering with 851's, 203-A's, 860's, and 1061's, which were then in use at W2BRO (employing a UV-851) modulated but little more than 200 watts input to the Class-C stage, there would be no come-down in power; but there would be a nice economizing in size, weight and cost of the equipment used to obtain that power. Rebuilding was in order, especially for 14-megaicycle 'phone, which had never quite lost its appeal despite occasional none-too-good radio conditions in that band. The r.f. portion of the transmitter that resulted will be described first; the modulator will be covered later.

What Tubes for the Low-Power Stages?

The problem immediately arises of what and how many tubes to use in the low-power stages. Because the choice of the power amplifier determines chiefly what is necessary in the low-power stages, it is better to begin figuring at the high-power end and work backwards. Further, in the case of a 'phone transmitter, the operating conditions of the r.f. power amplifier are very...

* Part II, describing the a.f. end of this transmitter will appear in a following issue of QST.
** RCA Radiotron Co., Inc., Harrison, N. J.
1 Reinarts, "Putting the Type 800 Transmitting Tube To Work," QST, Nov., 1933.
definitely controlled by the power output of the modulator unit. Since two 800's as Class-B modulators will deliver approximately 100 watts of audio power, we might expect to have an input of 200 watts to the Class-C stage. However, the power output rating is from the tube viewpoint only, and does not take into consideration the efficiency of the output transformer or of the circuit. The modulator output transformer has a known peak power efficiency of 90 percent; therefore, 90 watts of useful audio will be available.

As explained several times before in QST and in the Handbook, the mean power input to the r.f. amplifier at 100 percent modulation should be just twice the audio power delivered by the modulator. Therefore, an input (d.c.) of 180 watts to the Class-C stage appears feasible. However, an inspection of the data on the 800 as a plate-modulated r.f. amplifier shows that the maximum rated conditions of 1000 volts at 80 ma. per tube will give an input of 160 watts for two tubes in push-pull. Good enough — that leaves a reserve of about 10 watts of audio. It is better, from the standpoint of quality with high percentage modulation, to have a modulator that is slightly under-worked rather than one overloaded.

Next, what tube to drive push-pull 800's?

Looking over the list, the 10, 841 and 800 all seem to have possibilities. The 800 was not used because it was more powerful than necessary; besides, it is enough to dodge 1000-volt potentials in the power amplifier without having to do it in the buffer stage as well. The 841 was finally chosen, because it delivers somewhat more output than the 10 with the same exciting source. The 10 will give comparable results, however, and can be used if it is desired to keep cost at a minimum. Because a number of amateurs have already asked, "How about the 46 to drive push-pull 800's?"; it should be noted that this type is not suitable for this service. Two 46's in push-pull operating at 400 volts and 50 ma. per tube might prove fairly satisfactory, but a single 841 or 10 is much to be preferred.

A 59 serves as a tri-tet oscillator (see article by J. J. Lamb, in October, 1933, QST) with a 3550-kc. crystal; the plate tank of the 59, tuned to the second harmonic of the crystal frequency (7 mc.) drives a type 46 as a 14-mc. doubler. A 46 won preference for this position over a 59 simply because the latter requires several extra parts, such as a screen-circuit resistor and another by-pass condenser. The "Universal Exciter Unit" described in October QST should be very satisfactory as a driver for the 841. For

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**FIG. 1 — CIRCUIT OF THE 100-TO 150-WATT R.F. UNIT**

| L₁ to L₄ | See "Coil Data" table. |
| L₁ | Antenna coupling coil (see text). |
| C₁ | 200-µfd. midget variable (Hammarlund Type MC-250M). |
| C₂, C₃, and C₄ | 100-µfd. midget variables (Hammarlund Type MC-100M). |
| C₅ | 182-µfd. per section (Cardwell Special Split-Stator Type 407-B). |
| C₆ | 210-µfd. per section (Cardwell Type 157-B with Myscale insulation). |
| C₇, C₈, and C₉ | 0.05-µfd. fixed mica (600-volt). |
| C₁₀ | 0.02-µfd. fixed mica (5000-volts working voltage). |
| C₁₁ | 500-µfd. fixed mica (600-volt). |
| C₁₂ | 0.01-µfd. fixed mica (400-volt). |
| C₁₃ | 35-µfd. midget variable (Hammarlund Type MC-35M). |
| C₁₄ | Neutralizing condensers (see text). |
| C₁₅ | 25-µfd. electrolytic (audio by-pass for modulated service only), 500-volt rating. |

| C₁₆ | 0.002-µfd. fixed mica (600-volt). |
| R₁ | 100,000-ohm 1-watt resistor. |
| R₂ | 40,000-ohm 2-watt resistor. |
| R₃ | 1000-ohm 5-watt adjustable resistor (wire-wound). |
| R₄ | 30-ohm center-tapped resistor. |
| R₅ | 1500-ohm 10-watt resistor (wire-wound). |
| R₆ | 1000-ohm 10-watt adjustable resistor (wire-wound). |
| R₇ | 50-ohm center-tapped resistor. |
| R₈ | 50-ohm 5-watt center-tapped resistor. |
| R₉ | 2000-ohm 75-watt variable resistor (wire-wound). |
| R₁₀ | 120-ohm 10-watt resistor (wire-wound). |
| RFC | 8-millihenry General Radio transmitting type r.f. chokes. |
| J | Single-ended circuit jack. |
| K | 3550-kc. quartz crystal with plug-in holder. |
| K₁ | Key or push-switch for telephone break-in. |
| K₂ | Key for C.W. |
operation to include the 10-meter band it would be more desirable, in fact, than the arrangement shown in Fig. 1, because of the increased output of the 59 as a regenerative doubler.

The type of coupling to be used between stages was next considered. Because of its simplicity and ease of adjustment, conventional capacitive coupling is used between the 59 and the 46, and between the 46 and 841. But inductive coupling with a low-impedance line (link coupling) was the logical choice for transferring the excitation from the single-ended 841 to the push-pull 800's. This arrangement is both convenient and efficient, and is finding increasing favor as more amateurs learn of its advantages.

THE BIAS PROBLEM

The matter of obtaining grid bias for each stage was also given careful consideration. There are in general three ways of biasing an r.f. amplifier tube. These are: (1) grid leak; (2) a separate source, such as a battery or bias rectifier; (3) self-biasing resistor between the filament center-tap (or cathode) and minus B.

Grid-leak bias appears simple but has one serious disadvantage. With this method, grid bias is derived from the rectified r.f. excitation voltage, which causes a direct current to flow through the leak. The voltage drop across the leak biases the grid negatively. But if the crystal pops out of oscillation or if the excitation is removed from the grid-leak-biased tube for any other reason, the tube is left with zero bias — and the plate current of the tube hits an altitude determined chiefly by the plate supply voltage and the plate resistance of the tube. Naturally, such plate-current excursions are not conducive to long tube life.

Battery bias is satisfactory at low power, where grid current is small, but is somewhat expensive over a period of time. A combination of battery and grid-leak bias is also usable.

Automatic self-bias is attractive from the viewpoint of longer tube life, ease of adjustment and consistently stable performance. It has the disadvantage of requiring a comparatively high-wattage resistor for the plate-return circuit in addition to a separate filament-supply winding for each self-biased filament-type tube. Against these drawbacks is the fact that the plate current of the tube is safe-guarded from "running away," because the bias automatically increases and the effective plate voltage decreases proportionally as the plate current rises. For coated-cathode tubes such as the 46, 47 and 59 (except as crystal oscillators), self-bias is almost a necessity in order to prevent the plate current from increasing until the tube is destroyed. This is always likely when the tuning adjustments are incorrect. When these tubes have their safe plate and screen dissipation exceeded, primary grid emission begins and the fireworks really start!

Since the cathode of the 59, as in most heater-cathode types, is electrically insulated from its heater, the same 2½-volt supply can be used for both the 59 and the 46. The only extra filament supply necessitated by this biasing arrangement is the 7.5-volt winding for the 841. Self-bias was found to be no better than grid-leak bias for the crystal oscillator; therefore, the leak method is used because of the fewer parts required.

THE LAYOUT

The photographs show the layout of the various parts of each stage. The base-board is a piece of dry white pine of ¾-inch stock measuring 12 by 40 inches. The hard-rubber panel on which are mounted the plate-circuit meter jacks and the midget tuning condensers measured 3 by 26 inches. This could also be of dry wood.

It should be noted that the first three coils, from the crystal-oscillator end, are all placed at right angles to each other to minimize stray inductive coupling between stages. This positioning is less important with each coil operating at a different frequency, as in this transmitter, than it would be if the second, third, and fourth coils were all operating at the same frequency. The grid and plate coils of the final amplifier are placed with their axes parallel to obtain mechanical and electrical symmetry for the connections to the push-pull 800's. With the 800's properly neutralized, not the slightest trouble was experienced with self-oscillation in the final stage. Furthermore, when the 800's are modulated or keyed no undesirable reaction on any of the preceding stages is apparent.

The self-biasing resistors for the 46, 841, and 800's, may be seen in the photograph. Each is adjustable, the one for the 800's being fitted.
with a sliding contact. This is an especially useful feature in adjusting the power amplifier.

The neutralizing condensers (Cn) for the 800's are homemade. Their construction is shown in the photograph. Consisting of four small stand-off insulators and four plates from an old variable condenser, they are inexpensive. This type of construction is advisable because of the extremely low grid-plate capacitance of the 800 tube. The plates of each condenser are spaced ¼-inch apart; the adjustable top plate is, in this setup, placed at about 40 percent of full capacity.

An r.f. choke will be necessary for the crystal stage if grid-leak-across-crystal bias is not used for the 59. This method was found to be entirely satisfactory at the low plate and screen voltage stage, if grid-leak-across-crystal bias is not used for the 59. This method was found to be entirely satisfactory at the low plate and screen voltage stage. It is only necessary to increase the length of the twisted pair between the 2-turn coupling coils. Ordinary twisted lamp cord should prove satisfactory for this purpose. The coupling coil at the 841-end is placed in between two of the turns of the tank coil near the low r.f. potential end. The coupling is about 60 percent and is not extremely critical.

For 14 me. the neutralizing coil for the 841 stage is composed of four turns of No. 18 d.c.c. wire, bunch-wound around the "cold" end of the 46 plate coil. This neutralizing arrangement works perfectly, is exceptionally easy to adjust, and leaves the plate coil of the 841 stage free of all neutralizing connection.

The grid and plate tuning condensers in the 800 stage should be preferably of the split-stator type, in order to balance the capacity from each tube plate to ground and between each grid to ground. Although the condensers shown in the photograph (Cardwell types 410-B and 411-B) are not of the split-stator type, after the photograph was taken the split-stator condensers specified in Fig. 1 were installed. The Type 411-B, which worked satisfactorily for c.w. operation, was replaced by the 157-B, the latter type having a voltage breakdown rating more suitable for modulated service.

The coil specifications given in the "Coil Data" table are for 20-meter operation only. For operation in other bands, additional coil data may be obtained from back issues of QST and from the table on page 100, The Radio Amateur's Handbook (tenth edition). For operation in the 10-, 20-, 40- and 80-meter bands, all tank coils except the 59-cathode coil should be of interchangeable type. The frequencies at which the various circuits may be operated for output on bands other than 14 me. are given in the "Tuned Circuit Combinations" table.

### TUNED CIRCUIT COMBINATIONS FOR FIVE BANDS

<table>
<thead>
<tr>
<th>Output Band Lc1 and Lc4</th>
<th>Crystal Frequency</th>
<th>Lc1</th>
<th>Lc4</th>
<th>Lc1</th>
<th>Lc4</th>
</tr>
</thead>
<tbody>
<tr>
<td>7000 kc.</td>
<td>1750 kc.</td>
<td>1750 kc.</td>
<td>3500 kc.</td>
<td>3500 kc.</td>
<td>7000 kc.</td>
</tr>
<tr>
<td>14,200 kc.</td>
<td>3550 kc.</td>
<td>3500 kc.</td>
<td>7100 kc.</td>
<td>3500 kc.</td>
<td>14,200 kc.</td>
</tr>
<tr>
<td>28,000 kc.</td>
<td>3500 kc.</td>
<td>3500 kc.</td>
<td>14,000 kc.</td>
<td>28,000 kc.</td>
<td>28,000 kc.</td>
</tr>
</tbody>
</table>

Note. — Where Lc1 is at the same frequency as Lc4, the 46 will also have to be neutralized.

The coil specifications given in the "Coil Data" table are for 20-meter operation only. For operation in other bands, additional coil data may be obtained from back issues of QST and from the table on page 100, The Radio Amateur's Handbook (tenth edition). For operation in the 10-, 20-, 40- and 80-meter bands, all tank coils except the 59-cathode coil should be of interchangeable type. The frequencies at which the various circuits may be operated for output on bands other than 14 me. are given in the "Tuned Circuit Combinations" table.

### THE POWER SUPPLIES

While power supplies are more or less cut-and-dried affairs, and while most amateurs probably have one or more already constructed and in use, the proper operation of this transmitter is so dependent on the correlation of the plate supplies with the various stages that a brief discussion of the subject is justified.
For c.w. work the crystal oscillator may be operated through a dropping resistor from the same 500-volt supply which furnishes power to the 46 and 841, as long as the keying is done in the final stage. If the 46 or 841 stage is keyed, a separate 250- to 300-volt supply should be used for the 59, to prevent the note from being chirpy. For "phone operation, the 500-volt supply may be used as shown in Fig. 1. The circuit constants of this rectifier are shown in Fig. 2.

The same 1150-volt power supply may be used for both the Class-B modulator tubes and the r.f. power amplifier, provided the supply has a sufficient volt-ampere rating and exceedingly good voltage regulation (10% or better). The plate transformer should have a rating of at least 500 watts; a choke-input filter employing a "swinging" choke of low d.c. resistance should be used. Mercury-vapor rectifiers Type '66 will be satisfactory for the purpose. The circuit constants for this supply are given in Fig. 3. If it is not convenient to build a power supply the equivalent of the one described, it will be advisable to use separate high-voltage supplies for the modulator and the r.f. power amplifier.

TUNING UP FOR 14 MC.

After the transmitter has been constructed, it is usually a good plan to connect up all filament supplies and the negative B leads, but to leave the positive B leads disconnected. The positive 300-volt supply lead should then be connected to the crystal oscillator, with the plate milliammeter plugged in the 59 plate jack. If the crystal oscillates properly, the plate current will drop from 50 or 60 ma. to about 12 ma. when oscillation starts.

With this indication that the crystal stage is operating properly, the positive 400-volt lead to the 46 should be connected, first making sure that the self-biasing resistor of the 46 is adjusted to about 400 ohms. The plate current meter, which is shifted to the 46 plate jack for this adjustment, should read practically zero when the crystal is not oscillating. With the crystal oscillating and the plate tank of the 59 tuned to resonance at 7 mc. (approximately), the plate current of the 46 rises sharply, indicating excitation. The 46 plate tank is next tuned to resonance (14 mc.), the plate current dipping about 30 ma. on this adjustment. The 14-mc. output from the 46 should light brightly a sensitive neon bulb touched to the plate side of the circuit.

The 841-stage should now be neutralized in the usual manner, using a sensitive neon bulb or, better, a thermo-galvanometer. After each adjustment of the neutralizing condenser C11, both the 46 and the 841 tank circuits should be re-tuned, and C11 then readjusted. When this has been gone through three or four times, the neutralizing should be satisfactory.

The positive 500-volt lead should now be connected to the 841. With the 46 tuned for maximum output, the plate current of the 841 should rise to something over 60 ma., until its plate tank is tuned to resonance, when it should dip to about 30 or 35 ma. As another indication of correct neutralization, the plate current of the 841 should rise to approximately the same value when C1 is detuned on either side of resonance. The 46 and the 841 biasing resistors should now be adjusted until the plate current of each is 50 ma.

(Continued on page 74)
The Overmodulation Racket

A Plea for Restoration of the Wasted Kilocycles

By James J. Lamb, Technical Editor

I believe that I can qualify as an old-timer in amateur 'phone operation. The beginning was an introduction by Dr. A. H. Taylor at old 9XN—9YN, University of North Dakota, back before the war, when modulation of his long-wave arc transmitter was just so much Einstein to a knee-trousered ham from a nearby small town. Through loop modulation in '21, the workings of a Heising in '22, the achievement of a real double-button mike in '23, "like broadcast quality" in '26, 100 percent with crystal-control in '29, Class-B modulation in '31—yes, I'm probably eligible as an old-timer. And, as such, I cannot help but have genuine interest in amateur 'phone; an interest that makes me want to have 'phone as good as it can be, not only so that I can get the maximum of enjoyment from it for myself in the limited operating periods available to me but, perhaps even more, so that I can feel satisfaction in knowing that amateur 'phone as such is making full use of the technical developments it has available and of the practical information concerning them which consistently has been presented first in QST.

There is no denying that all is not aces with amateur 'phone today. It's too crowded. We all know the pat panacea that is most often proposed as the measure of relief. But above the not altogether harmonious chorus for more kilocycles, chanted as the solution of existing congestion, we hear arising an occasional voice not quite so certain that further frequency assignments hold the only answer; nay, even venturing the suggestion that most of the crowding and jamming may, possibly, be the result of something haywire with the 'phones themselves and not with the width of the bands. And these occasional voices are right. There is every justification for complaint against the wholesale and needless slaughter of perfectly good kilocycles that goes on day and night, in which crime the vast majority of 'phone's citizenry are not only the hapless victims but are, at the same time, the cheerful perpetrators. It's a kind of suicide. Its name, broadly speaking, is overmodulation.

Now it cannot be said that warning against this particular crime has not been given, both in QST and in the Handbook. It has been stated repeatedly that overmodulation generates spurious side bands and, hence, causes serious interference; that modulation must be symmetrical; that there must be no carrier shift; that there should be no variation in the Class-C amplifier plate current—all of which, despite the superior ability we assume to characterize 'phone operation, seems to have gone in one eye and out the other. Perhaps these statements should have been run in Gargantuan red letters, not simply given as straightforward technical suggestions with the assumption that their face-value importance was sufficient to make them register. If the evidence has any meaning at all, those for whom the information was intended seem, almost unanimously, to be suggestion-proof. Over 90 percent of the 'phones are over-modulating anywhere between 50 and several hundred percent and, in consequence, are taking up as much as 10 times more space per 'phone than there is any sane reason for their occupying. It can be said, without violating conservatism, that at this time overmodulation alone reduces the effective width of the 3900-kc. 'phone band to less than half of what it could and should be with proper modulation in every transmitter.

Now this is not high-flung theory evolved from abstract mathematics and put forth for academic argument. It is woefully real. The spurious frequencies resulting from improper modulation actually exist, and exist to an extent and with an importance far beyond what theoretical speculation would lead us to suspect. Here are a few bits of actual evidence, based on unbiased measurement, that happen to be at hand:

Exhibit A: Of 13 'phones checked in the A.R.R.L. laboratory during a single noon-hour period, using a superhet receiver with a linear second detector, 12 were overmodulated from 50 to 200 percent, as indicated by increase in average plate current of the detector. The one properly modulated 'phone, which caused no variation in the detector plate current, not only had the highest quality but also effectively occupied a band of but 4 kilocycles on the s.s. receiver. The 12 overmodulated 'phones had harmonic distortion ranging from noticeable to terrible and occupied from 6 to 50 kilocycles apiece on the same receiver, being worse on both counts in proportion to the extent of their overmodulation. One, the worst, was so badly distorted as to be practically unintelligible. Summary: Bad and improperly operated 'phones, 92.3%; good and intelligently operated 'phones, 7.7%.

Exhibit B: Quoting from a report received from W. H. M. Watson, W5NT, who, with W5AOT, has checked a number of 'phones with equipment including a cathode-ray oscillograph, and indi-
cating and recording volume-level indicators:

"So far we have found 1% of the stations on
75-meter 'phone modulating up to 100%, none
modulating less than 100% and 99% modulating
over 100%. On 20 meters the average 'phone is
modulated close to 200%, while on 75 meters the
average 'phone is modulated close to 250%.
These figures may seem high but that's how they
turn out. We actually logged a W6 the other
night who was modulating 375% on phonograph
records and so much more on voice that we were
unable to take readings. We also find, by their
indications, that on 20 meters less than 1% of the
transmitters have r.f. in the audio systems while
on 75 meters about 15% have r.f. in them.

"As for ourselves (W5NT and W5AOT), we
find that when modulating up to exactly 90% we
cause one another no interference, while 100%
modulation causes a very slight amount of inter-
ference. We are located 2 miles apart. We also found
that we were modulating somewhere in the neigh-
boring 75 meters about 15% have r.f. in them.

"It can be said, without violat-
ing conservatism, that at this time
overmodulation alone reduces the ef-
fектив width of the 3000-kc. 'phone
band to less than half of what it could
and should be with proper modulation
in every transmitter"...

"Let no 'phone be operated with
the slightest variation in average
plate current to any stage handling
modulated r.f. Watch the plate mil-
liammeter indicates the
average value of the plate
current... Therefore, there
should be no variation in
the current indicated by
this meter: Q.E.D.

D.c. meters measuring average current value
really show something—by not showing any-
thing. That is, the average values concerned
should be absolutely constant. It goes like this:
When a wave is properly modulated its average
amplitude is constant. The average amplitude
should be unchanging between zero and 100% modulation. With
constant d.c. plate supply voltage the average ampi-
itude of the radiated wave is directly proportional to
the average current input to the plate of the modu-
lated stage. The plate d.c. milliammeter indicates the
average value of the plate current. Therefore, there
should be no variation in the current indicated by
this meter: Q.E.D.

The constant average re-
quirement applies equally
to the plate current of
Class-B linear r.f. stages
following the modulated
stage. It also applies equally
with all systems of modulation—grid-bias,
Class-A plate, Class-B plate—or what have you.
Any system for normal modulation that will not
permit constant average input (and output) is
not permissible. Like Joe Cook's corn flakes
without milk, it's just no good. It is in failing to
meet this constant average requirement that
various trick systems fall down, among them
being absorption (loop) modulation, plate modu-
lation with only audio power and without the
necessary steady d.c., non-linear grid-bias (grid-
leak) modulation, and so on.

Of course the rightness or wrongness of a modu-
lation system is not all in its type and the kind of
circuit diagram used to hook it up. It must have prop-
erly coordinated tubes, the right audio
coupling devices, proper voltages here
and there, and, above all, intelligent
adjustment"...

(Continued on page 78)
Without pomp or ceremony the National Guard of Kansas has for the past few years been going about the business of building up an amateur radio net during its summer field training period. This year's encampment brought the climax—the enviable total of 7275 messages handled during the month from July 27th to August 26th! Worthwhile traffic, too, with 100% deliveries all along the line. Such a record is not made without complete preparation; long before the camp opened the groundwork of lining up reliable schedules with amateur stations in principal Kansas cities and towns had been laid. And this year things went off like clockwork (literally, too, as will be seen later) to the tune of an all-time record for messages handled by an amateur station in the space of one month.

CX7 is the call used at Camp Whitside, Fort Riley, Kansas. The station equipment is housed by the building shown in one of the photographs. Alongside it is the tower which supports one end of the transmitting antenna; this tower is 68 feet high and is made from $2 \times 2$'s braced with $1 \times 2$'s. The transmitter, a view of which is given in another photograph, is built up in two units, each of which can be used as an independent transmitter in case something should go wrong with the other. The frame at the left contains a shielded crystal oscillator using a 47 tube, a buffer stage having a pair of 46's in push-pull, and a push-pull amplifier with a pair of 211's. These three stages normally run with inputs of 3, 15, and 135 watts, respectively. The power supplies for all three are contained in the lower compartment of the frame. While the output of the 211 stage is normally used to excite the amplifier at the right, this stage can readily be coupled to the antenna should a failure occur in the high-power stage.

The right-hand frame contains a pair of 204-A's in push-pull, complete with power supply and so arranged that the stage can be used either as an amplifier or as a self-excited oscillator. Normal input to this stage is slightly over 600 watts. There were no failures of sufficient consequence in either unit to make it necessary to use the other alone, however, despite the fact that the transmitter was in continuous operation for 21 hours a day, every day of the month's encampment. The operating frequency used was 3620 kc. A half-wave Zepp was the antenna decided upon, after field-strength measurements had been made of the performance of several different types of antennas.

As is often the case with National Guard training periods, there were two camps, each of two weeks duration. During the second camp it was found necessary to locate the receivers and control point about 1000 feet from the station building to avoid interference from electrical appliances attached to the camp power-supply system. A keying line (weatherproof) was run to the remote-control station, which was set up in a tent, and although no relays were used the system functioned perfectly. Keying was in the center-tap of the 211 stage.

Four receivers were available, two a.c.-operated and two battery-operated. One of the a.c. receivers was set on 1810 kc. to monitor the transmitter; the other, a superhet- erodyne, was used to copy traffic when the interference level was low. Both these sets were installed in the station building. The two d.c. sets were similarly used at the remote-control point, one as a monitor, and the other for regular copying.

The operating personnel were all licensed amateurs enlisted in the National Guard. Purely a voluntary proposition, their operating was in addition to the military training which constituted the purpose of the encampment. Ten in all, the operators were: E. N. Johnston, W9ICV; A. B. Unruh, W9AWP; Lewis Dickensheets, W9FKD; Philip Smythe, W9KSY; H. O. Byers, W9LFB; R. H. Frye, W9NV; Dana Pratt, W9BGL; J. D. Eickson, W9ESW; W. Crane, W9CUF and Leo Born, W9KVG. Occasionally other ham members of the outfit would assist the operator on duty. The work of CX7 was this year, as in the past, under the direction of Capt. W. A. Beasley, W9FRC.

Keeping schedules with some 36 stations in 22 different cities necessitates an accurate timing system, especially with the many opportunities for confusion existing when the station is handled by a large number of operators. To keep things absolutely straight a unique and mistake-proof clocking system was devised. This consisted of a seven-day clock with a tape attachment indicating a 24-hour day; the schedules were marked off on the tape, together with the call letters of the
of messages handled with any one scheduled station were those between CX7 and W9YAB, at Lawrence. Most of these messages were between members of the two Indian units at the encampment and their girl friends at Haskell Institute.

The crew at CX7 and the amateur stations who made the record-breaking traffic handling possible are to be congratulated on a splendid achievement, planned and executed in true ham style.

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THE TWO-UNIT TRANSMITTER

Either frame can be used alone in case a failure should develop in the other. Normally, however, the left-hand unit serves as an exciter for the high-power unit at the right.

scheduled station, his city, and the time allotted for that schedule. In addition, the tape was punched in such a way that a light would flash up during the last four minutes of the schedule, and one minute before the end of the allotted time a bell would ring. This arrangement effectually prevented running over time on skeds.

To keep all the scheduled stations within a small frequency band and thus facilitate locating them, crystals having frequencies between 3815 and 3845 kc. were loaned by the state to the amateur stations participating. All scheduled stations were therefore to be found within a 50-kc. band removed by about 200 kc. from the operating frequency of CX7. This frequency separation made break-in operation possible.

The activities of CX7 are not strictly a National Guard affair, but are sponsored by the Guard in the interests of developing close cooperation between the military organization and radio amateurs. The ham influence is responsible for the fact that this year, for the first time in its history, the Communications Section found it necessary to purchase a Vibroplex for the use of its radio operators! A large number of amateurs not on schedules used the transmissions of CX7 for code practice.

An interesting sidelight on this year's encampment is that fact that by far the greatest number

QST Index (1933) Now Available

The annual index to QST for 1933 (Volume XVII) 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.

Culver Reelected

Mr. S. G. Culver has been reelected director from the A.R.R.L. Pacific Division for the 1934–1935 term. Congratulations, O.M. Mr. E. J. Beall was also nominated but withdrew his name. Our by-laws provide that if there be but a single nominee, the Executive Committee is to declare him elected without balloting by the membership, and that is the case in this division. In the remaining areas that choose directors this year, however, there is competition, and ballots have been sent out. The results will be known about the end of the year.

56-Mc. World's Records?

The amateurs of the United States certainly started something when they pulled 56-mc. out of the laboratory and installed it as an invaluable field for short-haul communication. However, it has remained for the amateurs of England and the Continent to beat us at our own game. G5BY started this record business by pushing his signals a distance of 200 miles from a mere hillock 3870 feet high and by claim-
A TRANSMITTER can hardly be considered complete until it delivers a reasonable amount of power to an antenna. Hence the universal exciter units described in the October and November issues of QST are not what ordinarily would be considered complete transmitters—except for QRP work—and it is therefore logical to describe an amplifier which not only will work well with those units, but also will use them to their fullest capabilities. Since the output of the exciter units is just about right to drive one of the newer intermediate-power denser, C1, mounted edgewise with the “bottom” of the condenser facing left. The socket for the tube is mounted vertically from this condenser by a pair of brackets made from pieces of %4-inch by %2-inch strip brass, the brackets being fastened to the condenser by the two screws which hold the insulating strip to the end frame. This “204-A type” of mounting has been adopted to keep the r.f. leads short, without at the same time having the grid and plate circuits too near each other. The only precaution to be observed is that of keeping the plane of the tube filament vertical so tubes at good efficiency, such a tube is a reasonable choice as against the use of one or two 10’s. The amplifier described uses an RK-18 tube. Outputs of 35 to 50 watts can be expected from it on frequencies from 1.75 mc. through to 14.4 mc., assuming rated input to the tube.

The advantages of the circuit used are to be described in a later issue, so this article will be confined to the constructional and operating details which apply to the unit shown in the photograph. The general construction of the amplifier is similar to that of the exciter unit described in November QST, the two having been made to operate together as a complete transmitter. The baseboard measures 7 by 20 inches, and is fitted out with wooden runners underneath to elevate it from the table or whatever the unit is placed upon. The physical layout follows the circuit diagram, Fig. 1, as nearly as possible. The socket into which the grid coil plugs is near the left-hand edge of the board, with a pair of miniature porcelain standoffs alongside to serve as input terminals. To the right of the coil socket is the grid tuning condenser and the filament will not sag and touch the grid. The stationary plates of C1 are connected to the grid prong on the tube socket; the filament leads drop down behind C1 to a pair of midget bypass condensers and thence through the board to the terminal strip on the rear lower edge. This strip, incidentally, is identical with the one on the exciter unit described in November QST.

The plate end of the tube is supported by a grid clip soldered to a piece of stiff bus wire which in turn is mounted firmly on the terminals of one set of stator plates of C2, the plate tuning condenser. This condenser is mounted in the same fashion as C1, except that the rotary plates face inward. Between C1 and C2 is the neutralizing condenser, C5. One terminal of this condenser connects to the second set of stator plates on C2, while the other goes to the stator plates of C1. The length of grid and plate leads with this arrangement is almost zero, and the neutralizing condenser leads are likewise quite short; both these features aid in suppressing any tendency toward ultra-high-frequency parasitic oscillations.

The plate coil, Lb, and antenna coupling coil,
L₄ rest on the bakelite rods to the right of C₄. These rods are mounted on midget standoffs to give the necessary clearance between the plate coils and the baseboard. The antenna tuning condensers, C₃ and C₄, stand vertically at the righthand edge of the board. The mounting pillars are underneath, and the machine screws holding the condensers in place run through the baseboard.

The grid-bypass condenser, C₅, and the plate r.f. choke are fastened to the under-side of the baseboard in convenient locations. That is all there is to the circuit.

**SOME OPERATING HINTS**

Complete specifications for five bands are given under Fig. 1. It will be well to pay careful attention to the construction of the plug-in grid coils, since the amount of excitation furnished to the amplifier tube will be dependent to a large extent on the constants of L₁ and L₄. Be sure that L₄ is wound at the filament end of L₁; if this is reversed, it is quite possible that the capacity between the two coils will upset the operating conditions and reduce the excitation. The specifications for L₄ should not be regarded as iron-clad, since the number of turns often can be changed to good advantage. In any event the exact number of turns will depend upon the type of exciter unit used to push the amplifier, and the mounting pillars are underneath, and the machine screws holding the condensers in place run through the baseboard.

The neutralizing condenser at about half scale, tune the resonance point, or can be found by touching a neon bulb to the plate of the tube. Having noted the resonance point, adjust the neutralizing condenser until no effect on the grid current can be observed as C₂ goes through resonance. When the amplifier is properly neutralized, C₃ can be swung over all but the portion of its scale near minimum capacity with no noticeable effect on the grid current; the number of turns which gives the largest grid current is right.

Bias may be supplied by a 90-volt battery or can come from the voltage drop through a grid leak. With 90 volts "C" or a 5000-ohm leak the grid current should be between 15 and 20 milliamperes. A combination of battery and leak bias can be used, if desired. In such case it is recommended that the leak be 2500 or 5000 ohms and that at least 45 volts of battery bias be used. With greater leak resistance or more than 90 volts battery bias the grid current will be smaller than specified above and vice versa. The optimum operating condition seems to be with about 100 volts bias, regardless of the method by which it is obtained. The bias furnished by the leak will be equal to the product of the leak resistance and the grid current in amperes.

Neutralizing can be carried out quite simply. Connect in the plate coil, L₄, for the band on which the amplifier is to work and, with the neutralizing condenser at about half scale, tune C₄ to resonance. This will be indicated by a flicker in the grid meter as C₄ passes through the correct tuning point, or can be found by touching a neon bulb to the plate of the tube. Having noted the resonance point, adjust the neutralizing condenser until no effect on the grid current can be observed as C₂ goes through resonance. When the amplifier is properly neutralized, C₃ can be swung over all but the portion of its scale near minimum capacity with no noticeable effect on the grid current; provided a condenser having good capacity balance is used. The capacity ratio between the two sections changes near minimum capacity with no noticeable effect on the grid current.

(Continued on page 70)
Convert 'Phone Monologues to Conversations

A Quick and Simple Break-In System for the 'Phone Station

By Clark C. Rodimon, Managing Editor*

WHEN is a 'phone QSO not a monologue? Only when it is a conversation. And real conversation can be had only with an effective method of break-in operation. Break-in simply means a sure-fire, rapid method of cutting the carrier when no speech is being transmitted. Does this lend itself to snappy operating, no-loss transmissions and lessening of QRM? It does—and how.

Probably every 'phone man at some time or other has marvelled at the snappy operating which goes on among the airway operators just below 3500 kc. The manner in which they dispatch information with an apparent minimum of effort and time is nothing short of marvelous to those who are used to nothing less than 5- or 10-minute, one-way contacts. These stations use a manually-operated “push-to-talk” system. The question naturally arises, “Why can’t such manually-operated break-in be adapted to amateur 'phone transmitters?” Various voice-operated electronic stunts, recalled as having been described in QST, would seem attractive; but they always struck the amateur as being unnecessarily elaborate and too complicated, what with extra tubes and sensitive relays being the order.

After a simple change at W1SZ we were ready with high hopes for our first break-in conversation. But it was at least two weeks of talking up the idea before we had our first real break-in contact. It happened one Saturday afternoon while working W2AND of Bohemia, Long Island (one of the stations to whom the system had been described previously). Then followed an hour and a half of conversation comparable only to a conversation over the telephone. Both of us were so enthused with the success of the scheme that we were reluctant to call a halt, but it was necessary at this end. W3NK of Cedarville, New Jersey, heard this QSO and immediately contacted W2AND with a demand to know how he could change his transmitter to work in the same manner. Within ten minutes W2AND and W3NK were hitting it off in the fashion previously described. Later on W1SZ joined in for a three-way break-in contact. Since that time these stations have used it continually and find it of considerable interest to practically every station contacted. Its simplicity appealed to all as well as its practicability.

While all the advantages of this system have not, by any means, come to light in practice as yet, numerous advantages have appeared from the first. As the system is manually-controlled by a small spring switch at some handy spot in front of the operator (W3NK uses a foot pedal), it is necessary only to hold the switch closed while talking, and the moment talking ceases, allow the switch to release itself. The carrier is on the air only while the button is pressed and there is talking. It’s simply a matter of co-ordinating the hand and the jaw. Immediately the switch is released the carrier goes off the air and one is ready to listen. Thus the station being contacted can break in with his comments during any interval. Every contact is “100%” and the usual 5-minute one-way transmissions, often lost because of interference, are a thing of the past. QRM is lessened to a great extent and much power and wasted speech are saved. Inspector Sterling, when told of the idea, remarked that it certainly would go a long way towards eliminating QRM on the ‘phone bands.

There are several ways of accomplishing the end and we shall describe the simplest first. Incidentally, the simpler the transmitter the simpler it will be to install break-in. First off, dig out the old telegraph key or “bug,” for it will make an excellent switch, and connect it in series with either the filament center-tap (cathode) of the crystal stage or in the high-voltage supply circuit of the oscillator. Thus, with the key open the crystal stops oscillating and there is no excitation on the remaining stages. Of course, it will be necessary to have some fixed or automatic bias on the remaining amplifier stages, to prevent plate current from rising excessively with excitation removed. Now to try it out: Tune in some 'phone station and, without touching the receiver, press the key and talk into the microphone. Either the system will work, or there will be considerable audio feedback from the speaker or head-phones to the microphone. If this audio howl is present when the carrier is not on it will be necessary to break the audio plate supply circuit as well as the r.f. If a double-pole relay is handy it can be put into use by having one set of contacts break the crystal circuit and the other set of contacts short the microphone transformer secondary or open the high voltage on some of the audio stages. It would be more preferable to do it this way than to cut the B supply on the receiver, since the latter is very likely to cause unpleasant clicks in the operator’s ear. The audio howl is
more probable when a speaker is being used than when with head-phones.

Although elaborate deviations from these primary suggestions may occur, regardless of the complications (in the most elaborate layouts) it should be remembered that the relay or relays must work from a single small push-button switch (or the like) which is convenient to the operator. Otherwise the full advantages of this break-in arrangement would not be realized.

We have known several operators who mentioned that they could use "break-in," but it was not of the "push-to-talk" variety in that they had to snap a switch to eliminate the carrier. It will be found operating a snap switch takes much too much time and that the switch one will finally end up with will have a spring release; that is, one merely releases the pressure on the switch to cut the carrier — and hear the answer to his question.

Remember that each station must sign his call at least every 15 minutes (when engaged in a QSO that lasts that long). It is not necessary to sign otherwise except when finishing the QSO, for "end of transmission."

Now, gang, just "press-to-talk."

QRR Log

Monday, August 21st. Heavy rains along eastern shore of Maryland, Delaware and Virginia.

Tuesday, August 22d. Rain increased, submerging streets.

Wednesday, August 23d. Northeaster was in full force, tearing everything before it. The Delmarva Radio Club met at Ed Thompson's Grill, moved W3CQS's transmitter to one of the booths there, it being the only place where power was available, and braved the fifty-mile gale in getting an antenna up. W3SN was contacted briefly, before his power went off. In Laurel, Del., E. L. Hudson of W3BAK found the weather too miserable to sell gas from his filling station, so he contacted W3AAJ early Wednesday morning, later working W3ZK with much press and other traffic. At 11:00 p.m. press was transmitted to W3AIS.

The Tidewater section of Virginia was struck equally hard, an eighty-mile wind costing the lives of 15 and $10,000,000 damage in the Norfolk region. WIZZAR, operated by Lyman Rundlett on the U.S.C. & G. Survey Ship Oceanographer, tied up at the Naval Base, was the only station able to handle traffic for the region, having its own power. On Wednesday WIZZAR worked W3FJ, W3BVG, W3ZD, W9ILH and W9FJW. W3AAJ organized an efficient inter-Virginia traffic net during this period.

Thursday, August 24th. W3CQS established its first workable contact with W9CVW at 3 a.m., the operators working in their bare feet with inches of water on the floor. W2BPY, W3QV, W3GX (op'ed by W3CL) W3ZD, WWB (an emergency battery station manned by officials of the Federal Radio Commission at Fort McHenry), took press and official and personal emergency traffic. At 5 p.m. Western Union had a wire going, so W3ADP, W3GE and W3VJ, who with the owner had manned W3CQS, called it a day after 36 hours continuous work. Meanwhile, W3BAK at Laurel worked W3ZD and W32K, handling press and Western Union messages. WIZZAR worked until noon Thursday with W3CA. The storm had ceased, the sky was clear, but the water was still high and roads impassable, so traffic flowed until late Thursday night.


Sunday, September 3d. Two tropical storms, each of hurricane intensity, struck Florida and Texas Sunday evening. Early that day F. C. Elliott, chief engineer of the Internal Improvement Board, who is in charge of evacuation in the event of storm, called on S.M. Douglas, W4ACB, and asked for hourly storm reports. With W4AU, also of Tallahassee, acting as alternate, these reports were received from southern Florida stations. W4WF transmitted first press news of hurricane imminence through W4KU. W4NN and the Florida emergency net functioned thoroughly.

Monday, September 4th. Early Monday morning all communications in Florida were wiped out. The AP called on W4ACB for information concerning the extent of the damage in southern Florida, which was secured largely through W4CJR. Later, W4SC was put on the air for emergency traffic. W4CHM and W4BPA handled press.

Monday morning Corpus Christi, Texas, was astir. A storm of great intensity was in the Gulf, and it seemed certain that it would hit that region. By noon the city appeared to be deserted, except for the Corpus Christi Radio Club, which had W5BXX on the air at the High School throughout the night, with W5AQQ, W5MS, W5HP, W5CHF, W5BKG and W5BZW as operators. W3TG and W3BTK were worked Monday evening. Meanwhile, W3ALV had installed his
station in the Missouri Pacific baggage room, working W5OW and W5BTK.

In Houston, watches were maintained at W5TG, W5AFV and W5VB long after the actual storm danger had passed. W5CN A at Harlingen worked W5CA, W5BBR at McAllen and W5BZO at Bay City, also in the path of the storm, were active.

In Brownsville, W5CKS was on the air with the assistance of W5CGO, W5CZF, W5DQA, W5BQI, W5BIG, W5ATU and Dave DeKorte’s gas engine. W5PJ took the first message announcing the disaster to the outer world, which was broadcast by WFAA. W5BFI and W5CTW did the principal relaying. W4OG, W5ASX, W6GAL, W7PY, W9DFY and W2ZFP did commendable work in clearing the air for the QRR traffic.

Tuesday, September 6th. The eastern tip of the richly developed Rio Grande Valley was the scene of a roaring tropical hurricane which took the lives of 26 and caused $20,000,000 property damage. At 5 a.m. W5ALV rescued eleven passengers of Missouri Pacific train No. 215 which was marooned between Corpus Christi and Odem, later working W5OW, W5BKJ, W5MN and W5BII. W5BXX contacted W9USA at 4:30 a.m., with traffic. Preparations were made to take a portable transmitter and receiver to the stricken area, in a special car filled with nurses and doctors, but this was abandoned after it was learned that W5OW of Sam Houston had left for that area with an Army transmitter.

Communications with St. Augustine being washed out, the Adjutant General of the Florida National Guard called on W4ACB to handle traffic to that point for the head of the Relief Board, from the Governor’s secretary.

Friday, September 15th. Sweeping up the Atlantic coast came a terrific storm, probably of greater intensity than that of ten days before. Amateurs in Norfolk and Portsmouth, warned by the Weather Bureau, rigged emergency gear and stood by. W3NO, W3BPA, W3CLX, and W1ZZAR were on the job for WU, Postal, press and officials.

Saturday, September 16th. At 1:30 p.m. a change in barometric pressure indicated that the storm would head out to sea before passing Virginia capes, and danger to Norfolk was averted. The above operators ceased their 38-hour watch, along with W3COO, W3AUG, W3MT, W3MQ, W5SN, W2AJF (for C.B.S.), W2BGO, W5EIK, W4EG, W3QV, W3FJ, W3CQS, W3ADP and other scheduled stations.

—C. B. D.

Learning the Code

The A.R.R.L. Code-Practice Program—Schedules of Code Practice Stations

A SPEED of at least ten words per minute (five characters to the word) in both receiving and sending must be attained before an Amateur Radio Operator’s license can be secured.

To assist newcomers in learning the code the A.R.R.L. during the active radio season conducts a program of code practice from various amateur stations throughout the United States. This program is conducted in the 1715-2000-kc. band. Most of the stations use a combination of ‘phone and code in transmitting code practice, ‘phone being used for announcements and a buzzer or audio oscillator keyed in front of the microphone furnishing the actual code signals. A list of the stations whose operators have volunteered their services as “code practice senders” is given here, together with locations, operating frequencies, and days and hours of transmissions.

Stations listed would be pleased to hear from listeners, and to render as much additional help as possible. They are particularly interested in receiving reports on how their signals are received, what benefits are obtained from their transmissions, and what progress their listeners are making in learning the code. Correspondence requiring a reply should be accompanied by a stamped addressed envelope. If you cannot locate the complete address of any of the stations in your call book, you may send your letters care of the A.R.R.L. Communications Department.

Attention is called to the schedule of transmissions “To Radio Amateurs” from the League’s Headquarters Station, W1MK.

Sunday 8:30 p.m. E.S.T. 3825 & 7150 kc.
Monday Midnight 3825 & 7150 kc.
          10:30 p.m. 3825 & 7015 kc.
Thursday 8:30 p.m. 3825 & 7015 kc.
          Midnight 3825 & 7015 kc.
Friday 8:30 p.m. " 3825 & 7150 kc.
            10:30 p.m. " 3825 & 7150 kc.

Many beginners put too much stress on their “sending ability” and not enough on their “copying ability.” Master the art of “receiving” before you try to “send” at top speed. A good operator can copy as fast as he can send. Do as much listening to actual signals on the air as possible. Try to copy as many letters as you can. Write down every letter or numeral you recognize. Keep at it regularly. Soon you will find yourself getting whole words, and later whole sentences. Then you will find your speed increasing.

Learning by actual listening on the air is in many ways preferable to learning by the use of a buzzer.
as it accustoms you to copying through interference, static, fading, and so on.

Too many beginning amateurs become discouraged at their progress in conquering the code. To them (and to all other newcomers) we say, "Have patience!" Don't expect to learn it all in one day. Take things easily. Be optimistic! You will be surprised at your progress. If possible, get some one to practice with you. A well balanced program for the individual starting to learn the code might be to divide time between (1) one or more of the stations sending code practice on the 1715-kc. band, (2) periods of listening to general amateur work on any of the bands, and (3) periods of practice with a buzzer and key, preferably with another person.

Schedules of additional code practice stations will appear in future issues of QST as they volunteer their services. Any amateur operating a transmitter in the 1715-kc. amateur band who is willing to devote some of his time to the A.R.R.L. program of code practice transmissions, is invited to write the League's Communication Department, West Hartford, Connecticut.

### 1715-KC. STATIONS SENDING CODE PRACTICE

<table>
<thead>
<tr>
<th>Station</th>
<th>Location</th>
<th>Frequency</th>
<th>Days</th>
<th>Hours (Local Time)</th>
</tr>
</thead>
<tbody>
<tr>
<td>W1ASZ</td>
<td>Pawtucket, Rhode Island</td>
<td>1925 kc.</td>
<td>Tuesdays</td>
<td>7:00-8:00 p.m.</td>
</tr>
<tr>
<td>W1BTL</td>
<td>Plymouth, Massachusetts</td>
<td>1985 kc.</td>
<td>Tuesdays, Fridays</td>
<td>7:30-8:00 p.m.</td>
</tr>
<tr>
<td>W1DFT</td>
<td>Windsor, Connecticut</td>
<td>1830 kc.</td>
<td>Mondays, Tuesdays, Thursdays, Fridays, Saturdays</td>
<td>7:15-8:00 p.m. 4:30-5:00 p.m.</td>
</tr>
<tr>
<td>W1DND</td>
<td>South Boston, Mass.</td>
<td>1875 kc.</td>
<td>Mondays, Fridays</td>
<td>8:00-9:15 p.m.</td>
</tr>
<tr>
<td>W1DOF</td>
<td>Lynn, Massachusetts</td>
<td>1888 kc.</td>
<td>Tues., Fri., Sun.</td>
<td>6:00-7:00 p.m.</td>
</tr>
<tr>
<td>W1SN</td>
<td>Medora, Massachusetts</td>
<td>1890 kc.</td>
<td>Mondays, Thursdays, Sundays</td>
<td>6:45-7:45 p.m. 7:00-8:00 p.m. 8:00-8:30 p.m.</td>
</tr>
<tr>
<td>W2QY</td>
<td>Cornwall-on-Hudson, N. Y.</td>
<td>1950 kc.</td>
<td>Mon., Wed., Fri.</td>
<td>5:00-6:00 p.m.</td>
</tr>
<tr>
<td>W4BHR</td>
<td>Warren Plains, N. C.</td>
<td>1870 kc.</td>
<td>Wednesdays</td>
<td>6:30-7:15 p.m.</td>
</tr>
<tr>
<td>W6CTT</td>
<td>Los Angeles, California</td>
<td>1885 kc.</td>
<td>Fridays</td>
<td>7:00-8:00 p.m.</td>
</tr>
<tr>
<td>W6HS</td>
<td>Larkspur, California</td>
<td>1995 kc.</td>
<td>Mon., Wed., Fri. Daily exc. Sun.</td>
<td>3:30-4:30 p.m. 8:30-9:30 p.m. 10:30-11:00 p.m.</td>
</tr>
<tr>
<td>W8ARF</td>
<td>Toledo, Ohio</td>
<td>1855 kc.</td>
<td>Tuesdays, Thursdays, Saturdays</td>
<td>10:30-11:00 p.m.</td>
</tr>
<tr>
<td>W8CJQ</td>
<td>Sodus, New York</td>
<td>1752 kc.</td>
<td>Mon., Wed., Fri.</td>
<td>7:00-9:00 p.m.</td>
</tr>
<tr>
<td>W8CVF</td>
<td>Baldwin, Michigan</td>
<td>1912 kc.</td>
<td>Thursdays</td>
<td>8:00-8:30 p.m.</td>
</tr>
<tr>
<td>W8DDX</td>
<td>Toledo, Ohio</td>
<td>1811 kc.</td>
<td>Wednesdays</td>
<td>3:00-4:00 p.m.</td>
</tr>
<tr>
<td>W8FAZ</td>
<td>Cleveland, Ohio</td>
<td>1775 kc.</td>
<td>Fridays</td>
<td>9:00 p.m.</td>
</tr>
<tr>
<td>W8FK</td>
<td>Cleveland Heights, Ohio</td>
<td>1950 kc.</td>
<td>Tuesdays, Wednesdays, Sundays</td>
<td>7:30-8:00 p.m. 7:00-7:30 p.m. 12:00 Noon-1:00 p.m.</td>
</tr>
<tr>
<td>W8FO</td>
<td>Toledo, Ohio</td>
<td>1825 kc. 1760 kc. 1970 kc.</td>
<td>Fridays, Fridays, Tuesdays, Thursdays</td>
<td>10:30-11:00 p.m. 11:00-11:30 p.m. 8:00-8:30 p.m.</td>
</tr>
<tr>
<td>W8GJM</td>
<td>Pittsburgh, Pennsylvania</td>
<td>1900 kc.</td>
<td>Sundays</td>
<td>2:00 p.m.</td>
</tr>
<tr>
<td>W8WE</td>
<td>Mansfield, Ohio</td>
<td>1900 kc.</td>
<td>Saturdays</td>
<td>7:00 p.m.</td>
</tr>
<tr>
<td>W9BSP</td>
<td>Olathe, Kansas</td>
<td>1908 kc.</td>
<td>Daily</td>
<td>7:30-8:30 p.m.</td>
</tr>
<tr>
<td>W9GFS</td>
<td>Evansville, Indiana</td>
<td>1948 kc.</td>
<td>Saturdays</td>
<td>7:00 p.m.</td>
</tr>
<tr>
<td>W9IOB</td>
<td>Richmond, Indiana</td>
<td>1780 kc.</td>
<td>Tuesdays, Thursdays, Saturdays</td>
<td>8:00-9:00 p.m. 10:30-11:00 p.m.</td>
</tr>
<tr>
<td>W9MKS</td>
<td>Granville, Illinois</td>
<td>1950 kc.</td>
<td>Tuesdays, Wednesdays, Thursdays, Saturdays</td>
<td>6:30-7:30 p.m.</td>
</tr>
<tr>
<td>W9NBZ</td>
<td>Terre Haute, Indiana</td>
<td>1805 kc.</td>
<td>Daily except Sat. and Sun.</td>
<td>6:30-7:30 p.m.</td>
</tr>
</tbody>
</table>

December, 1933
THE Federal Radio Commission is a pyramid of divisions. When amateur regulations needed recently to be revised, the work was delegated to Lieut. E. K. Jett, chief of the commercial communications section of the Engineering Division, by Dr. C. B. Jolliffe, the Commission's chief engineer. None better qualified could be found than this veteran of twenty-two years (out of forty) in the government service, eighteen in the Navy having seen him rise from apprentice seaman to lieutenant and officer in charge of the Navy Department's Radio Central, from where he went to the F.R.C. as senior engineer in 1929. His is now the responsibility for practically everything in radio outside of broadcasting. After months of work with other F.R.C. divisions and A.R.R.L. officials, the new amateur regulations were written and officially approved, and October 1st they went into effect.

TYPICAL of the aptness with which A.R.R.L. directors, as a class, exemplify the qualities of their regions of the country is that genial New Englander, George W. Bailey, W1KH, director of the New England Division. Born at Quincy, Mass., May 14, 1887, he emerged twenty years later as treasurer of the Harvard class of 1907. He is now the responsibility for practically everything in radio outside of broadcasting. After months of work with other F.R.C. divisions and A.R.R.L. officials, the new amateur regulations were written and officially approved, and October 1st they went into effect.

IT WAS at WNY that he learned to use a bug, and at New York Law School that he learned to practice law, in which activity he still indulges when ham radio calls and he feels desirous of eating. Bernard J. Fuld, W2BEG, director of the Hudson Division, A.R.R.L., has some other fairly abstruse hobbies, too, such as sociology in general and penology in particular. Nonetheless, he holds a Class-A amateur ticket and a first class commercial with 'phone endorsement. Born in New York City in 1906, he moved to Brooklyn, with the aid of his parents, at the age of one year. There he lives now, a lonely bachelor, except for his radio, his violin, and a Boston terrier named Rex. Commissioned an ensign in the Naval Reserve, his “going to sea” usually takes the form of long automobile trips. Horseback riding is his sole sport; upholding the under-dog his chosen mission in life.

THERE'S been a little excitement in Chicago this summer. Some thirty million people traveled to town to see a Fair. Maybe ten percent of them saw the amateur radio exhibit in the Travel & Transport Building, a high-class stock pavilion there on the grounds. Anyway, there were enough to gladden the heart of Fred Hinds, chairman of the World’s Fair Radio Amateur Council, and his fifty or more minions. Fred’s been managing the hams of Chicago and all of Illinois since 1928, when he was elected SCM, and as president of the C.R.T.A.; before that time he was ORS, RCC, and PRR. He lived in Galesburg, Ill., for one year, his first, that of 1901. Then he moved to Berwyn and has managed to stay there ever since, accumulating a YF (W2CC’s sister) in 1927 and a YL op in 1932, as well as the calls W9APY and W9WR. His job is printing, commercial and advertising—and ham QSL cards. His hobbies, stamp collecting, model boats and art work.
The World's Fair Radio Amateur Exhibit

By Wallace F. Wiley, W9AZI*

We have all wondered how many hams—and others, for that matter—who visited A Century of Progress in Chicago, failed to find W9USA and the Amateur Exhibit. When you inquired, were you sent to the Electrical Building, to the top of the Sky Ride, or back of the Hollywood concession? Actually, W9USA and the Exhibit were located on the second floor of the Travel and Transport Building toward the south end of the grounds—almost as far from the Electrical Building and its bedlam of interference as possible and still be within the fence.

Even if the place was hard to find, about 4000 amateurs signed in the registration book—nearly 10% of those licensed in the United States. These were not all W's. The book shows registrations from Barbados, Canada, Cuba, Mexico, Argentina, Alaska, Porto Rico, Panama, Newfoundland, Hawaii, Guam, New Zealand, Australia, England, France, Austria, Japan and China. And if we manage to catch a visiting ham from Africa before the Fair is over, we are thinking of applying to Headquarters for a WAC certificate for the book.

That book contains many well-known signatures. Among them are those of our League's President, Mr. Hiram Percy Maxim, W1AW, and Senator Guglielmo Marconi. The total list of prominent amateurs registered would require several pages in QST. Many of the old-timers, now off the air, are also registered. And, of course, there are included the various signatures of John Q. Public and family who did not know a Ham Register (very plainly marked) from a grid-leaf. Rather than be impolite and refuse these last permission to register, we allowed some of them to sign. The column in the book marked "Call" had them stumped, and the results in many cases were startling. Some took a look at the signature above and mixed figures and numbers indiscriminately to fill this space. COD, FOB and BYD were also much in evidence. And one YL, after considerable thought, recorded her phone number.

One B but D YL asked if this book was where the amateurs registered. And the following conversation ensued. "Certainly. Are you an amateur?" "Yes." "What is your call?" A blank look and the scratching of the pen. "Do you have a transmitter?" Another blank look and more scratching. "What is your station?" "Oh, we listen to KYW." As most amateurs know—the W's at least—considerable traffic was handled from the Exhibit by W9USA. At the time this was written (the middle of October) a great many more than 10,500 messages had been received at the information desk. The figures 10,500 represent those which were deemed sufficiently proper to be numbered. And of this number many were discarded because of insufficient address, illegibility, etc.

Much of the traffic handled was of considerable importance. We received a message one morning which caused us to ask permission to page a man on the grounds through the Fair's PA system. Although the Fair had banned the use of the system for this purpose some time before, they made an exception in this instance. The man was located, came to the Exhibit for the message, and immediately returned to his home town.

An international exposition—a World's Fair—A Century of Progress—and amateur radio not represented? Never! cried Chicago amateurs, and proceeded to organize the World's Fair Radio Amateur Council. In two thousand feet of exhibit space in the Travel and Transport building were secured, exhibit space was sold to 25 manufacturers of amateur gear, apparatus of historical interest was gathered, high-powered modern transmitters were designed and built to operate under calls specially assigned by the Federal Radio Commission—and it only remained for 4000 hams, 400,000 of the general public, to see, to admire, to marvel, for five well-filled months of crowded activity.

In charge of this spectacular accomplishment was Fred J. Hinds, General Chairman of the World's Fair Radio Council. With him were associated many of Chicago's prominent amateurs, including a representative from every active radio club in the Chicago area. The work of the Council was organized under committees, each headed by a capable man. C. W. Glaser gave unstintingly of his time and experience in organizing the Exhibit, with W. F. Wiley, W9AZI, carrying on its active management through five months of existence. In charge of W9USA, USB as Communications Director was J. Edward Wilcox, W9DDE, with Operations Manager Laddie J. Smach, W9CVH; Traffic Manager C. E. Miller, W9VS and Chief Operator George Makl, K7HV. Fred Schnell, W9UZ, headed the Technical Committee, assisted by Dave Abernathy, W9MYH; Ralph Briggs, W9EMD; George Dannemann, W9JH; Louis Jamachei, P. D. Lamb, W9CIT; Edie Russell, W9HRX; C. E. Fiske, W9CB and E. R. Word, W9BVY. Other committees were Publicity, Wm. E. Wight, W9AAW; Convention, Wm. E. Schweitzer, W9AAW; Forester P. Wallace, W9CRT and Art Ageeim, W9CN. The Secretary of the Council was W. D. Ferrell, W9QY, its advisor, Marcus Hinson and H. D. Hayes.—EDITOR

*Exhibit Manager.
Several runaway boys who had come to the Fair sent messages back to their folks advising of their whereabouts and safety. Many messages were handled for the officials of A Century of Progress. But ordinarily the messages consisted more or less of notifications of safe arrivals, local address and change in plans.

Since one of the primary purposes of the Exhibit was to acquaint the public with amateur work—or at least to let them know there was such a thing—we expected some queer questions, but not the flood that was loosed on us. For example, after reading the sign and being given a long verbal explanation of the workings of ham traffic, a lady wrote a message and asked when it would be sent. After a look at the schedule sheet, the reply was:

“Eleven-thirty p.m.”

“But my folks won’t be listening at that time, and so they can’t get it.”

Followed some more explanation. And then:

“Oh, it won’t go over the NBC or Columbia? Well, my folks wouldn’t get it anyway, as they never listen to anything but NBC or Columbia.”

Or, take this one, which has been sprung several times:

“Do you have any samples of short-wave radios to give away?”

Or:

“You don’t know Johnny Jones in Spudtoe, Kansas? That’s funny. He has a short-wave receiver.”

The general public has shown considerable interest in the Amateur Exhibit. For the first two and one-half months of the Fair, every person who entered the Exhibit was counted, and we found we were drawing approximately 2% of the total gate of the Fair each day, which means that up to the first of October about 360,000 people had seen the Exhibit. When a sufficient number of attendants were on the floor, we guided small groups about the Exhibit and explained things in detail. In this way we tried to give them a good idea of what amateur work consisted, and the purpose of the apparatus used.

Without exception, this personal contact was greatly appreciated by the visitors; they were attentive and always interested. Sometimes a group would spend several hours in the Exhibit and absorb every bit of knowledge we could give them. Old, young and middle-aged, as soon as they saw what a fascinating hobby ham radio could be, fell like the proverbial ton of brick. Many an elderly couple, living alone and wanting a hobby of interest to both, have walked out with copies of “How to Become an Amateur,” the Handbook, and QST. And, in at least one instance, they returned a few weeks later with questions concerning the refusal of the detector of their first short-wave receiver to oscillate.

One surprising thing about the attendance was the number of teachers who visited us, and who made many notes on all phases of short-wave work. Not only the men teachers, but the women as well. Upon inquiry it developed that these teachers felt they were unable to cope with the knowledge their pupils were showing in this field and were determined to keep at least one jump ahead of them—if possible.

As far as the public is concerned, the Exhibit has done two things. It has given our visitors the knowledge that radio does not start at 0 on the dial of their BC receiver and end at 100, and that the short waves are much more interesting than the broadcast band. It also has created a large number of will-be hams.

Five months is a long, long time to keep a ham shack running with volunteer help. This is especially true when the place is open to the public and it is necessary to handle the large number of visitors and messages that we have had. It would have been an utter impossibility without the generous participation by the hams in the Chicago area who have stuck through these long weeks on the floor and at the key; or without the splendid cooperation given us by Headquarters and QST. Neither could we have completed the job without the help of the boys on the other end of the QSP’s who completed the traffic moving job; nor without the manufacturers who were interested.
enough in amateur work to furnish us with materials that were otherwise unobtainable. Our sincere thanks and 73 to all of these.

We have learned many things during these months. If this gang had the same job to do over, there would be many changes in plans and procedure. We have had to forget a lot of things we thought we knew, and in their places have received a lot of new ideas. But we have not yet found the correct answer to give when a sweet young thing approaches the information desk and asks, “Please, may I have an audition?”

* * *

W9USA—1000 Watts—7040 Kc

By F. H. Schnell, W9UZ*

RELIABILITY and simplicity are two desirable characteristics in any type of radio transmitter, especially in an amateur transmitter which is subjected to operation by many different operators. W9USA is just that kind of transmitter. It is one which had to be ready for operation twenty-four hours of the day if necessary, and it had to be free from the usual “tinkering” which often takes place before starting operation for each day. It had to be simple in construction and easily accessible for the benefit of the visiting amateurs who are interested in seeing “what is on the inside.” Naturally, it also had to be somewhat along lines that would be representative of the type of transmitter almost every radio amateur would like to own, and it had to use the maximum power allowed by the regulations. Nothing else would do.

Chosen for the actual building and assembly of W9USA was Dave Abernathy, W9MYH. Dave not only knew what was wanted but he had had the necessary wide experience. He was familiar with all kinds of layouts for various types of transmitters. He knew how to go about the job and he did a splendid piece of work.

The crystal stage, using an RCA 210, has its own power supply which delivers very close to 500 volts to the plate at 30 ma. The fundamental frequency of the crystal is 3520 kilocycles and, in spite of Mr. Bliley’s warning about using too much current on the crystal, we are working this crystal at least twice as hard as recommended and it has yet to show signs of failure. Sure, it gets hot, but we want it hot—and remember that W9USA operates from six to ten times as much as the average amateur station.

To the doubler also is an RCA 210 and this stage is followed by an RCA 860. Up to this stage the transmitter may be considered something along the type of the desirable average since the output of the RCA 860 can be coupled to an antenna system. However, we go one step more; to the final stage which is two RCA 852 tubes in push-pull. This stage operates on about 2500 volts at about 400 ma. and the plates of the RCA 852’s remain cool.

The antenna system is of the Zepp type. The feeders being 92 feet long and the radiator 66 feet—not counting the stretching. Reception at W9USA is far from the best—but reasonably good signals are copied with little difficulty. All reception has been done with National FBX single-signal superheterodyne receivers and the Silver Ham Super.

THE MAIN TRANSMITTER—W9USA

A fellow worker glancing over W4ACB’s shoulder while he was reading the RM Bull wanted to know what team was leading in the American Radio Relay League!!!

S.S. Filter Crystals That Won’t Work

Attention is called to a peculiar cause of poor filter operation in some s.s. receivers. A number of cases have been traced directly to the fact that the owner screwed down the cover of the crystal mounting too tightly. This can cause pressure on the top plate of the crystal mounting with consequent bending of the top plate and excessive damping of the crystal. Since the cover must be left loose and since it is natural for the operator to screw it down tight, this trouble undoubtedly has been responsible for considerable seemingly poor i.f. alignment, lack of sensitivity and failure of the crystal to oscillate in a test circuit.

December, 1933
Further Licensing Notes

A Correction

IN PREVIOUS notes on this subject published on page 31 of QST for November, and again on page 50 of the same issue, I made reference to the “proof of activity” which is required before modification or renewal of either operator or station license. I said that, since this had to be done during the last three months of the life of the license, and the new application had to be filed not later than sixty days before expiration, this demonstration of activity had to be made during the one month period between ninety­days-before-expiration and sixty­days-before­expiration. It has been brought home to me that I was thoroughly wet about this, through confusion with some earlier draft of the regulation. Sorry, fellows. Rule 402 plainly permits this proof of use to be made during the three months prior to the date of submitting the application for modification or renewal.

Have you seen the new license? Funny looking thing. It is a piece of light­weight white cardboard, 3 inches by 5 inches, printed in black ink, station license on one side, operator license on the other. It may be trimmed to 2 ½ inches by 4 inches and then is the same size as driver’s licenses, membership cards, etc. After years of engraved operator certificates this is certainly quite a change. We shall particularly appreciate, however, the portability of the operator authority.

Every ham used to tack up or frame his two licenses and his A.R.R.L. membership certificate. Wonder if we might not now just as well change the A.R.R.L. membership attestation to a traveling card, to keep pace with the F.R.C. tickets?

The Commission’s Rule 221b, called 221 (3) at the time the regulations were first published in QST and the License Manual, provides that an operator may continue operating not longer than thirty days without having his operator license in his possession, if it has been mailed in for endorsement or other change (provided, of course, the license doesn’t expire within that period). A.R.R.L. has pointed out to the Commission that this length of time is insufficient in the case of amateurs in Hawaii and Alaska, and sometimes a pretty close squeak in the case of the West Coast. The Commission accordingly has changed this rule so that the figure now reads sixty days.

An amateur has old­fashioned licenses, separate for station and operator. He desires a second station license in his school city or summer place. He wonders whether to apply only for a second station license and merely mention that he is already a licensed operator, or whether he is obliged to surrender his existing operator license and have it reissued with the new station license in combination form. The instructions accompanying the new amateur application form state that any applicant holding a valid amateur operator license must submit that license with any new application in order that, to the extent appropriate, the old license may be canceled when new or superseding licenses are issued on the new combined form.

Should a person apply only for a station license, leaving the operator questions blank, the Commission would return the application, as it is impossible to secure station license without becoming, or proving that one already is, an amateur operator.

Rules 405 and 406 permit the issuing of amateur operator privileges to the holders of certain other types of license without complete examination. Some applicants apparently have thought that under this recognition of other licenses, no personal appearances were necessary, regardless of where the applicant lives. This is not true. A Class­A applicant who qualifies under Rule 405 and who is not a licensed amateur operator must appear in person for the code test and the remainder of his examination; and personal appearance is also required for the Class­B applicant under Rules 405 or 406.

Commission Rule 213 cites the limiting conditions under which the Commission will authorize remote control. On October 3d the Commission amended this rule from the form recently published in QST to as to delete the limitation to one­kilowatt stations and to a separation between control point and transmitter of not over five miles.

The Commission has adopted an addition to Rule 23 permitting the use of radio stations during emergencies for communication with points other than those specified in the license, and stipulating the conditions to be met by stations performing such service. This applies primarily to such stations as, for example, broadcasting stations, which normally are not permitted to engage in any point­to­point communication. It is not necessary for amateurs to comply with this Rule 23 and send notices to the Commission when their stations are engaged in emergency communications. The amateur case is covered in our Rule 370. It has been suggested to us informally that the word “emergency” therein should be construed to mean major disasters, such as earthquake, flood, hurricane, etc.

Many applicants fail to understand the distinction between the terms “new,” “modification,” and “renewal,” which come into use in filling out the application form for either station or operator license. The Commission uses these terms as follows:

New
Any amateur’s first operator license.
Any license successor to a T.A.
Any other operator license issued on application lacking proof of use under Rule 402.

Any amateur’s first station license.
Any fourth license for an additional station (additional call) to be maintained simultaneously with the other.

Renewal
Any reissue in kind or equivalent, designed solely to overcome expiration, and issued as or before expiration on application showing proof of use under Rule 402.
Any reissue, not necessarily in kind or equivalent, but designed primarily to overcome expiration, and issued after expiration on application showing proof of use under Rule 402.

Modification
Endorsement of a valid operator license for higher class privileges.
Reissue of station license before expiration, on application showing proof of use under Rule 402, to authorize change of station location or of trustee­licensees.

(Continued on page 70)
A.R.R.L. Fourth All-Section Sweepstakes Contest

Big Annual QSO Party Dates Set as December 9th to 18th—All W, VE, K, KA, CM and VO Hams Invited to Take Part and Report—69 Certificate Awards to Section Winners—Affiliated Radio Clubs Holding Local S.S. Contests With Additional Awards

By F. E. Handy, Communications Manager

ANY ham with an amateur station in the U.S.A.1 or Canada can take part. Each station participating "works" as many other stations as possible in the contest period. In operating, the idea of making contact with amateurs in as many different A.R.R.L. Sections2 as possible is also kept in mind. As necessary proof of "solid" QSO, a short message will be exchanged. Two week-ends and the time between them, nine days in all, will be available for participation. Fullest operating enjoyment is assured. Ask any amateur who took part last year!

The 1932 contest was the biggest national contest in A.R.R.L. history to date, a story of more taking part, larger scores, more fun. Letters urging this year's "S.S." have in many cases put forward December as the month, so December it is. To prevent misunderstanding of the starting and ending time of our 1933 Sweepstakes, consult your local time in the following table. The contest runs from Saturday, December 9th, through Sunday, December 17th (into early Monday, December 18th).

<table>
<thead>
<tr>
<th>Time</th>
<th>Starts</th>
<th>Ends</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.S.T.</td>
<td>Dec. 9th, 5:00 a.m.</td>
<td>Dec. 18th, 5:00 a.m.</td>
</tr>
<tr>
<td>E.S.T.</td>
<td>Dec. 9th, 4:00 a.m.</td>
<td>Dec. 18th, 4:00 a.m.</td>
</tr>
<tr>
<td>C.S.T.</td>
<td>Dec. 9th, 3:00 a.m.</td>
<td>Dec. 18th, 3:00 a.m.</td>
</tr>
<tr>
<td>M.S.T.</td>
<td>Dec. 9th, 2:00 a.m.</td>
<td>Dec. 18th, 2:00 a.m.</td>
</tr>
<tr>
<td>P.S.T.</td>
<td>Dec. 9th, 1:00 a.m.</td>
<td>Dec. 18th, 1:00 a.m.</td>
</tr>
</tbody>
</table>

THE CONTEST PERIOD

"CQ SS CQ SS CQ SS de W... W... W..." is suggested as a special call to indicate stations looking for contacts during the Sweepstakes contest. During the active operating hours a single snappy "CQ SS" will bring results I contacts during the Sweepstakes contest. During the active

THE GENERAL CALL

As contacts are made and a score built up you keep a list of stations, their A.R.R.L. Section and the number of points for each QSO. Each station (c.w. to c.w. or 'phone to 'phone) worked can contribute a possible two points. A message received counts one; a message sent counts one. More messages may be handled, but add no more to the score. At least one message must be handled between two stations as "proof of QSO" before points or Sections can be claimed. These exchanges have been simplified to the minimum for "proof of contact" at the same time they enable operators to keep in form by permitting short snappy texts. C.W. telegraph to 'phone station counts double credit...a possible four points per QSO.

At the end of the contest add all the points. Count the number of different A.R.R.L. Sections worked (those with which at least one message has been handled). Multiply the sum of your points with individual stations by this number. There are 69 Sections in the League's organization so this is the greatest possible multiplier. Keep the summary of your score in the form suggested. List all operators whose work at your station is responsible for any part of the score.

PHONE WORK

1 Phone possibilities are unlimited. In the last contest W8ALC worked 43 Sections on voice, running up a score of 9374 in the S.S. This year the scoring rule is changed so that every 'phone to c.w. station QSO gives twice the credit,

2 There is no point in working the same station more than once in the contest period if two points have been earned by exchanging messages. If but one point is made the first time you can add a point by working this station again and handling a message in the opposite direction.

3 The highest individually-attained score of any one of the operators of amateur stations having more than one operator is the official score for such a station. The summary of score must show all stations worked by all operators however, underlining, or circling the entries of stations and or Sections that cannot be scored in the official contest. Awards will be made on the official total and will be made to the individual operator accredited with this total. To show the possible score that can be built up by several operators at one station, such scores (all Sections listed by all points listed) may be shown parenthetically after the "official" score that counts toward a possible award.

December, 1933

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for both operators (3 points for msg. sent; 2 points for msg. received... a possible 4 points). What 'phone operator can break W8ALC's record?

LOW POWER POSSIBILITIES GOOD

Real operating is more important than power. Last year with a single 48 with 400 watts W8APQ had a score of 16,000 points. As is the previous S.S. one of the winners used a 01A transmitter with 190 watts B supply. So don't let uncertainty about your "power" deter you from getting in on a good operating opportunity. Let us know who can make the best record with low power. Report all work.

PROOF OF QSOs

Except when regular amateur traffic is sent or received (which it should be when it can be routed in the proper direction to assure promptest delivery), "contest messages," each of at least five words text, may be sent to create proof of solid contacts. The test messages, as with all messages must be sent complete, in proper A.R.R.L. form with city, station, number, date, address, text and signature. Those who take part may report improper message sequence or abbreviations in texts (abbreviated words are not ethical direction to assure promptest delivery), contest messages, crediting messages. Example of a message in A.R.R.L. form:

Ht msg fm Linden, N.J. WALK NR 898 DEC 10

To C. B. Anderson, W6CDA

3865 A Nicot Ave

Oakland Calif

What days do you work Byrd expedition KJTY an 85Q50 kcs

C D Tobin

(Northern New Jersey Section)

Before each day's operating several different short test message texts can be written in use in swapping proof-of-QSOs in proper form. Progress of competitors can be discussed. A little humor and imagination inserted in texts (abbreviations in texts (abbreviations in texts)). Where Sections are smaller units than states, the name of the Section should be included after the signature in originated messages to assist participants in properly crediting messages.

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Volume Control in Terms of Decibels

In most amateur phone transmitters the voltage-divider type of volume control is used. A simple method of graduating this type of volume control in terms of decibels is as follows:

It is known that attenuation varies according to the following formula:

$$E_{\text{db}} = 20 \log_{10} \frac{R_1}{R_2}$$

But since the voltage drop across a resistance is directly proportional to the resistance we may write:

$$E_{\text{db}} = 20 \log_{10} \frac{R_1}{R_2}$$

where $$R_1$$ and $$R_2$$ are as shown in the diagram, Fig. 1.

For example, suppose we wish to make a voltage-divider type volume control which has steps of 2 db for a type 56 or 27 tube. The total resistance, $$R$$, is usually around 100,000 ohms. Transposing we get

$$\frac{\text{db}}{20} = \log_{10} R_2 - \log_{10} R_1$$

or,

$$\log_{10} R_2 = \log_{10} R_1 + \frac{\text{db}}{20}$$

Substituting in this last formula the known values of 2 db attenuation and $$R$$ of 100,000 ohms we get:

$$\log_{10} R_2 = \log_{10} 100,000 - \frac{2}{20}$$

$$\log_{10} R_2 = 5 - 0.1 = 4.9$$

The antilog of 4.9 is 79,430 ohms (from a log table). For the 4 db loss:

$$\log_{10} R_2 = \log_{10} 100,000 - \frac{4}{20}$$

$$\log_{10} R_2 = 5 - 0.2 = 4.8$$

The antilog of 4.8 is 63,090 ohms. This process is repeated on down till the required loss is a maximum. Usually a 20 db loss is more than sufficient. The results tabulated for a 20 db loss are as follows:

<table>
<thead>
<tr>
<th>DB loss</th>
<th>$$R_2$$</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>79,430 ohms</td>
</tr>
<tr>
<td>4</td>
<td>63,090 ohms</td>
</tr>
<tr>
<td>6</td>
<td>51,000 ohms</td>
</tr>
<tr>
<td>8</td>
<td>39,810 ohms</td>
</tr>
<tr>
<td>10</td>
<td>31,620 ohms</td>
</tr>
<tr>
<td>12</td>
<td>25,110 ohms</td>
</tr>
<tr>
<td>14</td>
<td>19,920 ohms</td>
</tr>
<tr>
<td>16</td>
<td>15,840 ohms</td>
</tr>
<tr>
<td>18</td>
<td>12,580 ohms</td>
</tr>
<tr>
<td>20</td>
<td>10,000 ohms</td>
</tr>
</tbody>
</table>

Thus if we take a wire-wound resistor and bring out taps at the designated points, uniform steps of loss will be obtained when the volume control is used. The advantage of this is that we know just how much loss is introduced and we can turn to that loss at any time so that the excitation does not vary every time one goes on the air. If music is to be faded in and out, the taps will have to be right on the resistor so that the grid will not be free between taps. However, the slider can run directly on the resistor and stops be stationed so that the pointer arm stops at the right value of resistance. If a value of resistance other than 100,000 ohms is used the process is repeated, using the new value of resistance in the place of 100,000.

Walter Fliegner, W6AST

(Errata's Note—The values given in the table can be used as percentages to determine the correct point at which to place taps on resistors having a total resistance other than 100,000 ohms. For example, to get 2 db loss the tap should be placed at 79.4% of the total resistance; for 4 db loss the tap would be at 68.6% of the total resistance, etc. A chart giving a calibration for any voltage divider is shown in the article, "What is This Thing Called Decibel?", in August, 1931, QST.)
A Portable Power Supply

Several ways of getting plate power from low-voltage d.c. for a small transmitter have been described in past issues of QST. A simplified arrangement operating on the vibrator-transformer principle has been worked out by A. P. and I. L. Brown, W8VJ-W8IDE, so that no special apparatus is needed—further, the power supply can be used on a regular a.c. line when such a line is available. In brief, the idea is to use an ordinary small power transformer, hook up the rectifier and filter in the regular way, and connect a 6-volt storage battery in series with a Ford spark coil to one of the unused filament windings on the transformer, preferably a 5-volt winding. When a.c. is available the regular primary is connected to the line. Fig. 6 gives the details.

W8VJ recommends that the transformer be one giving about 300 volts each side of the center-tap. The power supply as shown would be suitable for a low-power transmitter, but by the addition of a second filter choke and a third 8-µfd. condenser section it can be used to supply a receiver. In the latter case it has been found advisable to put the Ford coil in a grounded metal can to help cut out the "hash" from the vibrator. Filaments of the tubes used in the receiver or transmitter can be supplied with power from appropriate transformer windings, but it is preferable to use tubes designed for battery use and operate their filaments or heaters directly from the battery—or from dry cells, if 2-volt tubes are used.

A D.C. Receiver With E.C. Detector

The receiver circuit of Fig. 5 is used by John M. Everitt, Ridgewood, N. J., to secure the benefits of the so-called "electron-coupled" or screen-grid feed-back detector circuit, with filament-type tubes. In the original circuit (published in the Experimenter's Section in January, 1933, QST) the regeneration tap on the tuned-circuit coil was connected to the cathode of an indirectly-heated type tube; with directly-heated filaments a simple connection to one side of the filament will not work because it is necessary for the whole filament to be above ground for r.f. In Mr. Everitt's circuit this is accomplished by connecting one side of the filament to the tap on the coil and feeding the other through an r.f. choke. This is a thoroughly practical proposition with low filament-current tubes such as those in the 2-volt series.

Naturally the feature of greatest interest in the circuit is the filament choke, RFC1, in Fig. 5. Of this Mr. Everitt says, "... almost anything works at RFC1 with some success. I have used various cylindrical and bank windings on a piece of half-inch dowel. A choke made of 21 feet of No. 33 s.s.c. wire wound in three separated banks on the dowel seems a little better than anything else I have tried. ... It makes but little differ-

(Continued on page 64)
Super-Power Made Possible With Class-B Modulation

It's just two years since QST rang the bell with the first practical information for amateurs on Class-B modulation. Since then we have seen its application grow and thrive in amateur work, despite criticism from the die-hards, and have watched with interest the inevitable adoption of Class-B modulation in other fields, especially broadcasting. There is no doubt that the demonstration of its practicability by amateurs has had no small influence in accelerating its progress in these other fields. Striking evidence of the tremendous strides in this progress is the use of Class-B modulation in the new super-power transmitter of WLW which is slated to go on the air experimentally with 500-kilowatt carrier, modulation capability 100 percent, sometime in December.

It's a far cry from the first 25- and 200-watt amateur modulators of two years ago to the 400,000-watt Class-B audio stage of WLW's new rig; but the basic principles and circuits are the same as we have been using in amateur 'phone transmitters. The only real difference is in magnitude—audio transformers bulking car-load dimensions and weighing tons; potentials reckoned in kilovolts; plate currents measured in amperes. The circuit diagram would be familiar.

The new booster unit, which transforms WLW's present 50-kw. job to a 500-kilowatter, will use banks of Type 862 100-kw. tubes in push-pull-parallel, both in the 400-kw. output Class-B audio stage and in the 500-kw. output Class-C amplifier stage which is modulated, a total of 20 tubes of this type being used in the transmitter. In addition to the electrical power consumed—which, by the way, is less than would be possible with any other type of transmitter of equal power output—a million gallons of water per day will be required to cool the tubes.

Experimental transmissions on 700 kc. are expected to begin early in December, possibly sooner. Operating hours are to be 1:00 a.m. to 6:00 a.m., EST. It will be interesting to break a few early-morning skeds and crank up the broadcast receiver for a check on them.

Byrd Expedition News

Since November 1st the radio operators on the Jacob Ruppert, KJTY, have been listening in the 7-mc. amateur band daily, 9:30 to 10:15 p.m. CST, also 4:30 to 5:30 a.m. CST. KJTY on 8250 kc.

W2ACY reported KJTY heard in this period on October 26th, R7 motor-generator modulated note. On November 4th W9UZ worked KJTY at Balboa, C. Z., adjacent working frequencies, for telegraph and took 14 messages. It is reported that NY1AA at Balboa, C. Z., is keeping a twice-weekly schedule also, and some personal traffic routed that way. Expedition schedules with WSL and other commercials sometimes hold KJTY until 9:45 or nearly 10 p.m. CST. W3CXL-WLM schedules WHEW daily.

Both KJTY and WHEW (The Bear of Oakland) use the following calling frequencies, and specific adjacent working frequencies, for telegraph operation:

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Calling</th>
<th>Adjacent</th>
</tr>
</thead>
<tbody>
<tr>
<td>3105</td>
<td>6210</td>
<td>12,420</td>
</tr>
<tr>
<td>4140</td>
<td>8280*</td>
<td>16,560</td>
</tr>
<tr>
<td>5520</td>
<td>11,040</td>
<td>22,080</td>
</tr>
</tbody>
</table>

Operator Watson (of W1BGL) of the Byrd Antarctic Expedition advises as follows: "After leaving Panama we should have more time for amateur work. Due to the fact that amateur work is restricted, we will not be able to keep any definite schedules. We will look for calls on the 7-mc. band at the hours specified, when such operation does not interfere with the ship's duties."

The Federal Radio Commission has granted the permits for the main base, KFZ, 1 kw., and the forward base, KFY, 75 watts. These stations at Little America are both licensed to use the frequencies above 3000 kc. listed by F.R.C. Rule 285A, for telegraph work. These are, substantially, the frequencies assigned to KJTY and WHEW and given above.

Four experimental station permits, 10XCC to 10XCP, have been granted for 5-watt stations to communicate with dog sledges. Two permits likewise have been granted for 10XCA, for geological research and investigation of frequencies above 30 mc.

This month marks the tenth year of the existence of W3QP under the ownership of John B. Morgan, 2nd, of 8527 Germantown Ave., Philadelphia. After ten years of hamming many of us have nothing more impressive than experience to show for the time and money spent, but W3QP evidently has invested some of both in the makings of a good-looking and efficient station.

W3QP’s transmitter is a four-stage crystal-controlled job, having a 10 oscillator, a 10 doubler, and an 865 buffer exciting a final stage in which two 852’s are operated in parallel. The 852’s take 3800 volts at 150 mils and evidently like it, since neither of them shows signs of the faintest blush. This rig is contained in the frame at the left of the operating desk.

A list of W3QP’s receivers sounds like a catalog of manufactured sets. The one occupying the center plate on the desk is a Hammarlund Comet Pro, but there are also available a National AGS, an SW-5, and an M. & H.S.S. Super, as well as several home-made receivers. The R.E.L. portable in front of the loud-speaker horn is used as a monitor, while the gadget to the right of the receiver is a 50-kc. oscillator whose 100th harmonic is checked against WWV, other harmonics at 50-ke. intervals being picked up in all the ham bands. A couple of broadcast receivers are thrown in for good measure.

Practically all of W3QP’s work is done on 7288 kc., on which frequency regular schedules have been kept with Australia and the West Coast.

Antennas seldom are left alone for more than a few weeks, but at the time this description was received good results were being secured with a 3/2-wave 7-mc. antenna fed at the center with twisted-pair feeders.

At various times Morgan has been an O.R.S., R.M., S.C.M., O.B.S., and O.O., some of which he still holds; also a member of the old R.C.C.

W2VY, Brooklyn, N. Y.

The call originally assigned to George W. E. Shields was 3DS, issued in Philadelphia early in 1920. Operation under those call letters continued until November, 1927, when the family and station were removed to New York. W2VY has been in operation in Brooklyn, N. Y., from 1928 to date.

The transmitter shown in the photograph consists of two Hartley oscillators, an 852 for 20 meters and a 504-A for 40 meters. Both oscillators make use of the same power supply and antenna tuning controls. The 852 works with 250 watts input and the 504-A 600 watts. The power supply consists of a 1-kw. Thordarson plate transformer, 872 rectifiers, and a double-section (Continued on page 70)
Tests:
It all started down in W4. Eddie Collins, W4MS-W4ZZP, in common with hundreds of other eastern U.S. hams, was eager to work Japan. Not content with sitting hopefully by awaiting that moment when a J call would split his ears, he wrote Masaomi Oshima, JIFF, suggesting a series of week-end tests. JIFF communicated the idea to J.A.R.L. headquarters, and Secretary K. Kasahara, J1EZ, undertook the organization work. First results weren’t successful, so a new schedule for the last week of 1933 has been arranged. All eastern U.S. amateurs desiring to work Asia will then have a splendid opportunity to do so.

To alleviate QRM, alternate listening and calling periods have been arranged, so that we here will at least have a chance to hear the J’s when they are on. The QRH is the 14-mc. band. The schedule, in G.T., with E.S.T. in parenthesis, follows:

Dec. 23d 2045-2100 (3:45-4:00 p.m.)
" 24th 2115-2130 (4:15-4:30 " )
" 30th 2145-2200 (4:45-5:00 " )
" 31st 1645-1700 (11:45-12:00 a.m.)
" " 1715-1730 (12:15-12:30 p.m.)
" " 1745-1800 (12:45-1:00 " )
" " 1815-1830 (1:15-1:30 " )
Jan. 1st 2215-2230 (5:15-5:30 " )

These are the times for W stations to call Japan. Japanese stations will call in the intervening or following fifteen minutes, in each case. The times have been carefully selected as offering the best possibilities, with sufficient listening and transmitting periods for everyone to do some good work. GL.

Germany:
History will record the period from April to September of 1933 as a decisive turn in the D.A.S.D. and German amateur radio. Long years of struggle for the issuance of officially authorized amateur transmitting licenses were culminated during that time.

Never, in the past, had the D.A.S.D. found any governmental sympathy with its aims and intentions. The national socialistic government was the first to recognize the national German amateur organization as a part of all German radio, making it the only authoritative amateur society in the country, the representative of amateur radio in the “Funkkammer” or Radio Chamber which represents all non-commercial radio interests in the government, as well as the “Reichsverband Deutscher Rundfunkteilnehmer,” the organization of broadcast listeners, and the “Deutscher Funktechnischer Verband,” the familiar D.F.T.V.

In March of this year the government decreed a general ban on all amateur transmission, pending the settling of amateur problems on a carefully organized basis. In May about thirty amateurs got preliminary licenses, for the most part with their old calls.

In the meantime, the D.A.S.D. was acknowledged by the government to be the sole spokesman for German amateur radio. Licenses became available only through the D.A.S.D. After years of illegitimacy, German amateurs are at last able to work in the open light of free publicity, like their friends in other countries.

At the tenth German radio exhibition, the D.A.S.D. was able for the first time to exhibit as an officially recognized society. The Reichs-
Propaganda-Ministry, which controls all German radio, invited the leaders of all districts (now augmented to 20 as a result of the large growth in membership) to Berlin for a course covering all of amateur radio. The district managers took home the knowledge that the national government energetically supports the intentions of amateurs.

On August 27th licenses were granted 180 German amateurs. On that day a general get-together meeting was held in the 3.5-mc. band, QST announcing to the world the final emancipation of German amateur radio. The licensing of new amateurs is now being accomplished by means of a regular system.

VP2:

Two letters:

"... I wish to advise that on May 15, 1933, the prefix VP2 was provisionally allotted to amateurs in the Bahamas by the Bahamas government, pending final approval by the Postmaster General of England. However, from 1928 until May, 1933, I was the only amateur in the Bahamas and operated under the call sign V1BA, having been given special permission to operate my station because I already had a Canadian amateur license—c1BA, 1925. Through the kind cooperation of Mr. D. Salter, the superintendent of the Bahamas Telephones and Telegraphs, amateurs were finally recognized in the Bahamas, and my call sign automatically became VP2NA in May, 1933. There are now two other amateurs, viz.: VP2NB and VP2NC. . . . I expect that there will be several new amateurs in the Bahamas during the next six months." (Signed) J. M. Cruikshank, M. D., VP2NA, Chief Medical Officer, Nassau, Bahamas. E. A. Boyce, VP2NB, is Deputy Director of Public Works in the Bahamas. He has recently been stationed at Hope Town, Abaco, on official duty.

The second:

"Nothing official is known here (Fiji) of any change in prefix. Large numbers of QSL cards, intended for Bahamas, etc., are arriving here in consequence of a recent statement in QST that Fiji was now VP2. Further numbers of cards are arriving addressed to non-existing VP1 stations. The only active and licensed amateurs in Fiji are VP1FF and VP1FR, any others that may appear in call books being defunct for a long time. Certain stations in another group, viz.: Gilbert and Ellice Islands, use prefix VP1, but details of licensed calls are not available. There is no Fiji Wireless Club and matter addressed there-to is undelivered. Correspondence on amateur radio matters should be sent to one of the two active stations." (Signed) F. Fleming, VP1FF, Suva, Fiji.

TBTOC:

Several applications followed the announcement of this new order in October QST, two of them being acceptable. Clyde C. Anderson, W6FFP, in fact, makes it an TBTOC affair, having worked L. M. Mellars, ZL1AR on 1.7, 3.5, 7 and 14 mc. with the equipment described on page 21 of the October issue. They are now striving for a five-band QSO, attempting to put signals over on 28 mc. as well as the other bands.

Don Wallace, W6AM, claims to be the original TBTOC member on the basis of a number of three-band QSO's with VK and ZL approximately five years ago.

Special:

"Krotkofalowiec Polski" is the official organ of the P.Z.K., a monthly 16-page publication filled with real ham material for the consumption of Polish amateurs. Our knowledge of the Polish language is, unfortunately, very much of a minus quantity, but to anyone able to read the language perusal of the magazine should be highly interesting. Detailed Calls Heard lists are given, filled with calls from everywhere, with large numbers of American stations. The subscription rate to foreign amateurs is $1.00 yearly, the address Lwow, U1. Zyblikiewicsza 33, Poland.

Silent Keys

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

William A. Brecht, Jr., W3CDE, Glen-side, Pa.
Leonard W. Caywood, W9HAA, Wheaton, Ill.
Howard B. Hansen, W2EHA, Newark, N. J.
F. C. Hubbard, W6HL, Daly City, Calif.
Aldred Martini, W5KGF, Cleveland, Ohio
Ralph C. Rothrock, W7PL, Adams, Ore.
“Bk-in”—for Code and Voice Work

A “BREAK-IN” system has been used by up-to-the-minute amateurs for years. It is as useful in voice as in code work, and right now is rapidly gaining in popularity in the ‘phone bands.

If you have never used break-in, give it a try. All radio communication involves back-and-forth two-way transmission. With break-in ideas and messages to be transmitted can be pulled right through the holes in the QRM. Snappy, effective, efficient, enjoyable amateur work really requires but a simple switching arrangement in your station. True, complicated arrangements with dozens of relays can be rigged to do the job, but the simplest of arrangements will be thoroughly effective.

The faster the change from transmitting to receiving can be engineered the better. A Morse-wire type key with a switch on the side, is quiet and fast for voice changeover and is a logical choice for every amateur. A push-button to put the carrier on the air only while talking is also a completely practical device. Current observations indicate that just as monitors are scarcer than they ought to be (discussed editorially last month) the advantages of break-in are not apparent to some code-hams newly on the air, and break-in is just beginning to get into regular use in many ‘phone stations. But the trend is that way, and appreciation of the many advantages will make the use of break-in more wide-spread for both voice and code work.

Useless calling and unnecessary transmission during periods of heavy QRM can be prevented through intelligent use of break-in. Long calls, for example, are inexcusable, inconsiderate and unnecessary. Every transmitter can be so arranged that by lifting the key (and connecting ‘phones to the receiver if these are cut off during transmission) the operator can ascertain if the station called is replying. Brief calls with frequent short pauses to listen for replies constitute intelligent operating, devoid of useless effort. During c.w. transmission insert a “BK” and pause briefly at intervals. This makes it possible for the other operator to stop you, or get fills, if necessary. If not, transmission may be resumed. If you find that the station you are calling has, in the meantime, connected with another amateur instead of answering your call you will have at least saved yourself some wasted effort. QRM will also be lessened thereby. If the operators understand that break-in is being used, a “bk” and “g.a.” will be of greatest value to interrupt transmission and direct when it shall be resumed. Where voice is being used similarly, conversations resemble wire telephone communication, and flow smoothly from subject to subject, and the “click” noted when the carrier is cut off momentarily can be as effective as the word “break” (so this can be eliminated) when two operators experienced in this mode of operating use this improved system of operation.

You use ‘phone, or is it code, at your station. Either way, let us ask you a question. Do you use any form of break in? If not you are missing a bet. Use break-in. Give it a try. —F.E.H.

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The following contribution by Mr. Gene Clark, W6DQH, wins the C.D. article contest prize for this month. Four articles on any and all phases of amateur communication activity are likewise solicited, and may win you a bound Handbook, or equivalent credit applied toward League emblems, log books or other A.R.R.L. supplies. See announcement March 1933 QST (page 50).—F.E.H.

“What the NRA Suggests to an Amateur Operator”

By Gene Clark, W6DQH*

The National Recovery Administration, in its efforts to give the nation a new deal, is administering not new but time-tested principles. Likewise, to give amateur radio the new deal it deserves for healthy existence, we amateur operators need only apply a few principles of correct operating practice that we have known ever since we first learned that “dit-dah” was “A.”

Tune over one of the popular ham bands. New picture in your mind what that band would sound like and how much more enjoyment everyone would get out of the game if a “code” such as the following were adopted and conscientiously observed by amateur operators generally.

*1350 Butter St., Apt. 54, San Francisco, Calif.
Traffic Briefs

WHAT HAPPENS TO CALL BOOTLEGGERS?

If charged with “operating a station without a license” and convicted, such an individual, for violation of the provisions of the Radio Act of 1927, may be punished by a fine of not more than $3000 or by imprisonment for a term of not more than five years, or both, for each and every such offense. (After all, are these offenses or risks?) Even if Department of Justice officials temper their prosecutions with leniency, as in a recent Seattle Washington case of illegal operation of a station, and reduce the charge to that of “violating an international treaty” by transmitting without proper licenses, conviction carries the possibility of a fine of not more than $400 for such offense. In a Seattle case which resulted in conviction, the judge suspended sentence for three years, pending good behavior, and ordered monthly reports of the youth to the Federal court probation officer.

Call borrowing is decidedly a dangerous game, bound to wane in popularity following such prosecutions, especially with the simplification of the government system, now providing for examination and concurrent licensing of operator and station under the new regulations effective in October.

VE5CNE (VE3XBD) was installed at the Canadian National Exposition and handled a bunch of traffic in early September under the able guidance of operators VE6LA, VE6U and VE6M. VE8L reports that “CNE” was located in the electrical building with the following line-up: ‘47 osc.—10 buffer—2 ‘10s—2 ‘22a Class C, Mod. 56—2 ‘30s—2 ‘3A Class B with condenser mike, receiver a new Hammond. It is regretted that space limitations make it impossible to use photos from VE5DI and VE3LJ.

January 30th-21st has been set as the date of the next quarterly Official Relay Station QSO Party . . . also for the first quarter test of Official Phone Station appointees, if a sufficient number of phones have received O.P.S. appointment by that time. All O.R.S. who wish another Transcon in January should send a radiogram to A.R.R.L. so that details may appear in January QST or the next bulletin issued.

W5BPM suggests that when you have a message for the city in which the station you are working is located, use wire procedure and say KK City KK. The man copying can then grab an A.R.R.L. (instead of plain) blank and copy the “delivery” tierceon. KK is the Continental sent for a parenthesis.

Seven A.R.R.L. affiliated clubs in the Pacific Division have organized the “Federation of Radio Clubs, Southern California.” The clubs making up this federation are Amateur Radio Club of San Bernardino, Associated Radio Amateurs of Long Beach, Glendale Amateur Radio Club, Pasadena Short Wave Club, Santa Barbara Amateur Radio Club, San Gabriel Valley Short Wave Club, and Southwestern Radio Experimental Assn. of Bell. An endeavor has been made to simplify this federation and to eliminate complicated by-laws and rules. It is an organization to correlate radio activities of amateurs in the Los Angeles Section. The seven club presidents constitute the Executive Committee and have chosen a chairman. Chairs have also been appointed for each of the following committees: Technical, Interference, Publicity and Membership, Entertainment and Finance. Any club becoming affiliated with the A.R.R.L. in the Los Angeles Section is eligible for representation in the federation. This new organization publishes a monthly bulletin, the name of which is “73.”

The Atlantic Division Phone Association was affiliated with the A.R.R.L. on October 18th. The purposes of this organization as expressed in its Constitution are “to further the art of voice communication, to be a medium for the exchange of opinion between phone operators in the Division, to be a medium to express the desire and opinion of the group to the Atlantic Division A.R.R.L. Director, to improve standards of phone operating procedure and fraternalism.” The officers of the society: Robert Adams, WS3M, President; Dr. Burton T. Simpson, W8SCP, Vice-President; F. J. Wolf, W3BILZ, Secretary.

The Hudson Division Phone Association, Frank Carter, W2AZ, President, and L. J. Dunn, W3CLA, V.P., and the New England Division Phone Association, D. S. Boyden, W15L, President, and Henry Insart, W1AUd, V.P., have also been organized in these Divisions, adopting constitutions with purposes stated closely similar to those discussed above.

O.B.S.

The following is a supplement to the list of A.R.R.L. Official Broadcasting Stations in September QST (page 44):


December 10th—28-Mc. QSO Party

The Milwaukee Radio Amateurs' Club announces a 28-Mc. QSO test to be held December 10th from 12.00 noon to 10.00 p.m. CST. All reports on Wisconsin signals should be mailed to H. F. Warding, 4474 North 21 St., Milwaukee.

GWWY will call “Test Ten” at ten-minute intervals commencing at 1100 Greenwich and ending at 1300 Greenwich, every Saturday in December and January. Listening will be done between transmitting periods. Power used will be 150 watts, crystal controlled on 28,492 kcs. Reports are requested from any distance.

The TEN-METER GANG are requested to keep up week-end tests, and drop a postal with any observations or results to A.R.R.L. each Monday morning. 28-mc. announcements and results will be addressed back to the gang via W1MK on Thursday and Friday nights following the “QST!” (3825 and 7015 kcs.) at 7.30 p.m. and 11.00 p.m. CST.

P.R.C. EXAMS

The Federal Radio Commission offices at Detroit is authorized to conduct regular exams quarterly at Cleveland, Cincinnati, and Columbus, Ohio. In mid-December examinations will be conducted in Cleveland. The date and place will be sent “QST” from W1MK and A.R.R.L. OBS in Ohio as soon as final arrangements are concluded.

Examinations will be held at Cincinnati in the first week in February, and at Columbus in the last week in February, 1934.
BRASS POUNDERS’ LEAGUE

(September 15th—October 16th)

<table>
<thead>
<tr>
<th>Call</th>
<th>Orig.</th>
<th>Rel.</th>
<th>Tot.</th>
</tr>
</thead>
<tbody>
<tr>
<td>W9CQ</td>
<td>175</td>
<td>176</td>
<td>351</td>
</tr>
<tr>
<td>W9EQ</td>
<td>600</td>
<td>208</td>
<td>808</td>
</tr>
<tr>
<td>W9CL</td>
<td>90</td>
<td>104</td>
<td>204</td>
</tr>
<tr>
<td>W9WQ</td>
<td>800</td>
<td>200</td>
<td>1000</td>
</tr>
<tr>
<td>W9WQ</td>
<td>27</td>
<td>34</td>
<td>61</td>
</tr>
<tr>
<td>W9WEY</td>
<td>60</td>
<td>45</td>
<td>105</td>
</tr>
<tr>
<td>W9ABO</td>
<td>28</td>
<td>28</td>
<td>56</td>
</tr>
<tr>
<td>W9ADM</td>
<td>15</td>
<td>75</td>
<td>90</td>
</tr>
<tr>
<td>W9EIC</td>
<td>35</td>
<td>44</td>
<td>79</td>
</tr>
<tr>
<td>W9ALX</td>
<td>125</td>
<td>406</td>
<td>531</td>
</tr>
<tr>
<td>W9DD</td>
<td>35</td>
<td>306</td>
<td>341</td>
</tr>
<tr>
<td>W9CTA</td>
<td>31</td>
<td>21</td>
<td>52</td>
</tr>
<tr>
<td>W9GET</td>
<td>97</td>
<td>115</td>
<td>212</td>
</tr>
<tr>
<td>W9MA</td>
<td>17</td>
<td>7</td>
<td>24</td>
</tr>
<tr>
<td>W9IF</td>
<td>1</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>W9ABE</td>
<td>6</td>
<td>72</td>
<td>78</td>
</tr>
<tr>
<td>W9KZ</td>
<td>70</td>
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<td>135</td>
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<td>W9BKG</td>
<td>175</td>
<td>389</td>
<td>564</td>
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<td>W9JW</td>
<td>53</td>
<td>61</td>
<td>114</td>
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<tr>
<td>W9DUG</td>
<td>45</td>
<td>61</td>
<td>106</td>
</tr>
<tr>
<td>W9EAP</td>
<td>21</td>
<td>23</td>
<td>44</td>
</tr>
<tr>
<td>W9BB</td>
<td>211</td>
<td>263</td>
<td>474</td>
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<tr>
<td>W9KEM</td>
<td>24</td>
<td>79</td>
<td>103</td>
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<tr>
<td>W9CZ</td>
<td>61</td>
<td>67</td>
<td>128</td>
</tr>
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</table>

MORE-THAN-ONE-OPERATOR STATIONS

<table>
<thead>
<tr>
<th>Call</th>
<th>Orig.</th>
<th>Rel.</th>
<th>Tot.</th>
</tr>
</thead>
<tbody>
<tr>
<td>W9CXL</td>
<td>213</td>
<td>218</td>
<td>431</td>
</tr>
<tr>
<td>K1HJR</td>
<td>178</td>
<td>196</td>
<td>374</td>
</tr>
<tr>
<td>W9GSA</td>
<td>1204</td>
<td>48</td>
<td>1252</td>
</tr>
<tr>
<td>W9GOK</td>
<td>157</td>
<td>22</td>
<td>179</td>
</tr>
<tr>
<td>W9OW</td>
<td>105</td>
<td>129</td>
<td>234</td>
</tr>
<tr>
<td>NY1AB</td>
<td>175</td>
<td>157</td>
<td>332</td>
</tr>
<tr>
<td>W9BFT</td>
<td>194</td>
<td>104</td>
<td>298</td>
</tr>
<tr>
<td>W9HT</td>
<td>255</td>
<td>662</td>
<td>917</td>
</tr>
<tr>
<td>W9HUG</td>
<td>786</td>
<td>75</td>
<td>861</td>
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<tr>
<td>W9T7</td>
<td>260</td>
<td>25</td>
<td>285</td>
</tr>
<tr>
<td>W9UBQ</td>
<td>14</td>
<td>26</td>
<td>40</td>
</tr>
<tr>
<td>ACR1</td>
<td>24</td>
<td>39</td>
<td>63</td>
</tr>
</tbody>
</table>

These stations "make" the BPL with totals of 500 or over. Many "rate" extra credit for one hundred or more deliveries. The following one-operator stations make the BPL with deliveries of 100 or more during the month of deliveries as follows: Deliveries count!


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. Make more deliveries, send such information to the traffic that will qualify you for B.P.L. membership also.

Relative Standings of the Ten Highest Sections—September—October

<table>
<thead>
<tr>
<th>Messages Per Station (25%)</th>
<th>Stations Reporting Traffic (25%)</th>
<th>Gain or Loss (Traffic Report) (25%)</th>
<th>Traffic Total (25%)</th>
<th>Standing Based on Average of All Four Ratings (%)</th>
<th>Communications Manager</th>
</tr>
</thead>
<tbody>
<tr>
<td>M.-D.-C. D. 43%</td>
<td>Los Ang. (689) 97</td>
<td>Wash. 1-40</td>
<td>Los Ang. 6261</td>
<td>Washington 62.5</td>
<td></td>
</tr>
<tr>
<td>P. L. 274.3</td>
<td>Wash. (374) 84</td>
<td>Va. 1-15</td>
<td>Virginia 59.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hawaii 218</td>
<td>Ill. (250) 79</td>
<td>Oh. 1-10</td>
<td>Illinois 43.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E. Bay 188</td>
<td>Mich. (653) 69</td>
<td>Ore. 1-10</td>
<td>Ohio 35.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S. Texas 171.8</td>
<td>Ill. (148) 50</td>
<td>Ky. 1-9</td>
<td>Kentucky 35.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E. Pa. 169.6</td>
<td>N. C. (140) 54</td>
<td>Va. 1-9</td>
<td>Virginia 35.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N. N. J. 163.3</td>
<td>Ohio (249) 51</td>
<td>WVa. 1-8</td>
<td>West Virginia 35.</td>
<td></td>
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</tr>
<tr>
<td>Sac. V. 113.6</td>
<td>Mo. (324) 40</td>
<td>Me. 1-8</td>
<td>Maine 35.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Col. 109.4</td>
<td>Ore. (260) 41</td>
<td>Neb. 1-8</td>
<td>Nebraska 35.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

WASHINGTON gets the Banner for September—October with a sizeable increase in "number of stations reporting traffic." W9DGO, Los Angeles both have an "extra credit" rating of 50% on the "second high" position to go to Virginia on the basis of "making" three departments (Stns rep by 150, Gain/Loss, Rel. Tot.) Los Angeles made two deliveries in the last column, all other Sections in their Divisions, order of delivery showing relative standing of their different Divisions: E. Penna. Hawaii. Ill., Conn., Colo., Va., N. Tex., Neb., and Iowa (N. J. and Ill. lead), Phila., Ind., Iowa, Ala. During the September 15th—October 16th period 1400 stations Originated 21,047 Deliveries (63.3% of Total 33,816. 743.4% Deliveries) 105,366 m.b.a.

The Section A.R.R.L. membership (approx.) is shown parenthetically, so that the degree of traffic reporting activity may be indicated by comparison.

December, 1933 43
Section Communications Manager for this Section for the next two-year term of office.

The candidates and five or more signers must be members of the League in good standing or members of the League who are eligible to be members.

ELECTION RESULTS

Valid petitions nominating one candidate as Section Manager were filed in a number of Sections on or before the closing date that had been announced for receipt of such petitions. These petitions were provided by the Constitution and By-laws, when but one candidate is named in one or more valid nominating petitions this candidate shall be declared elected. Accordingly election certificates have been mailed to the following officials, the term of office starting on the date given.

Eastern New York: Robert E. Halpern, W2LU Sept. 10, 1933

Northern Massachusetts: Joseph A. Mullen, W1AHI Sept. 10, 1933

San Diego: Harry A. Ambler, W6SOP Oct. 30, 1933

Termin: Harry Pagi, W7HDA Nov. 9, 1933

Western New York: Don G. Buell, W3SJP Nov. 9, 1933

In the Ontario Section of the Ontario Division: Mr. B. J. Trinder, W3JFI, and Mr. Arthur S. Dolson, W3SFR, both of whom were nominated, Mr. Trinder received 51 votes and Mr. Ferguson received 49 votes. Mr. Trinder's term of office began October 18th.

ATLANTIC DIVISION


the winter. W8APV is new RM for that locality. W3QDF is QRL studies. W3QCO is QRL job. WSKW and BGP tell some wild tales in their latest contest reports. W3Q7I is rebuilding. W3ZPI reports 4 schedules. 30XY requested ORS. W3DPY returned to Jersey City after vacationing at Budd Lake, N. J. 

Traffic: 249 CLQ 52 ZI 19 CWL 119 AVY 6 BPT 52 APY 67 CLQ 151 QL 24 BYR 3 DPF 22. 

WESTERN NEW YORK—SCMC, Don Farrell, W8DSP —New R.R.A. officers: W8BQN, pres.; DZF, vice-pres., EEN, secy.; APD, treas. W8BHK blew H.V. transformer on his 1500-watt. W8ZVL had plenty of trouble. W8BR is T.N.T. perking. W8FGR is Q.5 mc. W8AWX is QRL football. W8DIU has new 50-watt. W8EMR is back after long absence. W8BET and FFW are QRL college. W8QG had his complete station in operation at Utica. W8BEX is going on 7 mc. W8IFY is going on 7 me. W8JZR announces arrival of 1.7-mc. 'phone. W8GBC reports a new high power rig. W8HLM is busy with professional DX. W8IDJ has FB-7. W8AFM has applied for the first O.P.S. in the section. W8DSP is on three nights per week. W8DBX is back on the air. New calls reported in Law­enville: KQW-3, W8QW worked GFWY on 14-mc. W8DIH is rebuilding to c.o. W8JLG had rig in operation at Palmyre Fair. W8BJO plans to resume schedules on "G" Trunk. W8BEN moved his junk in from after VK's. W8JTN is back operation at the Radio Show in Utica. W8BEX is going to 14-mc. "Send me a truckload of traffic to feed my schedules." W8BEU is tending police station at Rockford. W8UFN is building Jan. 32. W8QWY wants ORS. W8BHG and W8QZK are attending Cornell University. W8HM is on 1.7-mc. 'phone. W8QY wants OBS. W8FYF has nice schedules. W8DJSJ is building some needed equipment. W8JYV says, "Getting ready to rebuild!!!"
Sunday of each month from 9 a.m. to 3 p.m. C.S.T. W9JY, AEA and AEE have new receivers. W9AE T is new A.A.R.S. NCS. W9AIP says efficiency of his amp, is 75%. W9AKJ is in Mich. W9AXK has a modulation indicator, and W9BBO is in Iowa with low power. W9DET gets out with his '45. W9DJJ liked the Indiana QSO Party. W9DJU has new bug. W9EQG is awaiting license. W9EQV handles traffic. W9FLX has new mast. W9FPB plugs along. W9GUE is QSL number 1935. W9HFY works lots say they are hard. W9QFS has remote control. W9HML's ant. down. W9HBF is lining up schedules. W9HUO has trouble getting ant up. W9HUV is new OQ. W9JRM is local NCS A.A.R.S. W9JKR isQSLing at W9ANL. W9QYN has homemade bug. W9LW worked VK4. W9LWK was hot in ORS Party. W9MAT has new o.c. rig. W9MBG went to Chgo. W9MIG is working on MOPA. W9MQQ has an SWSAC. W9NCT is having trouble with grids. W9OLP uses DJU's old receiver. W9OXM has visions of PP '45s. W9PFS is a blind chap. W9QSG says too much school. W9TE raised 2 Vks. W9YP has 25 ops. W9AUA has 7 ops. W9AXK blew a '60, W9LRI can't get his 211 to amp. W9CVX is back after several years layoff. W9DRW worked a W on 3.5. W9JJK worked a K4. W9JQX joined CCC. W9JTU likes c.e. W9KED is planning 25-mc. 'phone. W9QFQ is building 50-watt rig. W9POA works on W2JFQ going to go up. W9QHQ is handing set up. W9RQF reports the radio club expects plenty activity this winter. W9JYKK is getting schedules lined up. W9CHA will be on with new receiver. W9HLP moved to Springfield, Ill. W9LWA goes 'phone ops 'phone. W9OSX is U.S.N.R. NCS. W9HUU visited Indianapolis Radio Club. W9QGR is oling 1.7-mc. 'phone. W9LHC is spending winter in N.Y.C. W9LQU is using LHC's rig. W9BHK blew 220 transformer.

Traffic: W9YB 127 AIP 01 HBB 94 AET 37 AAL 25 EGV 55 EPT 34 BEJ 23 HML 47 HSF 15 MBG 30 MQQ 31 JAA-OXM 7 JTU 18 TE 19 DJJ 32 DET 14 JOQ-AZ 210 JRA-GFS 6 QRA-EGQ-EQF-HPF 4 DJU-HUV 3 LLV 4 MIG 4 NCT 1 QG 2. KENTUCKY—SCM, Carl L. Pfumm, W9OX—The second Ky. QSO Party was a "signal" success, with bigger attendance than ever. W9KKG has a 70-ft. tower. W9BAZ is trying to rebuild without going off air. W9QYO-EQO is reveling in delights of an FBXA. W9CIM has an aetion. W9KYM is getting schedules lined up. W9NCT is having trouble with grids. W9OLP uses DJU's rig. W9AXK blew transformer.

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at WSKLP. WSHC entertains CATA members. New QRS at WSRM and DAV. WSGME says he is champion schedule, W9FEDW is at Fenn College. W2ZGB and W2ZGH have 2" tube rebuilding. W2ZGB reports his job, W2ZPX tries new antenna. "Me for traffic from now on," reports W2ZTR. W7ACZ is doing real Official Observing work. W5GE is QRL work. W8AOA blew '10. W8FJFE says Cleveland Heights High School Amateur Radio Club on schedule. W8JFE received W2ZGB's new schedule IMY. W8JFJ autoplates, K9J, DOP, FO0. W8A0C is on 14 and 7 me. W9PFL should be an ORS. Code practice sent from W7FJF on 1.7-me. band. W9BON is busy with A.A.B. ORS. W9BON is planning to continue some fall traffic in work. W8SVL says plenty A.A.A.R.'s activity. Schedules at W8CPS: W9USA, K9GUA, W9FQ, NY1AB, KE9DI, W4CA. FB, OM! OPS applicants: W9QSN, GDC, UX, HBN. ORS applicants: W7FJMI, AMF, HCS, FJN. Another Cleveland amateur was lost on the lakes, October 24th, when W9K8P fell down hatch on Steamer Ishpeming. Our sympathies to his relatives. Maumee Valley R.A. has resumed winter schedule of meetings. Medina County R.C. held successful hamfest. Committees: W8DXB, HPD, EMV, GMI, GAV, DCI, KNP, KOA. Cleveland A.T.A. elected officers: Pres., WA9FOV; V., F.; DI; Soc'y-Treas., CRT; Curr. Sec'y, UPW.


WISCONSIN—SCM, Harold H. Kurth, W9FSS—W9HMS leads traffic. W9HISK is good R.M. W9FSS is organizing Wia. Net. W9HSSG is putting in e.e. W9LFC is a traffic net. W9DXX handled radio week traffic. W9BTS is looking for schedules. W9NZT on 14 and 3.5 me. W9CHC finds traffic hard to get. W9HSD gets help from YL at station. W9KRL's antenna made 3-point landing in storm. W9K6G changed to parallel from P.P. Send your reports to W5VJ, P.O. Box 116. W9YQL was lost last year—do your best this year.

Traffic: W9ANZ 132 ESK 116 FSS 71 HGF 126 LFX 50 DXY 46 KJ 30 ETM 29 HTZ 16 MHC-14 HXL 8 IQW 7 DBO-GPC 3 ISD 14 MUI-NMK 4 EXH 6 EBY 2 ZY 5.

DAKOTA DIVISION

NORTH DAKOTA—SCM, W. A. Langer, W5DQS—W9DYS uses a 199 for local work. W9SEL reports all traffic here. W9KJX has QRM, W9GBH and W9SGR is resigning as RM. W9HAT wishes QST would use covers less attractive to children. W9QH is planning a 1-KW 'phone.


NORTHERN MINNESOTA—SCM, Robert C. Hershberger, W9DJI—W9HJS has QRN, W9GFR and W9IDR worked first ZL and VK. W90SB is now ham at Pine City. W9YOC reports first traffic. W9JIE schedules DKL, HSX and GSY. W8PNP wants reports on OBS. W9LAV has now succ. W9MD is on 56 me. W9KRB is on 7-me. W5QCO has three QRM. W9GGR is making plans to work more from WSCPS.

Traffic: W9PKN 125 JIE 66 INS 22 IPA 13 OYC 2 JID 271.

SOUTHERN MINNESOTA—SCM, Norman Beek, W9PJY—EMQ—W9HLM makes the BPL sound convincing time. W9BKK reports on fall activity. W9DKR has his rig all sandblasted! W9BN will continue work on TLS. W9CYS is AA DNGS. W9EFJ is going to monkey with 1.7-me. 'phone. W9RDL worked Africa. W9XQX put up new antenna. W9HIC is QRL Naval and Army schedules. W9DHL finished his rig. W9GUX is interested in OBS. W8GLLE says, "Forty hams for me." W9LQD reports fine time at Kato Hamfest. W9EJL expects to devote more time to radio. W9KDL reports W9EFW, W9BXT and W9MUP as going to Carleton SCM. W9FNM and GLE dropped in on the SCM. W9BIA visited Heron Lake. W9BNN is still working. W9HCC installed crystal filter in his AGS. W9DRY is new station at Mankato. W9QRA new QRA: 1928 Aldrich Ave., So., Apt. 6, Mpls. W9FMA new QRA: 3810 27th Ave., So. Mpls. W9CSJ has new receiver. W9BQGQ is building crystal superhet. W9GWO sends nice report. Ex-5BU is applying for license. W5BXM keeps five schedules. W9BPR joined A.R.R.L. W9GVD, W9BZT, W9JIE schedules DKL, W9KOM reports. W9OOO had 50 QSOs first month. W9OMI reports.

Traffic: W9DQL 250 BXM 55 ABL 12 28 5 26 1 5 B 4.

MISSISSIPPI—Acting SCM, W. P. Allen, W5JV—W9SAZ is on 3.9-me. 'phone. W5SLD supplied the dynamic "Mike" for WI-7Y. W9HTZ reports: W9HNN's R9 signal. W9 Community R9 makes news. W9GOQ is still working. W5SLD took in convention. W9WEY is having op's license renewed. W9BRR took in convention. W9BIR expects to be back in L.R. for winter. W9BZI is enlisting.

Traffic: W9BMO 230 BXM 55 ABL 12 28 5 26 1 5 B 4.

DELTA DIVISION

ARKANSAS—SCM, Henry E. Velte, W5AJ—W8BMM is on sick list. W5AJL has four-stage c.e. rig. W5JK sends nice report. Ex-5BU is applying for license. W9BXM has nice traffic report. W9BNB has e.e. receiver. W9CVQ visited W9JH. W9BHS is working DX. W9QH is a.c. receiver. W9EML's rig is on road. W9QH is still navigating. W5UI coupled plenty of prizes at convention. W5WE is having op's license renewed. W9DRT took in convention. W9BED expects to be back in L.R. for winter. W9BZI is enlisting.

Traffic: W9OMI 230 BXM 55 ABL 12 28 5 26 1 5 B 4.

Mississippi—SCM, W. P. Allen, W5JV—W9SAZ is on 3.9-me. 'phone. W5SLD supplied the dynamic "Mike" for WI-7Y. W9HTZ reports: W9HNN's R9 signal. W9GOQ is still working. W5SLD took in convention. W9WEY is having op's license renewed. W9BRR took in convention. W9BIR expects to be back in L.R. for winter. W9BZI is enlisting.

Traffic: W9BMO 230 BXM 55 ABL 12 28 5 26 1 5 B 4.

TENNESSEE—SCM, F. P. Purdy, W4APM—W4PL visited World's Fair. WACIA is located at University of Chattanooga. W4AXD is a real DXor. W4BBT says hard work plays havoc with his activities. W4AP1, AD1, OI, EMI, LU, and AEP are active. W4AP1 and EQH are new A.A.R.S. W4AAD is working a fine arrangement of break-in with his 'phone. W4ACU is pushing work on new rig. W4AXN returned from trip to California.


LOUISIANA—SCM, W. J. Wilkinson, Jr., W5WF—W5BBY handles traffic. W5ZBR visits Fair. W5IN changed to '10s. W5CVN is new ham. W5BBID keeps lots schedules. W9ER and BPV visited in Alexandria. W5BBID has three QRM. W9DGR is resigning as RM. W9HAT wishes QST would use covers less attractive to children. W9QH is planning a 1-KW 'phone.

EASTERN NEW YORK—SCM, R. E. Haight, W2LJ—Reports monthly to your SCM and receive the ENY Bulletin. W2BLU is again high man. W2BJA, GY, GIR, APF handled traffic at Albany Exposition. W2ACD missed SARA Turkey dinner. W2QD and DSO report for Plymouth. W2BYY and W2FMR join ORS. W2BK is back again. W2CLL applies for ORS. W2DHC and FXC make first reports. W2FPEQ reports plenty of activity. W2DTT sends code practice stalling transmitters on Admiral Byrd's ship. W2AGL is occasionally. W2FDQ claims c.c. ng. W2FHB has new receiver. W2BEG has been busy getting his meet­can QSY from 3505.5 for traffic. W2GCC is off MOPAs! W2BLU reports traffic. W2QY is Head Coach Cornwall Football team. W2FMF, EX, ON, and ORS, joins Eny. Traffic hounds: W2ECP, ATM, CNF, GJS, BRs.


NEBRASKA—SCM, S. C. Wallace, W9FAM—W9BNT takes the lead and is arranging daily schedules except Sundays and Mondays with each State. W9DMM and FYG will operate at the table. W9ORR is back in traffic. W9IDJ is lining up a lot of good schedules. Any one wanting a schedule or having any dope on schedules get in touch with W9DI, Tebes, or W9DNA, Grand Island. W9FAM says, "Don't forget that the SCM starts Nov. 15th, sends Feb. 15th." W9BOC moved to new location, W9BZF—AFD has been having transmitter troubles. W9EWO says he can't raise the SCM. W9EQN reports, W9EPX wants good East and West traffic schedules. W9DGL says DX pink and says Omaha Club going FB. W9FIF has been working 3.9-m. phone, W9EWN and PXX send PB reports via radio. W9GUY: Sure enjoyed the QSOs, OM. W9OEP: Always glad QSO you, OM. W9NDO says between radio sales and servicing and orchestras playing he doesn't have much time. W9KJP is building rack and panel job. W9CWM schedules DJ.

Traffic: W9BNT 861 DMY 257 EWH 67 DI 38 FAM 24 BCX 24 IZF/AFD 10 EWO 11 BQR-FXP 2 FGS 94 IZF/AFD 51 CUY 60 OPP 24 FZK 30 DHO 29 KX 6 CMW 5.

MISSOURI—SCM, C. R. Cannady, W9EY—W9FFTA/WBMA and W9RJR, RMs. Due to brevity necessary to omit QSO reports and increased demand for a State Ham Sheet, the "social activities" of Missouri amateurs will hereafter be included in "The Missouri Bull" which will go to all ACTIVE MISSOURI HAMS—reporting their activity. This space will be devoted to traffic reports only with a short announcement similar to the above. This, of course, is subject to the approval of the gang! Send your report in and get your copy of "The Missouri Bull" now, then give us your reaction to this system!

Traffic: W9BWA 608 CFR 176 BAY 46 HON 41 FETL 6 EWH 31 RR 11 ZW 1 PNO 35 FBY 20 KFL 4 BGE 14 KJU 1 DUD 15 EWT 1 HUZ 19 HWW 11 DOE 19 IXO 11 EY 27 EHS 4 MAK 1 HCP 4 JPT 3 LWJ 9 LWC 3 AAN 9 TBO-EK 4 LIN 1 NNN 20 AIN 6 BYN 4 ECE 28 EDK 21 IYT 17 DIO-LBM 1 LBA 21 GQ 17 HNM 30 FYM 8 AJ 75 HUG 13 LTN 10 CRM 27 ENF 24 JUB 1.

NEW ENGLAND DIVISION

CONNeCTION—SCM, Fred A. Ellis, Jr., W1CTI—W1AMG tops the list this month! W1CID comments of being QRL, but look at that total! W1FI0 is the 100% schedule station. Overheard W1BDI say that if he ran his input much over a couple hundred watts it blinked the good East and West traffic schedules. W9DGL says DX pink are wanted in Worcester and Hillsborough Counties. W9DEM is lining up schedules again. W9EWM returned from the submission of his '66s. W9MSV has FBXA. W9DFS is lining up the Cape traffic net with AG. W9BO has had nothing but hard luck since the SCM assigned him ORS No. 13. W9L RIU8'til he can comply with new regs. W9JAB says he will report regularly. W9GES is active on 3.5 and 1.7 MHz. W9FRO found time to handle a little. W9DFS is lining up schedules. W9CUL has a new shack away from jr. ops QRM. W9FQG is going to Deerfield Academy. W9JJS is looking for new job. W9FNG has a nice new shack. W9GIC is reorganized. W9FIO has a new shock from the SCM on the 15th of the month for use in this Section report.


WESTERN MASSACHUSETTS—SCM, Earl G. Newson, W1BMA/W1WZ—W1ZB is doing FB. W1BMM has FBXA. W1DFS is lining up the Cape traffic net with AG.

Traffic: W1FQA 127 PAR 41 W1LL 50 AJD 71 EOB 68 PBS 61 STG 48 EYJ 29 ARH 21 DLH 16 COI 6 HOD 5 HII 4 BNL-JNW 3 DBW 2.

NEW HAMPSHIRE—SCM, Basil F. Cutting, W1APK—Thanks, gang, for all the cooperation given me. W1CZG has a fine radio business. W1AXL has a job. W1BFP plays in an orchestra. W1HOU, HQE, HQG, and HOV are new hams. W1FJP is coming on with new rig. W1AVJ went to World's Fair. W1AVJ bled '56. W1BIF is doing fine work. W1BIF is handling the traffic. W1BNL has a new "triple" exciter. W1GUS reports activity in Fisherville with four hams on the air: W1HIB, HJO, FOY, GUZ.

Traffic: W1FPA 157 PAR 10 W1ML 50 AJD 71 EOB 68 PBS 61 STG 48 EYJ 29 ARH 21 DLH 16 COI 6 HOD 5 HII 4 BNL-JNW 3 DBW 2.

December, 1933

PACIFIC DIVISION

HAWAII—SCM, C. D. Slaten, K6COG—KRENIE is again operating as finalist expedition to remote islands in South Seas. New hams: K5JJP, JRN, JEP, JPQ. Three stations made YL.

Traffic: K4GWO 1048 COG 390 GUA 386 FAB 361 AIC 315 AUQ 254 TDH 162 JPT 146 GQF 134 EEI 63

NEVADA—SCM, Keaton L. Ramsay, W6EAD—W6GNN is new RM. W6WJF is working on the hill. W6BOB is building 55-mc. rig. W6FUO is on 'phone. W6HGL blew rectifier tubes. W6GYX has transmitter trouble. W6JEII has 50-watt. W6HCE is rebuilding. W6BOD and HBY are working 1.7-mc. phone. W6WHD has trouble holding voltage. W6GVR is building 5-stage c.c. rig. W6WRY is working on transmitter for U. of N. W6EAD is working out in the hills. W6AJP is building "Tritet" exciter.

Traffic: W6UO 43 GUR—AJP 35 BTI 6 FOU 4 HGLGYX 3.

LOS ANGELES—SCM, Francis C. Martin, W6AAN—W6GNN is now RM. W6UET says is home from CCC Camp at Medford, Oregon. W6CWO is studying mathematics course slowing down rebuild job at W6DYJ. W6SUS is giving 1.7-mc. 'phone a whirl, as are AZX, AZW, and FPU. W6HRG does low power DX. W6ATR schedules his OW and FGT are QRL school. W6BBB is going low power. W6DFT was on trail of last word in receivers. W6BJM is building 7-mc. rig. W6FMY says is on 3.5 mc. W6TE is back on 3.5 me. W6CAL is still high man. W6HLQ and JTS are new traffic men. W6BBB returned to Idaho. W6WHD handles traffic. W6GNN gets WAC. W6WJF is working on transmitter for U. of N. W6EAD is working out in the hills. W6AJP is building "Tritet" exciter.

Traffic: W6UO 43 GUR—AJP 35 BTI 6 FOU 4 HGLGYX 3.

Section statistics for the month of December, 1933.

Traffic: W6TE 705 CDA 632 EZX 287 RF 210 SJA 73 IPO 61 ERN 45 ATB 43 EZX 34 YI 19 AP 11 DBS 3 HH 1 IT 506.

SAN FRANCISCO—SCM, Byron Goodman, W6CAL—W6FQ BPL for umpitse time. New QSL W8JWL schedules RAGX. W6FQV is on 3.5 mc. W6TEB is working on transmitter for U. of N. W6EAD is working out in the hills. W6AJP is building "Tritet" exciter.


SACRAMENTO—SCM, George L. Woodington, W6DVE—W6CKO is still high man. W6LHQ and DFT are new traffic men. W6BBB returned to Idaho. W6WJF and DFT are on trail of last word in receivers. W6VWY has trouble with c.c. W6NFD has 'phone on the brain. W6FOD goes to bed with the chickens. W6CEV is QRL U. of C. W6GIBB is going low power. W6DFT was heard in 7L on 3.5 mc. W6WHD is building 7-mc. rig. W6FMY is on 3.5 mc. W6TEB is working on transmitter for U. of N. W6EAD is working out in the hills. W6AJP is building "Tritet" exciter.
is peking away. W6FYY has new rig. W6FPH has FB phone. W6GSS wants cash for new rig. W6DGY is building. W6DD is on the air. W6GYM is building 1.7-mc. phone. W6FHP is working 3.5-mc. c.w. W6HQL has 211E final. W6SOU uses '03s as modulators. W6GDJ has a pair of '03s and is building up. W6GEZ's '45 went west. W6IMV is getting out OK.


Fellowship: W6JHF is getting ready for snow. W6FKL has two rigs. W6DD is on the air. W6GVM DVE-EWB 8 HLQ 7 DFT 4. He built his c.r. rig. W6HBR hooked a "J" after trying a pair of '03As. W6GHN has a new c.r. rig. W6GSS wants cash for new rig. W6DZY is active. DXers: W6IIF, DSQ, JCE. Active: W6GUQ, W6JVR, W6FQU. W6DQN leads the Section. W6FWJ lost his rig.

Traffic: W6HQL has 211E final. New rig. W6FYX is waiting. W6DD is building a ham. W6FPH is building a new rig. W6DQO is building a new rig. W6DD is on the air. W6HQL has 211E final. W6FYX is building a new rig. W6DD is building a new rig.

Traffic: W6HQL is building a new rig. W6DD is on the air. W6HQL has 211E final. New rig. W6FYX is waiting. W6DD is building a ham. W6FPH is building a new rig. W6DQO is building a new rig. W6DD is on the air.
W3BXP wants schedules from CC Camp. W3BUO's new Zepps: W3DFU, DAM. W3BZA has new rig. W3CXM, APT, DVO, A WY. First reports: W3DQD, won crystal in RDC. W3AAF rig most finished. W3ZA blew power supply. W3CLV got DNR, DDG. Active on 'phone: W3COJ, ASK, AEI, AEQ, L-7, AY. W3B, W3DEE, CDW. Traffic hounds: W3CZX, COO, CFI, BJ, CA, CYY. Traffic: W3DV'T 351 BXX 237 BZI 241 OA 217 WS 143 DCU 100 AMB 33 AJ 85 CVQ 70 CTE 41 BCG 34 CSI 32 BRY 31 BDQ 7 BCA 4 GCN 2 DAM 1 AUG 220 FJ 160 AKZ 7 CVY 46 BAI 30 CVF 27 AKN 20 CWS 12 BWA 11 WM 6 CNP 4 ASK 3 TPI 2 DRK-MQ 1 BIW 115 BTM 40 CMJ 30 BFG 29 AEI 24 CHE 14 DDG 12 AU-DUN 6 DPQ 5 AT-LIX 2 BAD 3 COO 2 CDW 1 GE 27 BYA 56 CIJ 7 CFL 5 CEX 71 DNR 54 LY 2 BSW 1 XPJ 9 APT 11 COJ 52 ADD-DVO 143 DCU 106 AMB 93 AAJ 85 CVQ 80 CYK 41 BGS 34 CYM 1 CLX 23 APF 12 BRE-MT 2.

1. 20 CWS 12 BW A 11 WM 6 CPN 4 ASK 3 BPI 2 DRK-DG 14 DDG 12 AZU-DON 6 DVP 5 AU-DQD 4 BAD 3 143 DCU 106 AMB 93 AAJ 85 CVQ 80 CYK 41 BGS 34 CYM 1 CLX 23 APF 12 BRE-MT 2.

2. 3.5 me. W8HBQ worked first VK. W8CYV and CDV use c.c. W8BOW is attending Carnegie Tech. W8BTV uses are new hams. W8ILY is installing 1.75-mc. 'phone. W8EZR (ex-SVZ) Bluefield, keeping them in touch with Langley Field, Va. W8CDE has FB7. W8AOB, TI and ex-GCGR visited HD. W8ELJ installed station at Fall Festival in Logan, with 6 p.m. daily and 1 p.m. Sunday. W8FZH and KSJ are on (WSHD), WLHG (W8EIK), WLHN (W8IKN). WSEIK Ex-W8CAY is going up for 3rd-class mate's license in W. Va. over. W8GAD has Junior Opr. Listen for State WBHCL. CVX, CAY, JM, ASI won prizes in RDC contest. W8JM has been appointed RM for Northern District. Your cooperation with him will be an aid to putting building "Tritet" exciter. W8ETX and CAL threaten to. W8ELJ, W8EIK, ELJ, EZR, HD. New ORS: W8ELJ.

Salt Lake rnty stations. W6FRN gets VKs and ZLs. W6BAE is heard on NCR. W6JV A and JVB are new W6BSE is changing to c.c. W6EXL gets out FB with new cards than he. W7ABF got 'phone on air. Casper Radio Building, thanks to NCR. W6GCJ is thrilled with new rig. W6KHD, KLZ, KDP. W6EZR (ex-SVZ) has new 3.5 me. W9GLG having trouble with the R.I. W9DQD reports sky wires at the fair. W9CVE is coming on with c.c. W9MDN has gone to C.C.C. camp. W9RX is working at KTFI "In Southern Idaho." W6DGR and AHD play checkers by radio. W6EQY has new 50-watt rig. W6KBM is going up for 3rd-class mate's license in A.A.R.S. W7COH blew transformer. W7HX is out of town lot. W3ALS is taking rig to VPI. W3APF new QRA, Altavista. GREELY gang threw a very successful hamfest Oct. 28th. W9JNV is now an "00." W9CCM likes 3.5 me. W9RX is working on c.c. job. W9BYK is in wholesale tobacco business. W9KFO has crystals for sale. W9OUI: "Pop" is key shy. W9OLL moved to a new QRA and has new AGSX rec. W9BRI is teaching code. W9IFD uses 205D in last stage. W9KQY has 3.5 me. W9GSK claims largest 30-volt meter in world. W9GAG and FP are building "Tritet." W9IDR is in Oklahoma. W9LL was QSO Mexico and Honduras. W5ZZ¥ holds call 80 GCM 50 GLI 24 !PH 30 LYE 35 FRP 1 CJJ 2.

SOUTHERN DIVISION

UTAH-WYOMING—Acting SCM, Artz W. Clark. W4BZG reports from W4XQF, W4XQA is working at ITTFI "In Southern Idaho," W4DGR and AHD play checkers by radio. W6EQY has new 50-watt rig. W6ABE is heard on NCR. W6JVA and JVB are new Salt Lake City stations. W6FRN gets VKS and JP's. W6BSE is changing to c.e. W6EKL works out FB with new phone. UARC found new meeting place in Public Safety Building, thanks to NCR. W6GQG is thrilled with new phone. W7ABF got 'phone on air. Casper Radio Club met at W7AFD's house to celebrate his birthday. W8OU1 from Denver visited hams in S.L.C. W8AGQ is active A.A.R.S. W7OCHQ blew transformer. W6Q is QRX from 8 to 9 p.m. from 16th to 19th inclusive each month to receive reports.

Traffic: W6QQC 628 AFN 438 GQR 130 HFI 64 AYL 46 ALJ 40 ADH 35 AGQ 32 ARL 20 AHK 14 ASQ 12 BVP 7 BGR 5 BSE 4 BW-GEZB 1. W7AMU 50 AXX 1 COH 32.

COLORADO—SCM, T. R. Becker. W6BZQ- The

December, 1933

WESTERN FLORIDA—SCM, Eddie Collins, W4MS—Route Manager. W4ACB, W4CAU, W4AW, W4UW is arranging 28-mc. tests. W4QG is going FB. W4BSJ is knocking them out. W4BPI is going c.c. New hams: W4CCL, CQG. W4K3S schedules BBO. W4AGS is after W4ACB. W4ACB is getting second 28 mc. W4K5V reports FB over his way. W4RS is doing an excellent job. W4ATU is working 3.5 and 1.7 mc. W4CMB gets out OK. W4CDE reports every week. W4KBD is on 7 mc. W4AQY is moving to 28 mc. W4AXP reports traffic. Traffic: W4ALJ is selling tube. W4QK has an SW3. Rebuilding: W4ASV is fighting the c.c. rig. W4MS works 14 and 7 mc. JlEZ is moving to 28 mc. W 4AXP reports traffic. W 4ALJ is anxious for traffic. W9LMS uses an FBX rcvr. W4WC is got new YL op. W4BXX, ZB is a newcomer. W5AUG uses '10s in parallel.

DISCERNED SINE RECTIFIER. At the meeting of the Atlanta Radio Club, W4BZ gave an FB talk on mechanics of modulation. W4AW says his traveling representative, W4KQA, business is going well, and W4ZL won crystal Churchill at the meeting.

W4QF works a lot of business. W4KQA is in Chicago working at the EAT station. W4CBY is QRL radio hop. W4NN is on 7- and 3.5-mc.


GEORGIA - SOUTH CAROLINA - CUBA - PORTO RICO-IBLES OF PINES-VIRGIN ISLANDS—Acting SCM, G. A. Love, W4UT—W4UP has c.c. 50-watt rig. W4STI is at the meeting of the Atlanta Radio Club, W4BY is QRL school. W4KQA is DXing. W4BQI is DXing. W4BQI is DXing. W4BQI is DXing. W4BQI is DXing. W4BQI is DXing.


Traffic: W5BII has 12 schedules. W5DJL is lining up traffic. W5BTS, TR and CHK are active. W5CIS reports for 24 mc.

Traffic: W5ANU, RM, W5FC, Dallas Club station, makes BPL reports to 1202 Springdale Road, Atlanta. W4CE, ex-W4TLL, is in Atlanta working at the EAT station. W4CBY is QRL radio hop. W4NN is on 7- and 3.5-mc.

Traffic: WIICEZ 427 CNC 137 BOE-BDX 44 CBY 33 OUC 14 BAR 10 G7 7 CQA 5.

SOUTHERN TEXAS—SCM, David H. Calk, W5BHO—W5OW has some FB schedules. W5MN keeps ten schedules. W5BKE works five schedules. W5PF worked his first African, ZS2F. W5YL is building phone. W5CWV reworked W5ELX, W5AHX. W5CTET is rebuilding to 100 watts. W6AQF has new AUTO. W5CVVV visited in Bath, Maine. W5AYB and YX visited World's Fair. W5BKL reports nice total. W4MC reports 14-mc. 'phone. W5BBO moved to New Mexico.

W5BHO was glad to meet all you fellows at the Convention. W5BHO was glad to meet all you fellows at the Convention. W5BHO was glad to meet all you fellows at the Convention. W5BHO was glad to meet all you fellows at the Convention. W5BHO was glad to meet all you fellows at the Convention.

Traffic: W6BUW 1122 MN 330 BKL 127 PF 38 BKE 26 AFQ 14 CWGW-2 UTC 2 AXE 4 HX 3.

NEW MEXICO—Acting SCM, J. M. Eldodt, W5CGJ—W5AOP, AUQ and CPO were called for Nat'l Guard duty at Gallup. W8CFY has dismantled temporarily.

Traffic: W5COJ 36 AVE 17 CJP-BNT 2 ZM 1.

ONTARIO DIVISION

ONTARIO—Acting SCM, W. Stephen, VE3AD—SGT has organized Toronto traffic net including NO, RT, DJ, WX, SQ, LS, FT, JB, CE, VE, XM, LD, XR, GT and 9AL. 3RC is QRL new c.c. rig. 3RC is in the "Bug" business. The Western Ontario A.R.C. is being reorganized. 3SJE sneaks on the air occasionally. 3QG is manufacturing "Spartans." 3IX blew his 'phone. 3QG is in the "Bug" business. The Western Ontario A.R.C. is being reorganized. 3SJE sneaks on the air occasionally. 3QG is manufacturing "Spartans." 3IX blew his 'phone. 3QG is in the "Bug" business. The Western Ontario A.R.C. is being reorganized. 3SJE sneaks on the air occasionally. 3QG is manufacturing "Spartans." 3IX blew his 'phone. 3QG is in the "Bug" business. The Western Ontario A.R.C. is being reorganized. 3SJE sneaks on the air occasionally. 3QG is manufacturing "Spartans." 3IX blew his 'phone. 3QG is in the "Bug" business. The Western Ontario A.R.C. is being reorganized. 3SJE sneaks on the air occasionally. 3QG is manufacturing "Spartans." 3IX blew his 'phone. 3QG is in the "Bug" business. The Western Ontario A.R.C. is being reorganized.
Traffic Briefs

Upon completion of the Americus-Bartlett Expedition to the Arctic Ocean, 1933, Robert B. Moe, W2UN, operator of VOQH, the Schooner Morrissey, writes: "We depended entirely on amateur radio for all communications. Special credit goes to W2KJ for keeping daily schedules and handling the major portion of the traffic. We also wish to add that the cooperation and interest shown by every station worked was most commendable."

To "Work All Continents" is getting to be an everyday occurrence at W6CUH, operated by Chas. Perrine, Jr. and Herb. Becker, W6QD. On October 31st, W6CUH made WAC in 7¼ hours; on November 1st, in 6¾ hours, and then, "record of records, they WACKED in 1 hour, 58 minutes, on November 2nd!"

3.5-mc. 'phones W9EDW, Aurora, III., and W7AQX, Pendleton, Ore., on June 28th completed their 25th consecutive QSO without missing a night!

The S.S.—December 9th—18th

Each year the Sweepstakes has met with increased popular favor. It is the one contest suited to low power as well as high, to neophytes or old-timers, "phone or c.w., to all ham bands. Plenty of QSOs to go around guaranteed. Whether in the S.S. for an hour, a week-end, or the whole contest enjoyable operating is assured. Increased operating proficiency results, too. See details page 34 this issue. Take part and report to A.R.R.L.

Traffic:

<table>
<thead>
<tr>
<th>Country</th>
<th>Present Amateur Prefix</th>
<th>New</th>
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<tbody>
<tr>
<td>Austria</td>
<td>UO</td>
<td>OE</td>
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<tr>
<td>Dutch East Indies</td>
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<td>Monaco</td>
<td>CT</td>
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<td>UN</td>
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Flash—Madrid Changes

The Madrid Convention takes effect the first of 1934. A number of changes then effective in the Q Code and miscellaneous abbreviations will be of general ham interest. QRV once again means "Are you ready?" (Since 1929 the interpretation "shall I send a series of V's?" has been effective.) After January 1, 1934, our self-adopted MK? will not be required to assist the traffic handler. "QRV" will again be full of meaning to the traffic-handling brotherhood. QSV replaces QRV in the list, and will mean, "shall I send a series of V's?"

QRI (previously meaning, "Is my note bad?") now becomes, "Is my note good?" and the reply, "Your note varies." QSX (now, "Does my frequency vary? Your frequency varies") will become, "Will you listen for —— on bat?"

QSD will be, "Is my keying correct? Are my signals distinct?" with the answer, "Your keying is incorrect; your signals are bad." QSC and QSD are deleted from the list.

Ham use of QSK meaning "Suspend Traffic" under the present Q Code will be inappropriate to go with the usual sign off. It will mean, "shall I continue with the transmission of all my traffic? I can hear you through my signal?" and will carry the answer, "Continue; I will interrupt you if necessary." The new meaning will be FH for the real brass pounding gang just the same.

For repeats QSM means, "Shall I repeat the telegram I sent you?", and as a reply the meaning is in the affirmative. NIL has been added to the miscellaneous abbreviations, meaning "I have nothing for you."

A bunch of new amateur intermediates seems inevitable in call signals of the following countries, where blocks of prefixes different to the Washington allocations have been assigned:
Marconi at W9USA

2046 Lane Court, Chicago

Editor, QST:

I do not know what report was made of the visit of Mr. Marconi to the amateur station at A Century of Progress . . . .

It was the last day of Mr. Marconi's visit to Chicago, and the long round of dinners, broadcasts, and receptions was over. The time was 11 p.m., and everyone in the party was tired. Everyone, too, was hoping that the next event would be the journey back to the hotel, but they did not reckon with Mr. Marconi.

"I hear that there is an amateur station in the Fair," said he, "and I want to go and see it."

Some one suggested that all the buildings had closed an hour before, but that did not damper the great inventor's insistence. So his big Cadillac, with the Italian and American colors flying, turned in the narrow street before the Federal Building, and started slowly down the avenue toward the Travel and Transport Building.

The building was not closed. I cannot tell you whether this was exceptional or the regular procedure for this building, though I suspect the latter. We were the only guests in the building.

Up the blue-green-red-yellow escalator we rode, turned here and there on the floor above, and finally arrived at the small room which houses the official station of the Fair.

The two operators on duty did not seem to know their visitor, but he at once introduced himself. He inspected the equipment carefully, especially one of the transmitters, and said concerning the latter, "That is a very fine piece of workmanship."

The proud builder deprecated his efforts, as amateurs will, saying, "But it was built by only an amateur."

"Ah," said the Senator, "but I am only an amateur myself."

With the above, I will end . . . .

—G. H. Clark, Secretary, RCA Radio Museum Board

Not Enough Room?

North Hibbing, Minn.

Dear Old QST:

In answer to 6BO's letter, "In a Bottle" page 56 of October QST, wish to tell Franklin that something must be wrong with his receiver. I would be in favor of the A.R.R.L. campaigning for new ham recruits— at least 20,000 new members—and let 'em park on "40," too. My FBX spreds "40" over 100 dial divisions and every night for months over half the dial is unused. We need more hams, we need more of them on "40" or we will be finding our government will think we quit ham radio. Perk up your receivers, OM's, there's more room than you think.

—W. J. Ryder, Jr., W9CIY

NX1XL

Lawyers' Club, Ann Arbor, Michigan

Editor, QST:

On behalf of Prof. William H. Hobbs, Director of the University of Michigan Greenland Expeditions, and myself, as in charge of radio communications with NX1XL, the Expedition Station, I wish to thank the A.R.R.L. and the many friendly radio amateurs who have endeavored to facilitate radio communication with the University of Michigan Greenland Expedition during the past exploring season. The amateurs of this and other countries have proved of estimable value to the Expedition . . . .

The expedition, and NX1XL, has just concluded another successful season of exploration on the vast inland ice of Greenland. This season they were located northeast of Upernivik, several hundred miles north of the Arctic Circle. Radio communication was hampered by the necessarily limited power and the poorness, "radioly speaking," of the location. Two-way contact on the higher frequencies with the United States was restricted by the high horizon to the south of the expedition's camp. It was found necessary to relay messages out from the expedition via stations in northern Canada and Europe to the east and west of the expedition, and it was in this regard that the amateurs proved their worth. The mountains apparently did not prove to be as effective a shield to the incoming signals, as Karl V. Hanse, radio operator of NX1XL, had little difficulty in receiving our signals from the University of Michigan station, W8AXZ, in Ann Arbor, Michigan.

Special thanks are due VE6EM, VE4HM, VE6FS, VE4IZ, VE1BZ, TF5B, LA2W, PAOHR, PAOUP, G5HC, and Mr. G. P. Anderson, of London, for their most splendid work.

—Fred W. Albertson, W8DOE
STRIPPED FOR ACTION • Here is more than high performance, here is more than versatility, here is a one-hand, built-for-action receiver. Tuned by a single knob, its smooth responsive circuit picks signals from the air with incisive finality. A fingertip adjusts the volume, the minimum of motion changes coils. Nothing superfluous, nothing lacking, a set to please the hand before the eye. For the FB-7 is designed to dominate the channels, not the shack. It is stripped for action, — and plenty of it.

The FB-7A    The FBXA

NATIONAL COMPANY
THEY QUALIFY!

Constant use in all parts of the world, rapid change from freezing cold to tropical heat, extreme dryness and intense humidity — these are but a few of the factors to be considered in airplane radio equipment.

Here, all the adverse conditions met with in years of ordinary use — plus many new ones besides — may be encountered in a few hours. Here, human lives and the completion of important schedules may depend on the ability of parts to function properly at all times.

Yet standard IRC Resistors meet all requirements for both transmitting and receiving equipment. You'll find them specified by leading lines — find them in daily use from Alaska to Montevideo, from Los Angeles to New York, from Hong Kong to Peiping. Not only do they qualify by test — they excel in actual performance in this, the most exacting of all resistor proving grounds.

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Compton and California Earthquake

Editor, QST:

In the July issue of QST, we Compton hams read with a great deal of interest W6HMW's description of the 1.7-mc. 'phone activities during our recent earthquake. In the name of justice we wish to take exception to the phrase, "The City of Compton, right in the center of the devastated area, was without any means of communication."

The day of the quake the hams in and around Compton (W6FHE, W6BY, W6DNR, W6GAL, W6DVT, W6ECQ, W6DZP, W6BKI, W6DYM, and W6DYH) began immediately to try to get on the air. Much of our equipment was damaged, and it was with a great deal of difficulty we finally managed to set up our stations. W6DVT, W6DNR, W6FHE, and W6GAL negotiated with army officials who were in charge of Compton, and with the able assistance of Lieut. Bickel, W6BKY, we finally managed to obtain the tent, beds, etc., "in front of the city hall." W6FHE's Zepp was strung to the flagpole there, W6GAL's low power c.w. transmitter on 7 mc was set up, batteries, receivers, etc., were furnished by other hams in Compton, and schedule was obtained with W6GZQ in Huntington Park on 160-meter 'phone long before the fellows mentioned in the article by W6HMW were even heard of! Operations were under the competent direction of W6BKY. Of course as none of us had a 160-meter 'phone going, it was difficult to keep sked with the 'phone men; but, nevertheless, we handled many messages.

The following day 6FXE and GXH brought their 'phone rig down and installed it after we'd obtained and set up the tent, tables, antennas, beds, etc. We c.w. fellows then went to our home stations and handled hundreds of QRR messages with east and northern California. W6IIMW was not in Compton until about two days later. As the 'phone men used our equipment after we had "broken the ice" we did not consider it quite fair to give them all the credit. We Compton men were not going to mention our work; but when we read, "Compton was without means of communication" we wanted to set the QST board and other hams straight on this matter so as not to give them the impression we had to have external operators. Although the 'phone facilitated our work, we could have done nicely without the extra-territorial help, and no Los Angeles operator needed to lose 48 hours' sleep on our account.

We Compton men were not going to mention our work; but when we read, "Compton was without means of communication" we wanted to set the QST board and other hams straight on this matter so as not to give them the impression we had to have external operators. Although the 'phone facilitated our work, we could have done nicely without the extra-territorial help, and no Los Angeles operator needed to lose 48 hours' sleep on our account.

—The Compton Bunch

[Editor's Note.—In thus belatedly straightening out the record, we wish to point out that in the interest of giving everyone his fair due and keeping an accurate history of the part played by amateur radio in public emergencies, the amateurs concerned should not "let George do it" when the time comes to report activities. If you take part in emergency work, by all means send a complete account of it to A.R.R.L. Headquarters at the earliest possible moment.]
Even the smaller line of Weston Instruments embodies Weston balanced design, positive alignment of all parts to exacting tolerances and precise craftsmanship. This explains why Weston accuracy endures—why each instrument bearing the Weston name gives long, dependable service. Weston Electrical Instrument Corporation, 602 Frelinghuysen Avenue, Newark, N. J.
These transmitters will give you the most performance and keen enjoyment per dollar. You are vitally interested in seeing that the money you spend for your absorbing hobby brings you real results. The COLLINS RADIO COMPANY guarantees that either the 4A CW Transmitter or the 328 CW Phone Transmitter will do this very thing. The cost is very low — so low that every amateur can well afford to own one. The Byrd Expedition is now using COLLINS Transmitters for the most remarkable communication feat ever attempted. Be sure that your transmitter embodies the same high standard of engineering and constructional excellence demanded by Admiral Byrd and the Columbia Broadcasting System.

We will send you a bulletin with complete data and photographs of the 4A and 32B; and if you wish, we will also refer you to users of these sets who are daily talking all over the country with them. Just send us a card with your address.

COLLINS RADIO COMPANY
CEDAR RAPIDS, IOWA

A.R.R.L. Sweepstakes Contest
(Continued from page 84)

receivers will help, but operating proficiency is what counts! The best equipment is only as useful for communicating as the man behind the key or "mike" can make it. Operating proficiency is what counts!

It is not absolutely necessary that every station you swap messages with be actually taking part in the contest to make your points count. However, logs will be checked and compared with each other to insure complete fairness and accuracy of results and awards. Any operator who doesn't know what it's all about can be referred to these columns.

The highest scoring stations will have literally "swept the air," piling up points by skilful operating work . . . hence the name "Sweepstakes." It has become one of our most interesting and popular operating activities. The contest is extremely simple. For any hams who have taken part it is unnecessary to explain the opportunities for making new contacts and friendships. It is of interest to see how many Sections can be worked in the contest period; to determine how many stations can be worked if you have never tried to work "all Sections," take this as an opportunity to try it. You will add new Sections, and new stations. Any frequency bands can be used, and either voice or telegraph.

Scoring system in brief:
For c.w. to c.w. and 'phone-to-"phone contacts:
1 point for each QSO when message exchanged one way.
2 points for each QSO when message exchange is made both ways.

For c.w. to 'phone or 'phone to c.w. contacts:
2 points for each QSO when a message is exchanged in one direction.
4 points for each QSO when messages are exchanged in both ways.

For final score:
Multiply totaled points by the number of A.R.R.L. Sections worked, that is, the number in which at least one bona fide S.S. point or exchange has been made.

All active ham stations are invited to take part and report. You will work a new bunch of stations, make new records for your station, get a new bunch of QSL cards, have a whole lot of fun, meet new friends, and perhaps rate an A.R.R.L. award at the conclusion. If you are a newly licensed ham or one who has never majored in "traffic work" you will get some FB operating experience and have a chance to work with a "swell" gang of operators and really friendly fellow hams. The chances have been made as equal as they can be made for all. So put in your best licks at operating and send A.R.R.L. the results for QST mention.

REPORTING RESULTS
Report to A.R.R.L., West Hartford, Conn., giving your list of QSO's, showing Sections, stations and total, as soon as the contest is over. Include a signed statement that the points as enumerated are correct and true. Hold message files for checking but do not send them unless and until called for. Use the form suggested herewith in reporting.

QUESTIONS ON THE CONTEST
How short a message is permitted to prove a QSO? Five-word text.
Is a long signature required? It can be shortened to nickname or station call, plus Section identification where necessary.
When must Section be identified? When smaller than a state or province. Not in Form A, but in California, N. Minn., S. Minn., E. N. Y., W. N. Y., N. Y., N. Y. C., L. I., E. Mass., W. Mass., etc. Signatures to the example of message form is brief and thorough in wording if changed to "WA1REX N Y Y." What about the address? Call signal, city and state must be given, and a line meaning adequate on originator to addresser messages. Where relayed through even one station, a complete address with name, street, and number, should always be given to facilitate delivery.
Can Fig. stations take part? Yes, but the operators are ineligible for awards. WM1K will send the usual addressed transmissions to members, but in the remaining time will work with stations wherever possible to add the point or points of those in the S.S. What can I write texts about? Anything at all, See almanac,
These A. C. solenoid relays are ideal for remote control of transmitters, for control of crystal ovens, and for any general remote control application except for keying. THESE RELAYS WILL NOT OPERATE IN KEYING SERVICE. Silver-to-silver double break contacts are used throughout.

The maximum contact rating is 10 amperes at 220 volts. The relay coils are wound for 115 volts 60 cycle alternating current. Relays for other voltages can be supplied on special order. Use coupon below when ordering.

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<th>Type No.</th>
<th>Poles</th>
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<td>5.00 6.00</td>
<td></td>
</tr>
</tbody>
</table>

**ORDER BLANK—MAIL WITH REMITTANCE TO**

Enclosed find money order for $________________ for which please send me, shipping charges prepaid, the following items:

Name ________________________________

Address ________________________________
To Our Readers who are not A.R.R.L. members

YOU should become a member of the League! That you are interested in amateur radio is shown by your reading of QST. From it you have gained a knowledge of the nature of the League and what it does, and you have read its purposes as set forth on the page opposite the editorial page of this issue. We should like to have you become a full-fledged member and add your strength to ours in the things we are undertaking for Amateur Radio. You will have QST delivered at your door each month. A convenient application form is printed below—clip it out and mail it today.

A bona fide interest in amateur radio is the only essential qualification for membership.

AMERICAN RADIO RELAY LEAGUE
West Hartford, Conn., U. S. A.

I hereby apply for membership in the American Radio Relay League, and enclose $2.50 ($3.00 outside of the United States and its Possessions, and Canada) in payment of one year's dues, $1.25 of which is for a subscription to QST for the same period. Please begin my subscription with the issue. Mail my Certificate of Membership and send QST to the following name and address.


Do you know a friend who is also interested in Amateur Radio, whose name you might give us so we may send him a sample copy of QST?

Thanks

Standard Frequency Transmissions

<table>
<thead>
<tr>
<th>Date</th>
<th>Schedule</th>
<th>Station</th>
<th>Date</th>
<th>Schedule</th>
<th>Station</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dec. 1</td>
<td>BB</td>
<td>W6XK</td>
<td>Dec. 30</td>
<td>BX</td>
<td>W6XK</td>
</tr>
<tr>
<td></td>
<td>A</td>
<td>W9XAN</td>
<td></td>
<td>Jan. 5</td>
<td>A</td>
</tr>
<tr>
<td>Dec. 2</td>
<td>BX</td>
<td>W6XK</td>
<td>Dec. 1</td>
<td>G</td>
<td>W6XK</td>
</tr>
<tr>
<td>Dec. 3</td>
<td>C</td>
<td>W6XK</td>
<td>Jan. 7</td>
<td>C</td>
<td>W1XP</td>
</tr>
<tr>
<td>Dec. 8</td>
<td>A</td>
<td>W6XK</td>
<td>Jan. 10</td>
<td>A</td>
<td>W1XP</td>
</tr>
<tr>
<td>Dec. 10</td>
<td>G</td>
<td>W1XP</td>
<td>Jan. 12</td>
<td>B</td>
<td>W9XAN</td>
</tr>
<tr>
<td>Dec. 13</td>
<td>A</td>
<td>W1XP</td>
<td></td>
<td>B</td>
<td>W6XK</td>
</tr>
<tr>
<td>Dec. 15</td>
<td>B</td>
<td>W9XAN</td>
<td>Jan. 17</td>
<td>BB</td>
<td>W1XP</td>
</tr>
<tr>
<td>Dec. 20</td>
<td>BB</td>
<td>W1XP</td>
<td>Jan. 19</td>
<td>B</td>
<td>W9XAN</td>
</tr>
<tr>
<td></td>
<td>C</td>
<td>W9XAN</td>
<td></td>
<td>A</td>
<td>W6XK</td>
</tr>
<tr>
<td>Dec. 22</td>
<td>B</td>
<td>W9XAN</td>
<td>Jan. 24</td>
<td>B</td>
<td>W1XP</td>
</tr>
<tr>
<td>Dec. 27</td>
<td>B</td>
<td>W1XP</td>
<td>Jan. 26</td>
<td>B</td>
<td>W9XAN</td>
</tr>
<tr>
<td>Dec. 29</td>
<td>BB</td>
<td>W9XAN</td>
<td>Jan. 27</td>
<td>BX</td>
<td>W6XK</td>
</tr>
<tr>
<td></td>
<td>A</td>
<td>W9XAN</td>
<td></td>
<td>C</td>
<td>W6XK</td>
</tr>
</tbody>
</table>

STANDARD FREQUENCY SCHEDULES

<table>
<thead>
<tr>
<th>Time (p.m.)</th>
<th>Sched. and Time</th>
<th>Freq. (kc.)</th>
<th>Time (p.m.)</th>
<th>Sched. and Time</th>
<th>Freq. (kc.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00</td>
<td>A</td>
<td>BB</td>
<td>4:00</td>
<td>BB</td>
<td>C</td>
</tr>
<tr>
<td>8:08</td>
<td>BB</td>
<td>W6XK</td>
<td>4:08</td>
<td>7000</td>
<td>14,000</td>
</tr>
<tr>
<td>8:16</td>
<td>BB</td>
<td>W9XAN</td>
<td>4:16</td>
<td>7200</td>
<td>14,200</td>
</tr>
<tr>
<td>8:24</td>
<td>BB</td>
<td>W6XK</td>
<td>4:24</td>
<td>7300</td>
<td>14,400</td>
</tr>
<tr>
<td>8:32</td>
<td>BB</td>
<td>W9XAN</td>
<td>4:32</td>
<td>7400</td>
<td>14,600</td>
</tr>
<tr>
<td>8:40</td>
<td>BB</td>
<td>W6XK</td>
<td>4:40</td>
<td>7500</td>
<td>14,800</td>
</tr>
</tbody>
</table>

Saturday Morning Schedule

<table>
<thead>
<tr>
<th>Time (p.m.)</th>
<th>Sched. and Time</th>
<th>Freq. (kc.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4:00</td>
<td>BB</td>
<td>7000</td>
</tr>
<tr>
<td>4:08</td>
<td>BB</td>
<td>7100</td>
</tr>
<tr>
<td>4:16</td>
<td>BB</td>
<td>7200</td>
</tr>
<tr>
<td>4:24</td>
<td>BB</td>
<td>7300</td>
</tr>
</tbody>
</table>

The time specified in the schedules is local standard time at the transmitting station. W1XP uses Eastern Standard Time, W9XAN, Central Standard Time, and W6XK, Pacific Standard Time.

TRANSMITTING PROCEDURE

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

2 minutes—QST QST QST QST (station call letters).
3 minutes—Characteristic letter of station followed by call letters and statement of frequency. The characteristic letter of W1XP is "G"; that of W9XAN is "O"; and that of W6XK is "M".
1 minute—Statement of frequency in kilocycles and announcement of next frequency.
2 minutes—Time allowed to change to next frequency.

56-Mc. World's Records

(Continued from page 51)

ing it to be the last word in ground-to-ground 56-mc. DX. Now comes another claim from across the Atlantic—a claim for recognition of what would certainly appear to be the world’s best DX in plane to ground work. The job was done by F. C. C. van Baerle, PA0HI, and R. A. W....
Suggestions for Santa
We know most Hams don't need them—but just in case

GENERAL RADIO
Unit Panels & Accessories
set a new standard in experimental equipment design. Space does not permit a detailed description, so write us for Bulletin No. 935. The 661-A panel shown, for example, size 19" x 12" complete with all the gadgets is only $6.00. The 661-K end and base plate assembly for above, $5.00. The 661-R dust cover $1.50.

SYLVANNIA SPECIAL
Quantity production has enabled Sylvannia to reduce the price of the $30 87.75
A pair will give you 80 watts of audio in class B or 120 watts output in class C amplifier at 750 volts plate. The sturdy 10 volt, 2 amp, thoriated tungsten filament and graphite plate insure long life. The rugged tube for the 210 user who desires increased output at a reasonable price. Sylvanna 203-A, $17.50; 210, $4.75; 225 New... $10.

LEEDS TRANSFORMERS
For Every Amateur Need
Mounted Filament Transformers
25kv, 6 amp, 2000 v. ins... $0.95
25kv, 10 amp, 2000 v. ins... $1.25
5 v, 3 amp, 2000 v. ins... $0.95
6.3 v, 25amp, 2000 v. ins... $0.95
7.5kv, 10 amp, 2000 v. ins... $1.25
Two 256, 5 amp, one 5 v, 3 amp... $2.25
Two 754, 3 amp, one 25v, 3 amp... $2.50
Two 754, 3 amp, one 5 v, 3 amp... $2.50
Three 5 v, 3 amp, for 83 Bridge
Rectifier... $2.50
254v, C.T. 10 amp, 10,000 v.
Insulation.. $2.75
10 v, C.T. 7 amp, with tap
primary... $3.95
Mounted Plate Transformers
1100v, C.T. 150 M.A., 754v, 3 amp.;
5 v, 3 amp; 254v, 3 amp... $4.75
950v, C.T. 200 M.A. two 254 v.
5 amp, one 5 v, 3 amp... $3.75
Universal cased plate transformer, with stand-
off insulated terminals, 300 w., capacity:
750-1000-1500 v., each side...
$10.95
Leeds uncased class B transformer
for 45 and 59 tubes, pair... $3.50

Western Electric Phones
Type P-11 Signal Corp phones. These
would ordinarily sell at $7.50. All new
all perfect. Here's a genuine bargain at...
$3.95

The Grammer low powered transmitter
kits as supplied by us include all essen-
tial parts except tubes.
We have supplied several hundred hams
with these kits. Why not join this gang
with a signal well within the law? The
cost is low and both higher power and
phone can be added without junking any
parts.
Oscillator double kit... $12.95
Power supply kit... 6.95
Amplifier kit... 7.75

LEEDS
BAND SPREAD MONITOR
furnished complete — Sylvannia 30 tube, A
and B batteries and 340-80 coils. 50
division spread on meters — 35 divisions
on 40 meters and 70 divisions on 80 meters.
Unconditionally guaranteed.

$9.95

NAVY TYPE TELEGRAPH KEY
List $3.60.
Navy knob—
14" Tung-
sten con-
tacts. Only a
few left at...
$1.25

JEWELL TUBE CHECKERS
A few of the 214 and No. 533 Jewell...
$33
tube checkers left at the same price
Complete with adapters. See last month's
adv.

The New Hammarlund "Pro"
with crystal filter (less tubes)...
$111.72
with automatic volume...
$11.86 extra

45 Vesey Street, New York City
New York Headquarters for Transmitting Apparatus
Say You Saw It in QST — It Identifies You and Helps QST
GR STANDARD UNIT—
Panel Construction

INTERCHANGEABLE
READY TO USE
NO DRILLING
LOW PRICE

Panels, bases, end plates, and dust covers
are made of Eraydo, the new non-magnetic
panel material. Holes are cut for standard
navy-type meters with a liberal supply of
\( \frac{1}{2} \) inch holes for rheostats, jacks, terminals,
toggle switches, and whatnot. Covers of
the same material are furnished for mount­
ing condensers, coils, and other gear; also
adapter rings for 2-inch meters. Push-in
buttons cover the small holes that are not in
use, and bushings are supplied so that parts
mounting in holes smaller than \( \frac{1}{2} \)-inch can
be utilized.

GET THE WHOLE STORY
SEND FOR DESCRIPTIVE BOOKLET

A 12-page booklet that answers all
questions and shows dimensions,
prices, and assembly suggestions is
yours for the asking. Ask for Bulle­
tin 935-G and address the General
Radio Company, Cambridge, Massa­
chusetts.

GENERAL RADIO

Fereday, G6FY, in a plane flying at 4000 feet
over Dover and Folkestone, and by a listener at
Erick Church who copied a message in the
Dutch language with but a single error. The
distance covered was not a foot less than 235
miles.

Can we let 'em get away with this sort of
thing, gang, when we still have 14,000-foot moun­
tains and planes flying to 20,000 feet?

Experimenters’ Section
(Continued from page 88)

ence if \( C_s \), across the filament, is omitted. Slightly
more feedback is necessary with the 34 than with
a 38. The rig is at least as sensitive as the 32 or
34 in the conventional hook-up, and the regenera­
tion control is as smooth and definite as on the
a.c. model. The 34 seems to be a little better
than the 32; with the 34 fringe howl is almost
terribly absent. A disproportionate amount of
tickler is necessary on the higher-frequency coils,
probably because of capacity leakage between
the filament choke and the aluminum chassis.”

Band-spreading can be secured by using two
variable condensers, one having a maximum
capacity of 100 µµfd. and the other 35 µµfd., in
parallel in place of the single condenser shown at
\( C_s \). In this receiver the filaments are connected in
series, and the voltage drop through the 34
detector filament and the choke, \( RFC_s \), is used
to bias the Type 30 amplifier. Additional bias is
provided by the 3-volt battery in the amplifier
grid-return circuit.

Strays

R.f. chokes can be had by yanking apart those
old R.C.A. r.f. transformers and using the coils
out of them. The connections in the center should
be soldered together, as these wires are not other­
wise connected after dismantling. They make
fine chokes for 40 and 80, and will easily stand
anything a 210 can do to them.

Talk about the one-armed man with the 7-year
itch. We used to know a chap who had one
201-A and it did both the transmitting and
receiving. He used to slap it in the transmitter
and call a CQ, then deftly jerk it out and juggle
the hot tube into the receiver, set the regeneration
on edge and tune the boys in. In a minute back
the trusty bottle would go into the transmitter,
its white hot plate going through an accordion­
like motion under the 100-watt input.

—WIUT

Our Cover Illustration

For the benefit of readers worried to distraction
by the cover photograph, and about to write us
for an explanation, we suggest the following pos­
ible interpretations:

(a) Unnerved by the problems of QRM, a
phone ham has gone hay-wire.

(b) Overcome by the problems of producing
QST covers, a photographer has gone bug-house.
The "Three Aces" represent Hygrade Sylvania's latest contribution in the field of amateur radio. These three tubes, the 830, 825 and 210, meet a long felt need among amateurs. These tubes will give the amateur the kind of service and long life he has wished for. And further, the reasonable prices of these SYLVANIA Tubes make the buying of used tubes and "seconds" unjustifiable and uneconomical. And Fellows, remember, SYLVANIA engineers have not stopped here, they are always striving to improve upon tubes available for amateur use. Of course the "Three Aces" employ SYLVANIA'S GRAPHITE ANODE construction.
THE SYLVANIA 830

The Type 830 SYLVANIA Tube is a star performer. It is possible to place an 830 tube in a standard four prong socket... just increase the filament voltage to 10 Volts and the plate Voltage to 750. Very simple. And, what output! In Class C service under normal conditions the Type 830 is capable of 55 watts. This tube is meeting with wide-spread approval among 'phone men for Class B service in modulating systems. The GRAPHITE ANODE construction in the Type 830 makes this a real he-man tube. This tube particularly should make the amateur realize that the purchase of a 50 watt of the "used" or "second" variety is uneconomical.

CHARACTERISTICS

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Filament Voltage</td>
<td>10</td>
</tr>
<tr>
<td>Filament Current</td>
<td>2.15 Amps.</td>
</tr>
<tr>
<td>Maximum Overall Length</td>
<td>5 3/4&quot;</td>
</tr>
<tr>
<td>Maximum Diameter</td>
<td>2 1/16&quot;</td>
</tr>
<tr>
<td>Bulb</td>
<td>116-26X</td>
</tr>
<tr>
<td>Base</td>
<td>Medium 4 pin Isolantite</td>
</tr>
</tbody>
</table>

**Class "A" Service**

- Maximum Operating Plate Voltage: 450 V
- Maximum Plate Dissipation: 17 Watts

**OPERATING CONDITIONS**

<table>
<thead>
<tr>
<th>Plate Voltage</th>
<th>Grid Voltage</th>
<th>Load Resistance</th>
<th>Amplification Factor</th>
<th>Plate Resistance</th>
<th>Mutual Conductance</th>
<th>Plate Current</th>
<th>Undistorted Power Output, Watts</th>
</tr>
</thead>
<tbody>
<tr>
<td>250</td>
<td>-15.0</td>
<td>9300</td>
<td>8.0</td>
<td>4600</td>
<td>1750</td>
<td>15.0</td>
<td>0.35</td>
</tr>
<tr>
<td>350</td>
<td>-26</td>
<td>8800</td>
<td>8.0</td>
<td>4250</td>
<td>1900</td>
<td>17.5</td>
<td>1.1</td>
</tr>
<tr>
<td>450</td>
<td>-38</td>
<td>8000</td>
<td>8.0</td>
<td>4000</td>
<td>2000</td>
<td>20.0</td>
<td>2.0</td>
</tr>
</tbody>
</table>

**Class "B" R. F. Service**

- Maximum Operating Plate Voltage: 750 V
- Maximum D. C. Plate Current: 60 Ma.

**DIRECT INTERELECTRODE CAPACITANCES**

<table>
<thead>
<tr>
<th>Cpp</th>
<th>Cgf</th>
<th>Cpf</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.9 mmf.</td>
<td>4.9 mmf.</td>
<td>2.2 mmf.</td>
</tr>
</tbody>
</table>

**Class "C" Service**

- Max. Operating Plate Voltage (Modulated): 750 V

**OPERATING CONDITIONS**

- Plate Voltage: 750 V.
- Grid Voltage, Neg.: 180 V.
- Power Output: 55 Watts

AMATEURS PLEASE NOTE: This is the December issue of QST. A Sylvania Tube will make an excellent Christmas gift. Show Father or Mother, YL or Ex-YL these Sylvania pages.
THE SYLVANIA 825

- Widely-spaced, low inductive plate and grid connections and unusually low inter-element capacity make the Type 825 Tube the most efficient short wave oscillator and amplifier. The Type 825 is suited to all short wave work, but it is outstandingly superior for the frequencies between 20-100 megacycles. The Type 825 Tube embodies in design and performance the results of specialized research in ultra high frequency work, and knowledge of high frequency phenomena. This tube is excellent for amateur work on the 20-10 and 5 meter bands.

CHARACTERISTICS

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Filament Voltage</td>
<td>7.5</td>
</tr>
<tr>
<td>Filament Current</td>
<td>3.25 Amp.</td>
</tr>
<tr>
<td>Average Characteristics at:</td>
<td></td>
</tr>
<tr>
<td>Ep, 1000 Eg, 70 Ef, 7.5 A. C.</td>
<td></td>
</tr>
<tr>
<td>Plate Current</td>
<td>0.040 Amp.</td>
</tr>
<tr>
<td>Plate Resistance</td>
<td>10,000 Ohms</td>
</tr>
<tr>
<td>Voltage Amplification Factor</td>
<td>10</td>
</tr>
<tr>
<td>Mutual Conductance</td>
<td>1000 μMhos</td>
</tr>
<tr>
<td>Maximum Plate Voltage:</td>
<td></td>
</tr>
<tr>
<td>Modulated DC</td>
<td>750</td>
</tr>
<tr>
<td>Unmodulated DC</td>
<td>1000</td>
</tr>
<tr>
<td>Maximum Plate Dissipation</td>
<td>40 Watts</td>
</tr>
<tr>
<td>Normal R. F. Output</td>
<td>40 Watts</td>
</tr>
<tr>
<td>Interelectrode Capacitances:</td>
<td></td>
</tr>
<tr>
<td>Grid to Plate</td>
<td>3 μF</td>
</tr>
<tr>
<td>Grid to Filament</td>
<td>2 μF</td>
</tr>
<tr>
<td>Plate to Filament</td>
<td>1 μF</td>
</tr>
<tr>
<td>Max. Overall Dimensions:</td>
<td></td>
</tr>
<tr>
<td>Height</td>
<td>6 1/4 inches</td>
</tr>
<tr>
<td>Diameter</td>
<td>2 7/16 inches</td>
</tr>
<tr>
<td>Bulb</td>
<td>S-19</td>
</tr>
<tr>
<td>Base</td>
<td>Medium 4-pin Ceramic</td>
</tr>
</tbody>
</table>

EIGHT POINTS OF SUPERIORITY

1. Wide separation of input and output leads for lowest possible capacity.
2. Plate lead. Maximum insulation.
3. "Floating Anode" held only by low-loss ceramic spacers.
4. Thoriated tungsten carbide filament, specially designed and processed for ultra-high frequencies.
5. Low-loss ceramic base.
6. No mechanical strain on press.
8. Graphite anode.

ALL CORRESPONDENCE concerning our other transmitting tubes for amateur use should be mailed to Hygrade Sylvania Corporation, Amateur Radio Division, Clifton, N. J.
THE SYLVANIA 210

- This SYLVANIA Type 210 is the first 210 ever designed and manufactured strictly as a transmitting tube. This tube has a punch, the like of which has never before emanated from a 210. This 210 can take it! It is a powerful tube, efficient, and sturdily constructed. Don't miss the first opportunity to try a SYLVANIA 210. There is a surprise in store for you.

CHARACTERISTICS

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Elements</td>
<td>3</td>
</tr>
<tr>
<td>Filament Voltage</td>
<td>7.5</td>
</tr>
<tr>
<td>Filament Current</td>
<td>1.25A</td>
</tr>
<tr>
<td>Filament Type</td>
<td>Thoriated Tungsten</td>
</tr>
<tr>
<td>Average Characteristics at:</td>
<td></td>
</tr>
<tr>
<td>EP = 425, EG = -39, EF = 7.5</td>
<td></td>
</tr>
<tr>
<td>Plate Current</td>
<td>0.018 Amp.</td>
</tr>
<tr>
<td>Amplification Factor</td>
<td>8</td>
</tr>
<tr>
<td>Plate Resistance</td>
<td>5450 Ohms</td>
</tr>
<tr>
<td>Mutual Conductance</td>
<td>1550 uMhos</td>
</tr>
<tr>
<td>Interelectrode Capacitances</td>
<td></td>
</tr>
<tr>
<td>Grid to Plate</td>
<td>7 uufd.</td>
</tr>
<tr>
<td>Grid to Filament</td>
<td>4 uufd.</td>
</tr>
<tr>
<td>Plate to Filament</td>
<td>2.2 uufd.</td>
</tr>
<tr>
<td>Max. Overall Dimensions</td>
<td></td>
</tr>
<tr>
<td>Height</td>
<td>5% inches</td>
</tr>
<tr>
<td>Diameter</td>
<td>2 inches</td>
</tr>
<tr>
<td>Base</td>
<td>Medium 4-pin, ceramic</td>
</tr>
<tr>
<td>Bulb</td>
<td>1-16</td>
</tr>
<tr>
<td>Type of Cooling</td>
<td>Air</td>
</tr>
<tr>
<td>Class &quot;A&quot; Operation</td>
<td></td>
</tr>
<tr>
<td>Max. Operating Plate Voltage</td>
<td>600</td>
</tr>
<tr>
<td>Max. Plate Dissipation</td>
<td>15 watts</td>
</tr>
<tr>
<td>Typical Operation at:</td>
<td></td>
</tr>
<tr>
<td>EP = 600, EG = -58, EF = 7.5</td>
<td></td>
</tr>
<tr>
<td>D. C. Plate Current</td>
<td>0.018 Amp.</td>
</tr>
<tr>
<td>Peak Grid Swing</td>
<td>55 Volts</td>
</tr>
<tr>
<td>Load Resistance</td>
<td>10,000 Ohms</td>
</tr>
<tr>
<td>Power Output</td>
<td>3 Watts</td>
</tr>
</tbody>
</table>

Class "B" Operation

- Max. Operating Plate Voltage: 600
- Max. D. C. Plate Current (Unmod.): 0.70 Amp.
- Max. Plate Dissipation: 20 Watts
- Max. R. F. Grid Current: 5 Amp.
- Max. D. C. Grid Current: 0.015 Amp.

Typical Operation at:
- EP = 600, EG = -80, EF = 7.5
- D. C. Plate Current (Unmod.): 0.066 Amp.
- Peak Power Output: 12 Watts
- Carrier Output (Mod. Factor 1): 3 Watts

Class "C" Operation

- Max. Operating Plate Voltage: 600
- Modulated D. C.:
  - 450
- Unmodulated D. C.:
  - 600
- A. C. (R. M. S.):
  - 600
- Max. D. C. Plate Current: 0.070 Amp.
- Max. Plate Dissipation: 20 Watts
- Max. R. F. Grid Current: 5 Amp.
- Max. D. C. Grid Current: 0.015 Amp.

Typical Operation at:
- EP = 600, EG = -125, EF = 7.5
- D. C. Plate Current: 0.066 Amp.
- Peak Power Output: 15 Watts

- Sylvania’s Amateur Radio Division invites inquiries from amateurs on Sylvania’s Transmitting Tubes. FREE characteristic charts and Price Lists. See your dealer if he cannot supply you, send your order to:
"EXPERIENCE," said Andrew Jackson, "is the unerring test of all human undertakings." This Navy Radioman knows from everyday, first-hand experience the efficiency and reliability of CARDWELL condensers; that the lesson has not been lost upon him is indicated by his letter.

Experience has shown him that the CARDWELL survives where many "fair weather" condensers would fail, and that a condenser must be good if it can survive violent shocks, unavoidable abuse, the ravages of salt water and salt air, extremes of heat and cold — and still indefinitely retain the 100% efficiency required of all Navy apparatus.

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32 Main St. Bluffton, Ohio

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**W2VY**

(Continued from page 38)

filter with 8 µfd. of condenser. Tube keying is employed with both oscillators. An automatic tape transmitter is sometimes used for calling DX and stations with whom schedules are maintained. A 300-watt crystal-control outfit is now under construction.

Receiving equipment consists of a Hamburlund Comet Pro and National SW-3 and SW-5 receivers. A commercial dynatron frequency meter is employed for frequency checking.

The antenna system, which for the past three years has given exceptionally good results, consists of a 66-foot flat top, current fed through a pair of heavy weather-proofed twisted feeders 45 feet long.

DX is as expected for the power used. All continents have been worked.

Further Licensing Notes

(Continued from page 32)

Any renewal of station license occasioned solely by renewal of operator license. Any renewal of operator license occasioned solely by renewal of station license. Any renewal of station license occasioned by modification of station license.

The station license is not renewed, however, when an operator license is modified to grant higher class operator privileges. This is accomplished solely by an additional endorsement on the operator license, and it is not necessary to file any application with respect to the station.

The Commission has also revised its commercial operator license regulations. Included among them is Rule 420 which again states that amateur stations may be operated only by licensed amateur operators. Amateurs will be interested in Rule 445 which permits an amateur to operate any station in the experimental service licensed for and operating on frequencies above 30,000 kilocycles, solely by virtue of his amateur operator license.

An Amplifier for the Universal Exciter Unit

(Continued from page 38)

capacity, so the size of the tank coil should be such that resonance is reached with 50% or more of the total capacity of C2 in the circuit. If this rule is followed the amplifier will remain neutralized for any tank coil, L1, and the first neutralizing adjustment will be the last.

After the amplifier is neutralized, C2 should be set at resonance and the plate voltage applied; a final touch should be given C2 to bring the plate current to the lowest value possible. Following this the antenna coil may be coupled to L4 and the feeder condensers adjusted for maximum feeder or antenna current. The driver stage tuning condenser, together with C1 and C3 probably will require final readjustments to bring the output up to maximum. The grid current will drop when the amplifier is taking power, but this is a normal condition.

**DOUBLING**

The amplifier will work with rather good efficiency as a doubler, if the occasion should arise to...
Here are the essential accessories to the operating equipment of a well-run and efficient amateur station. Buy them ahead of your actual needs—don’t wait until you run out—check up now—how’s your supply? The LOG BOOK, bound in heavy paper covers, 8½ by 10¾, contains 39 log pages and the same number of blank pages for miscellaneous notes. Also there is a list of Q signals, a message number sheet and a sheet of cross-section paper. Price, 40¢ each or 3 for $1. The MESSAGE BLANKS are the most convenient form for handling and delivering messages. Designed by the Communications Department for maximum ease and efficiency. Well printed on good bond paper. Size 8½ by 7¾. Price, 35¢ per pad of 100 sheets, three pads for $1. You should write your radio letters on the official League MEMBER’S STATIONERY. It identifies you instantly and is good-looking and convenient. Lithographed on heavy 8½ by 11 bond paper. Price, 100 sheets for 50¢, 250 sheets for $1, 500 sheets for $1.75. The neatest and simplest way to deliver a message by mail is to use a standard MESSAGE DELIVERY CARD. It explains what it is and how it got there. Price, 2¢ each on U. S. stamped postal cards or 1¢ each on plain cards. All above prices are postpaid. Please do not remit in postage stamps. Stock up now with these various supplies for a flying start into the new year. THE AMERICAN RADIO RELAY LEAGUE, INC., WEST HARTFORD, CONNECTICUT.
The RK-18 is designed to meet every requirement of the amateur from a 5-meter self excited oscillator to a high power Class B modulator. A molybdenum plate tells when proper plate dissipation is reached. Isolantite insulation insures against dielectric loss. Grid and plate leads are positioned for convenience and efficiency in the transmitter assembly.

**RATING**

<table>
<thead>
<tr>
<th>Class A</th>
<th>Class B</th>
<th>Class C</th>
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<tr>
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<tr>
<td>Max. Watts Plate Dissipation</td>
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<tr>
<td>Nominal Watts Output Per Tube</td>
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<td>40</td>
</tr>
<tr>
<td>Max. over-all Length</td>
<td>2½&quot;</td>
<td>2½&quot;</td>
</tr>
</tbody>
</table>

List Price—$10.95

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---

**The Overmodulation Racket**

(Continued from page 19)

The methods of adjustment that accompany their description will result in proper, symmetrical modulation. Actually these instructions vary but little in their essentials, from one transmitter to another. Neutralize r.f. circuits precisely, apply the right bias and plate voltages, insure proper excitation, adjust r.f. load so that the modulator will be loaded as it requires, keep all r.f. circuits tuned to resonance—and never allow the gain control to get above the point where the indicator of the modulated stage's plate milliammeter begins to quiver. No need to repeat the details here; we have them in 'phone transmitter articles in QST, in the 'phone chapter of the Handbook and, for review of the high spots, in the 'phone section of the License Manual.

Let's take this thing seriously. The business is a serious one. Let's call a halt to the crime wave afflicting amateur 'phone. The unbounded and needless slaughter of useful kilocycles, not by just a few overmodulation racketeers but by the vast majority of us, must be stopped. We have only ourselves to blame and only we, cooperating intelligently, can clear up the mess by operating our individual transmitters to give proper modulation. There's no other way of retrieving the wasted kilocycles. And until we reach the state of making the fullest possible good use of the 'phone territory already assigned we are in a poor position to ask for more.

---

**An Efficient C.W. and 'Phone Transmitter Using the New Tubes and Circuits**

(Continued from page 17)

ma. This is the maximum rated current for the Type 46 and should not be exceeded. The output from the 841 should be quite high—at least as much as from a Type 10 self-excited oscillator at the same voltage.
The "CW 100" transmitter kit was designed to fill the requirements of the most discriminate purchaser. The performance, appearance and quality are unsurpassed — the value offered unequalled. Straightforward, efficient design throughout. The smooth and easy handling of the "CW 100" even on 20 meters will be a revelation.

TUBE LINEUP
47 osc. — 10 buffer or doubler — output stage choice of '03-A, RCA 900 or Raytheon RK-18.

Special lacks are provided so that entire transmitter can be tuned with stability and compliance with the new rulings which require all of the above. The cost is much less than you would expect to pay for a self excited transmitter of this type. An experienced operator to wire and put the set on the air, for real results. The "CW 100" is supplied with a neat metal chassis under which all the parts are mounted, making the wiring and components dustproof. The overall size of the chassis is 7¼" x 18" x 3". A plug-in crystal holder is furnished with the kit at no additional cost. Only one milliammeter is required for tuning the transmitter and each stage is provided with a lack for this purpose. The "20-W Jr." will use one 47 as crystal oscillator, one '46 as buffer or doubler and two '405 in the amplifier. One set of three wound coils is supplied with the kit for the 20, 40, 80 or 160 meter band. When the 160 meter coils are ordered add 50 cents extra to the price of the kit. Any additional coils can be supplied for $1 each.

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Coupling coil L1 may now be placed in L4 as shown, the "plus" plate supply lead to the 800's being left disconnected. With the negative B lead of the high-voltage supply connected and the filament return circuit closed, the neutralizing condensers C6 should be adjusted simultaneously in small steps, until complete neutralization is accomplished. A neon bulb is not very satisfactory for this operation. A superior method is to connect a 0-100 d.c. milliammeter in the center-tap lead of Ls to ground (the 800's grid return). The grid current, which will be about 20 milliamperes while the 800's are being neutralized, will remain perfectly steady when C6 is tuned through resonance, if the neutralization is correct. If the condensers C6 are even slightly out of adjustment, the pointer of the grid meter will "kick" as C6 is slowly tuned through the resonant point.

The positive 1150-volt lead may now be connected to the 800's, after the biasing resistor is set for maximum resistance. The primary circuit of the high-voltage transformer should be open while the high-voltage lead is being handled, unless self-electrocution is desired. A key should be inserted between R6 and ground, so that the filament return circuit may be quickly opened if the plate current of the 800's is unreasonably high or something in the circuit breaks down.

If everything is working properly, the d.c. grid and plate currents of the 800's will be quite low. The biasing resistor may now be adjusted to about 800 ohms, the plate tank being left tuned to resonance. The d.c. plate and grid current (for both 800's) should now be about 80 ma. and 50 ma., respectively. As C6 is tuned each side of resonance, the plate current will rise sharply to values of the order of 200 ma. Since this condition somewhat exceeds the maximum plate current rating of the tubes, the detuning (as a check of circuit operation) should only last a few seconds. To give a rough idea of the r.f. voltage that should be developed, a steady arc of about 3/4-inch can be drawn from either side of the main tank condenser to a pencil lead.

The antenna used with this transmitter consists of a half-wave Zeppelin 33'-4" long, fed with 10-foot feeders spaced 10 inches apart. The antenna coil, consisting of six turns the same diameter as Ls and parallel-tuned, is loosely coupled to one end of the 800 plate coil. Although feeder currents mean little except as a method of comparison between identical antenna and feeder systems operating at the same frequency, it may be of interest to note that the feeder current of this rig is about 1.5 amperes. With other radiating systems, it may be more or less.

When the antenna is taking power, the plate current of the final amplifier should be adjusted to 160 ma., this adjustment being accomplished by varying both the grid bias and the antenna coupling. The total d.c. grid current is then about 30 ma. To reduce the antenna load on the 800's, the coupling of the antenna coil should be loosened; load should not be reduced by detuning the antenna condenser. All circuits should be tuned.
It's the elementary things that are discussed in the League's carefully prepared book for beginners, "How to Become a Radio Amateur." Now in its third edition, completely done over in 1934 style, its 32 pages are filled with concise, clearly written material telling how to build the first receiver, a simple transmitter, an inexpensive monitor — in fact, the entire beginner's station.

"How to Become a Radio Amateur" (No. 8 in the A. R. R. L. series entitled "The Radio Amateur's Library") is the standard elementary guide for the would-be amateur. 25c (no stamps, please) postpaid anywhere.

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EDITOR’S NOTE.—The 100-watt modulator unit for this transmitter will be described by W2BR0 in an article to appear in a subsequent issue.

Pre-Selection and Image Rejection in Short-Wave Superhets
(Continued from page 18)

The schematic of a typical arrangement is shown in Fig. 4. This represents coupling of a two-wire transmission line (as from a “doublet” antenna) to the receiver, through a link circuit. The antenna coil is coupled to the link-circuit coil, with the electrostatic shield between the two. As suggested, the link-circuit coil is enclosed in a shield can having a diameter approximately twice that of the coil, facing a hole in the end of the can which is of a diameter slightly greater than that of the coil. The Faraday shield is simply interposed between the feeder terminating coil and the shielded link-circuit coil. The coupling is, then, of the magnetic type, practically unaffected by the Faraday screen. Elimination of the electrostatic coupling effects a marked improvement of the selectivity, as evidenced by a several-hundred-percent reduction in image response. Such screening may, of course, be applied to receivers with or without other means of improving the signal-image ratio. It is the final step in cleaning up image trouble in the receiver already equipped with a pre-selector.

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APPLYING the sectional bookcase idea to radio equipment, the panel assembly and enclosure shown in the photograph is so designed that it is a complete shielding container for a small transmitter or other apparatus, while at the same time several similar units can be stacked one on top of the other to take care of more elaborate layouts. Each section is so arranged that it bolts firmly to the one below; thus there is room for indefinite expansion upwards without the necessity for a mounting rack of inflexible dimensions.

The assemblies are constructed of sheet steel, heavily copper plated, and finished in black crackle outside and aluminum inside. The panel, which has the standard relay-rack measurements of 19x10 inches, is furnished with an attached sub-base on which apparatus can be mounted. The sides of the enclosing shield are provided with ventilating louvres, while the perforated rear shield is easily removable so that the con-
IT IS impossible to give in a small space a comprehensive description of the Radio Amateur's Handbook. The best we can do is to point out a few highlights.

It is the only really authoritative guide to Amateur Radio. First published in 1926, it has run through ten editions and fifteen printings. A total of over one hundred and ninety thousand copies have been sold. The current Tenth Edition is a complete revision. It has been almost entirely rewritten and it incorporates large amounts of new material and new illustrations. The Handbook has 440 pages and 230 illustrations. It is the work of the entire headquarters staff of the American Radio Relay League.

As an example of the thoroughness with which the Handbook treats each branch of the subject of Amateur Radio, suppose we examine the chapter headed, "Planning and Building Transmitters." We find the following subjects discussed: Types of Transmitters, Self-Controlled Oscillator Circuits, Frequency Stability and Efficiency, the Crystal Controlled Oscillator, Crystal Cuts and Grinding, the Crystal Oscillator Circuit, Crystal Mountings, from Oscillator to Antenna, Neutralizing, Transmitting Tubes, Planning the Transmitter, Building a Transmitter, Construction of the Set, Tuning the Transmitter, Coupling the Antenna, Using Two Tubes, a Push-Pull Transmitter, an Alternative Design, Building an Amplifier, Excitation for the Amplifier, Tuning and Neutralizing, Oscillator-Amplifier Combinations, a Crystal-Controlled Transmitter, Tuning the Crystal Transmitter, Operating the Doubler, a 100-Watt Transmitter, Other Combinations, a Single-Tube Amplifier, Push-Pull for High Power, Meters, Transmitter Assemblies, Other Bands, Condensers, Unsteady Signals. Forty-one illustrations appear in this chapter — and two tables, one of tubes and one of coil specifications.

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<th>Type</th>
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The Rocky Mountain Division
Convention

PIKE'S PEAK or bust was a by-word years
ago, and it must have been the motto for the seventh annual convention held at Colorado
Springs, Colo., August 26th-27th under the auspices of the Pike's Peak Radio Club, for
the very efficient manner in which all activities were handled by the convention committee,
and credit goes to Joe Rohrer, W9EYN, Carl Drumeller, W9EHC, G. E. Drumeller, W9FXQ
and the others for a program that left nothing to be desired.

Starting with a general "pow wow" with visi-
tors from Mexico, Texas, Utah, Wyoming and Colorado getting acquainted, Director R. M.
Andres found a receptive group when the con-
vention was declared opened. From then on there
was not an idle moment. B. P. Hansen, Western
Electric Engineer, but better known as W9KNZ,
showed he knew his amateur radio; Prof. Louis
Schnell, W9KI, formerly of Colorado Univer-
sity, gave some worthwhile information on key-
filters and Mr. H. C. Scharf, Chief Engineer of
KNOR, gave the 'phone boys some good "dope"
on modulation. A. A. Hebert, A.R.R.L. head-
quarters, recounted some of the struggles of the
past and Director Andrews made a complete
report of the last Board Meeting. The Aecia
Hotel was the starting point for all the visits,
which included trips to Alexander Film Co., ham
shacks (W9KNZ's seemed to have a great at-
 traction), Mt. Manitou, where a wonderful picnic
was given the delegates—and those cantaloupes
furnished by the Rocky Ford Amateur Radio
Association were a treat. However, the most
impressive ceremony was the initiation in the
R.O.W.H., in a cavern at midnight in the Cave
of the Winds, three hundred feet under ground,
and the degree team has the distinction of hav-
ing done something unique, and will be hard
to equal by others. Returning to town another
group, renown for their mountain climbing
proclivities, decided to return to the mountain
side, and there in a hunter's cabin with a log
fire burning, imagination was allowed to run
wild, and this probably may account for some of
the good liar's stories told later.

Some of the scenic trips taken were the Nar-
rows, Garden of the Gods and several others,
which has left an impression never to be for-
gotten.
THE NEW "RME-9" SUPER
SINGLE-SIGNAL
PROFESSIONAL
RECEIVER

ULTRA SENSITIVE—
DESIGNED FOR AMATEUR AND
EXPERIMENTAL ALL-WAVE RADIO COMMUNICATION

Specifications:
No plug-in coils used. 540 KC to 22,000 KC range. R.F. amplifier
stage precedes 1st detector. Manual and automatic volume
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Tone control and static pad provided. Heterodyne oscillator for
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as an integral unit. Priced exceptionally low.

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with brass tube 3/4" in diameter extending back 6". This
thermometer with a reading range from 85 degrees to
110 degrees is designed to give the exact
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Send cash or postal money order to JOHN
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CLASS B 800'S PHONE MEN! Two of the new 800
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a 200-watt input to the r.f. amplifier! The following Class B input
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<td>R-100</td>
<td>2-2A3 to 2-800s</td>
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<tr>
<td>O-101</td>
<td>2-800a to 500/20,000 ohms</td>
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(Note: Type O-101 has two secondaries, for use with 100MA,
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The Northwestern Division Convention

RALPH GIBBONS, W7KV, the flying director, flew the night mail to Salt Lake City and back, arriving in time to open the eighth annual division convention, held in Portland, Oregon, under the auspices of the Rose City Radio Club, August 18th and 19th. There was not an idle moment thereafter. A welcoming address by Police Chief Lawson representing the Mayor, and greetings by Ray Cummins, W7ABZ, chairman, placed everyone in good mood.

Entertainment being the keynote of the convention the guiding hand of George Ellison, Jr., W7AGX, and Ray Cummins saw to it that the delegates were kept going. However, there were some good talks: Mr. Deardorff from the A.T. & T.; Commissioner Tenkins and Sergeant Drapeau of the Police Department not only explained the progress made in police radio but gave also an astonishing demonstration by actually having four police cars report to the Commissioner in the convention hall, and when the gun-squad reported with their machine guns ready for action everyone was ready to run away. The first car reported in two minutes and the fourth (gun-squad) in nine minutes, the latter being seven miles away at the time of the call. A. A. Hebert, A.R.R.L. representative, gave a complete report on the F.R.C. regulations, and participated in many discussions. Ensign Randall, U.S.N.R., W7ATP, spoke for the communication reserve; other speakers being Don Wallace, W6AM, and Mr. Norman, W7OK, radio inspector, who also conducted examinations. At the general meeting Ray Cummins, SCM, Oregon and Stan Belliveau, SCM, Washington, took the opportunity to meet those interested in communications and everyone also had a chance to express himself.

With the headquarters at the Hotel Imperial and the meetings at the Hotel Multnomah, the
HINTS AND KINKS FOR THE RADIO AMATEUR
(No. 10 in the A.R.R.L. Series entitled The Radio Amateur's Library)

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<td>A complete parts service for amateur and serviceman</td>
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calibration error. Close to frequency 1750-4000 kilocyclea meters, your approximate frequency $1.35; no specified fre-

ellows, 15 S tephen S t., QSLs, two color 50¢ up, Stationery. W9ECI, RR3, Clayton, P. O. Box 607, El Monte, Calif.

SMITH—precision crystal prices back down: Busky, full-size, single-frequency oscillators. Unconditionally guaranteed. Zero calibrations to 1st harmonic and to second and third harmonic. $1.95, 7000-7500 kilocycles $3.95. X cut filter crystals, excellent respon-

time, no delay or delaying. Hipower Crystal Co., 3607 N. Luna Ave., Chicago, Ill.

SELL—RCA 20A4 with holder, $16, RCA 205 new, $5. RCA 204 A, $7. Teleplex with key, buzzer, 6 rolls, $12. Tubes 1A condition. W6BCX.

QSLs! QSLs! World's finest! Mailed to your own specifications! Free samples! WSDEDD, Holland, Mich.

GO-DEVIL—the $5. mechanical flat.

QSLs, samples free. W91HM, Escanaba, Mich.

SELL Pilot all wave twenty dollars, W4ATS.

WANTED—used Jewel pattern 579 test panel. V. W. Hodge, Claymont, N. H.

SELL $100 Silver-Marshall receiver 760 "Bearcat" with coils and dynamic speaker, $35. WSDDS, Ft. Sam Houston, Texas. VELOCITY microphone parts—new couplers given 50 to 50% better results. Corrugated ribbons, Melotte Radio & Electric-

mfg. Co., North Lawrence, N. Y.

SWAP sixteen millimeter Czechoslovak movie camera and pro-

jector, perfect condition, for National AGX or other signal transmitters. WlBEF, 16 W.

SELL rack and panel class B phones and CW transmitter. National ACSW3 and power supply. QSTs 1918, October, No-

vember; 1919, May, June, July; August; 1920 except Dec-


NEW $140, alto saxophone. Swap for transmitter, W2CVT.

QSLs and SWLs—finest material and printing. Send for sam-

ple. W9ECI, P. O. Box 607, El Monte, Calif.

HAN apparatus bought, sold. Joe's Route 1, Johnston, N. Y. W$GPA.

TRANSFORMERS—quotations given. WCSS, Frank Grech; Edcol accurate Radio Supply, 2290 W. Cermak Rd., Chi-

cago, Ill. Phone Crawford 2050.

COLLINS 9C amplifier-modulator. Like new, $40. Collins 96C speech amplifier, new $20. W8BCA.

GO-DEVIL for beginners or old timers.

BRAND new Radio time and wave checkers. Every offer considered. Carlson, 3119 Shannon Drive, Batimore, Md.

SUPERLEXTS, bought, sold. Rebids $7 up. Trade-ins accepted. 28 Circuits, 1000 $25.00. New 200 one color QSLs, $1. 100 two color QSLs, $1. Jake, the Specialty Printer, Box 215, Franklin, Penna.

METERS—all makes and types repaired and rebuilt. Prices reasonable. Electrical Instrument Labs., 1442 Hertel Ave., Buf-

falo, N. Y.

TRADE—old model Jewel 109 tester for good mike. W6ADS.

QUALITY QSLs, Samples? T. Varchovita, Elsford, N. Y.

PANELS—Aluminum faced, 1/4 inch thick 70 cents square foot. Guaranteed 866's $5 day approval $1.25; plate and field con-

centrator transformer for 203-A $3.50; other bargains. Commer-


NEW Velocity Microphone complete with transformer. Three types $18, $21.50, $22.50 list. Send for folder. E. A. Schlueter, 5352-62nd Ave., Oakland, Calif.

NEW MICROPHONE complete with transformer. Three types $18, $21.50, $22.50 list. Send for folder. E. A. Schlueter, 5352-62nd Ave., Oakland, Calif.

GO-DEVIL see November QST page 83.

TRADE two RCA211s for good 852. WICAE, 18 Stephen St., New Bedford, Mass.

SEE page 87 October QST for "Something different in QSL cards" by QST's cartoonist. Samples on request. "Gill" Cartoon Service, 12 St. Paul Street, Buffalo, Conn.

211Es, guaranteed, $2.50, f.o.b. Write W2DCJ.

GUARANTEED Cardon 585 tubes, 75¢ each. Works in the ment, Edison batteries. See September display, March ham-

aday. QSLs-SWLs. W6DOU, Hayward, Calif.

QSLs, modern, different. Samples? WSDDS, 2155 West 81st St., Cleveland.

Bum QSLs! You are the judge. Samples. W6DYL, Exchange, P. O. Box 577, Emporia, Kansas.


NEW Velocity Microphone complete with transformer. Three types $18, $21.50, $22.50 list. Send for folder, E. A. Schlueter, 5352-62nd Ave., Oakland, Calif.

SEE page 87 October QST for "Something different in QSL cards" by QST's cartoonist. Samples on request. "Gill" Cartoon Service, 12 St. Paul Street, Buffalo, Conn.

211Es, guaranteed, $2.50, f.o.b. Write W2DCJ.

GUARANTEED Cardon 585 tubes, 75¢ each. Works in the blank of 250 or 210 tubes. Takes 650 volts at 100 ma. W9MG.

CRYSTALS: $1.25 Hipower Oscillators, close to your specified frequency, 3500-1700 kc bands, 1,000 cycle $4.25. Exact Calibration with each crystal. One inch blanks 65¢. Dust-proof plug-in holder with mounting, nothing extra to buy $1.00 Complete. You cannot purchase a better oscillating crystal than a Hipower Crystal at any price. We have been supplying Broadcast Commercial and airline crystals for the past five years. Our frequency standard is accurate to one part in five million. Prices on request for crystals for any use and description. Please state at once delivery time, no delay or delaying. Hipower Crystal Co., 3007 N. Luna Ave., Chicago, Ill.

SMITH—precision crystal prices back down: Busky, full-size, single-frequency oscillators. Unconditionally guaranteed. Zero cycle errors to 1st harmonic and to second and third harmonic. $1.95, 7000-7500 kilocycles $3.95. X cut filter crystals, excellent response, $2.50. Exact frequency 1700-4000 kilocycles $20.00. Send Immediatly. 2400 sold, W6BCX Santa Maria.

SELL—RCA 20A4 with holder, $16. RCA 205 new, $5. RCA 204, $7. NEP20-A, $7. Teleplex with key, buzzer, 6 rolls, $12. Tubes 1A condition. W6BCX.

QSLs! QSLs! World's finest! Mailed to your own specifications! Free samples! WSDEDD, Holland, Mich.

GO-DEVIL—the $5. mechanical flat.

QSLs, samples free. W91HM, Escanaba, Mich.

Diga que se ha leído en QST — Así se dará Vd. a conocer y ayudará a la vea en QST!
YOU'RE AN EXPERT
GET EXPERT RESULTS!

USE ONLY
eMajestic
GENUINE PARTS
FOR YOUR REPLACEMENT WORK
on Major radios

You save time and you save money—you get better results every time!

See the authorized Majestic Distributor in your territory

GRIGSBY-GRUNOW COMPANY
Manufacturers of Majestic Radios, Tubes and Refrigerators
5801 DICKENS AVENUE CHICAGO, ILLINOIS

AMATEURS, ATTENTION!
We Carry a Complete Stock of NATIONAL Parts and Receivers—Prompt Service

Latest model FB-7A S.W. Receiver.............$34.20

Famous SW-3 Receiver, in 3 models, AC or DC, less tubes and coils...........17.70

FBX-A Crystal Filter Receiver—with crystal....47.70

"FB-7" Coils, regular and bandspread types, pair 6.00 10.00, 15.00 160 meter band. Coils for SW-3's, pair 3.00 National E. F. Choke, type 100..................45c

National 4-5-6-7 prong Isolantite Sockets....36c

National Power Pack for "FB-7" receivers....5850-AB ..........15.90

National Power Pack for "FB-7" receivers—Model 5897-AB .........15.90

NATIONAL MIDGET VARIABLE CONDENSERS—"ST" TYPES

35 mmf........ $ .90 100 mmf........ $1.35

50 mmf........ 1.08 140 mmf........ $1.50

75 mmf........ 1.20 150 mmf........ $1.50

40% off on all NATIONAL parts and receivers,

40% and 2% off on Hammarlund.

Billey "BCX" one inch square crystals, unmounted 40-40-160........ $3.90

Billey BC2 moulded bakelite Holder for BCX crystals..............1.50

TOBE 8 mfd. dry electrolytic condensers, in moisture-proof cardboard cases, 500 volts..................49c

TOBE 8 mfd. dry electrolytic condensers, in round aluminum cans, 500 volts..................55c

We are distributors for all NATIONALLY advertised manufacturers of Transmitting and Receiving Equipment.

Write for quotations. Free bulletin. 20% deposit with all C.O.D. orders. Remit by M.O. Include postage.

MAURICE SCHWARTZ & SON
710-712 Broadway, Schenectady, N.Y.
You Are Protected When You Buy From QST Advertisers

Advertising for QST is accepted only from firms who, in the publisher’s opinion, are of established integrity and whose products secure the approval of the technical staff of the American Radio Relay League.”

Quoted from QST’s advertising rate card.

Every conceivable need of a radio amateur can be supplied by the advertisers in QST. And you will know the product has the approval of the League’s technical staff.

* See Editorial April issue of QST
GENERAL ELECTRIC

Announces

a Real All-Wave Receiver

WITH PRESELECTION

COIL SWITCHING

AUTOMATIC VOLUME CONTROL

You old timers know what G-E has done in the development of short wave communication. Here is a G-E all wave receiver — that is a good broadcast set and a swell short-wave receiver as well. You can safely recommend it to your non-technical friends and neighbors. It brings short-wave reception up to date — this job has all the refinements you expect in the very best broadcast receiver.

General Electric All-Wave Radio
Model K-80—Price $92.50
Price slightly higher West and South.
Subject to change without notice.

FEATURES

SUPERHETERODYNE CIRCUIT:
An eight-tube chassis employing three new dual-function tubes: three type 58, one type 2A7, one type 2B7, one type 59, one type 53, one type 80.

FREQUENCY RANGE: Continuous tuning range from 540 to 18,000 Kilocycles (555-16.7 meters) in four frequency ranges:
A—540-1500 Kilocycles
B—1500-3900 Kilocycles
C—3.9-10 Megacycles
D—11-18 Megacycles

COIL SWITCHING: Eliminates inconvenience of changing coils. Permits instantaneous change from one band to another.


AUTOMATIC VOLUME CONTROL: Minimizes fading and prevents blasting from strong stations when tuning.

VERNIER TUNING: Double reduction vernier: 55:1 ratio, makes hand spreading unnecessary.

AIRPLANE TUNING DIAL: Full vision illuminated dial accurately calibrated in kilocycles and megacycles.

NEW INTERMEDIATE FREQUENCY: In order to minimize the possibility of image frequency response, an intermediate frequency of 445 kilocycles is employed.


DYNAMIC SPEAKER: Large dynamic speaker capable of handling high power output.

TONE CONTROL: Full range tone control permits tone shading to suit the ear.

You will be interested in seeing and operating this remarkable development at your local G-E Radio Dealer. We cordially invite you to do so.

GENERAL ELECTRIC

Radio Sales Section R-6812
General Electric Company
Merchandise Department
Bridgeport, Conn.

Please send me, free of charge, full technical details and circuit diagram of the new General Electric All-Wave set.

Name.
Address.
City.
State.

[ ] Check here if you do radio service work.

Radio Sales Section R-6812
General Electric Company
Merchandise Department
Bridgeport, Conn.

Say You Saw It in QST — It Identifies You and Helps QST
Be Santa Claus to Your Friends

COMPLETE THE CIRCLE WITH 1934 COPIES

QST can help you with your Christmas list. Each year an increasing number of individuals finds it to be the ideal gift. A subscription present is unique, too. It serves as a monthly reminder of your thoughtfulness. A yearly subscription, including League membership, costs only $2.50, little enough for the ones you have in mind. And — we'll send an appropriate gift-card conveying your Christmas Greetings at the proper time.

Once you form the habit of giving QST as a Christmas present you'll come back year after year with the same thought.

QST

38 La Salle Road, West Hartford, Connecticut
INGREDIENT OF SUCCESS

The success or failure of your entire transmitting equipment is largely dependent upon the excellence of your power supply. Far from being a mere detail the amateur's power supply is a unit which performs a major function. The best R.F. or Modulation equipment is obviously useless, with no power supply at all. It works after a fashion with inadequate power equipment. Powered by soundly engineered and accurately rated* Acme-Delta equipment, optimum operation and performance are assured. Delta Manufacturing Company

*ACCURATE RATINGS — The amateur and experimenter cannot be sure of their equipment unless they know the correct characteristics of each component they use. Accurate rating of its chokes and transformers is a fundamental policy of the Delta Manufacturing Company.

RIPPLE — Under the new radio law low ripple is of paramount importance to all amateurs. Delta has standardized ripple measurements by expressing in percent the ratio between the r.m.s. value of the AC ripple voltage and the average DC voltage. The stated ripple values of Acme-Delta components are correct and may be depended upon when the equipment is used as recommended.

A USEFUL TABLE OF RIPPLE VALUES

<table>
<thead>
<tr>
<th>PERCENT RIPPLE</th>
<th>TRANSMITTER</th>
<th>RESULTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1 to 0.25%</td>
<td>Phone or telegraph</td>
<td>Standard practice</td>
</tr>
<tr>
<td>0.25 to 1.0%</td>
<td>Phone or telegraph</td>
<td>Phone unsatisfactory</td>
</tr>
<tr>
<td>1.0 to 10.0%</td>
<td>Telegraph only</td>
<td>Telegraph set satisfactory</td>
</tr>
<tr>
<td>Over 10%</td>
<td>Telegraph only</td>
<td>Approaching poor tone</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Noisy, poor tone</td>
</tr>
</tbody>
</table>
RECTIFIER CIRCUIT INFORMATION

Rectified A.C. power supplies must 1st DELIVER SUBSTANTIALLY CONSTANT VOLTAGE. This requires good transformer regulation and a low-resistance swinging choke of proper inductance range. And they must ADEQUATELY SMOOTH THE RIPPLE. Acme-Delta engineering provides filters reducing the ripple to low values obtained in best commercial practice. When using accurately rated Acme-Delta parts, filter circuits can be and are designed for predetermined characteristics. 3rd they must PROPERLY OPERATE THE RECTIFIER. The swinging choke originated by DELTA prevents high current peaks, contributes materially to smoothing and improves regulation, thus combining three important features. The variation of Inductance must be correct. 4th they PREVENT OUTSIDE INTERFERENCE. Metallic shields described below aid in accomplishing this.

![Circuit "A" (CW ONLY)](image)

![Circuit "B" (CW OR PHONE)](image)

RECTIFIER CIRCUIT COMPONENTS

*Note: All prices in this catalog are subject to 40% discount to Amateurs and Experimenters.*

**ACME-DELTA PLATE TRANSFORMERS**

Acme-Delta transformers are designed and constructed in accordance with the best modern engineering and manufacturing practice.

All units are assembled with static shields between primary and secondary to minimize "tunable hum," key-click interference, and R.F. radiation from lighting lines.

They will deliver their rated voltage within limits of minus 0 plus 5%. This is important in filament excitation to obtain maximum tube life.

They will operate continuously at full load without the temperature rise exceeding 50° C. This gives long life and the ability to stand large temporary overloads.

Their mountings are simple to reduce cost, but due to careful design are nevertheless attractive and adequate. All terminals are non-rotating type mounted on engraved bakelite panels.

**Standard Primary Input—115 Volts—60 Cycles, 1 Phase**

<table>
<thead>
<tr>
<th>Cat. No.</th>
<th>Type</th>
<th>D.C. from Filter</th>
<th>A.C. from Secondary</th>
<th>Output</th>
<th>Insulation</th>
<th>Weight lbs.</th>
<th>List Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>AD20</td>
<td>A</td>
<td>400</td>
<td>.175</td>
<td>595-0-595</td>
<td>.130</td>
<td>150</td>
<td>2500</td>
</tr>
<tr>
<td>AD21</td>
<td>B</td>
<td>750 or 500</td>
<td>.200</td>
<td>900-600-600-900</td>
<td>.150</td>
<td>200</td>
<td>4000</td>
</tr>
<tr>
<td>AD22</td>
<td>C</td>
<td>1000 or 1500</td>
<td>.500</td>
<td>1500-1500-1500-1500</td>
<td>.380</td>
<td>845</td>
<td>13000</td>
</tr>
<tr>
<td>AD23</td>
<td>B</td>
<td>2000 or 2500</td>
<td>.250</td>
<td>3000-2500-2500-3000</td>
<td>.190</td>
<td>350</td>
<td>3500</td>
</tr>
<tr>
<td>AD25</td>
<td>E</td>
<td>1250 or 1000</td>
<td>.400</td>
<td>1500-1500-1500-1500</td>
<td>.300</td>
<td>675</td>
<td>7000</td>
</tr>
</tbody>
</table>

**GROUP V CIRCUIT**

*(Described in QST, March, 1933)*

**RECTIFIER CIRCUIT INFORMATION**

The swinging choke originated by DELTA prevents high current peaks, contributes materially to smoothing and improves regulation, thus combining three important features. When using accurately rated Acme-Delta parts, filter circuits can be and are designed for predetermined characteristics. 3rd they must PROPERLY OPERATE THE RECTIFIER. The swinging choke originated by DELTA prevents high current peaks, contributes materially to smoothing and improves regulation, thus combining three important features. The variation of Inductance must be correct. 4th they PREVENT OUTSIDE INTERFERENCE. Metallic shields described below aid in accomplishing this.

![Circuit "A" (CW ONLY)](image)

![Circuit "B" (CW OR PHONE)](image)
This necessitates the use of an input choke whose inductance "swings" up to a maximum value. Such near double the minimum which is established by the load voltage and current.

Note:

Note:

The inductance value selected for Acme-Delta smoothing chokes is based on ripple requirement and the ratio of inductance and capacity which will obtain maximum smoothing for a given use of active material — thus resulting in a minimum cost.

Say You Saw It in QST — It Identifies You and Helps QST

95
### ACME-DELTA

#### COUPLING TRANSFORMERS

<table>
<thead>
<tr>
<th>Cat. No.</th>
<th>Type</th>
<th>Purpose</th>
<th>For Coupling</th>
<th>Wt. lbs</th>
<th>List Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>AD90</td>
<td>F</td>
<td>Input Trans.</td>
<td>to Grid</td>
<td>2/4</td>
<td>$7.50</td>
</tr>
<tr>
<td>AD91</td>
<td>F</td>
<td>Interstage either single tube or pushpull</td>
<td>to Grid</td>
<td>2/5</td>
<td>7.50</td>
</tr>
<tr>
<td>AD70</td>
<td>A</td>
<td>Class B Driver</td>
<td>Class A</td>
<td>2.50</td>
<td>13.75</td>
</tr>
<tr>
<td>AD71</td>
<td>E</td>
<td>Class B Output</td>
<td>Class B</td>
<td>203A</td>
<td>30.50*</td>
</tr>
<tr>
<td>AD72</td>
<td>F</td>
<td>Class B Driver</td>
<td>Class A</td>
<td>2.46</td>
<td>7.50</td>
</tr>
<tr>
<td>AD74</td>
<td>B</td>
<td>Class B Output</td>
<td>Class B</td>
<td>2.59</td>
<td>13.00*</td>
</tr>
<tr>
<td>AD75</td>
<td>F</td>
<td>Class B Driver</td>
<td>Class A</td>
<td>2.59</td>
<td>7.50</td>
</tr>
<tr>
<td>AD76</td>
<td>B</td>
<td>Class B Output</td>
<td>Class B</td>
<td>2-RK18</td>
<td>15.50*</td>
</tr>
</tbody>
</table>

**Note:** Transformers will be available for Class B operation of RCA 800 Tubes. Delta has a firm policy not to offer such apparatus until tested under operating conditions and as tubes were not available before going to press, the transformers could not be included in this catalogue. *Secondary will carry class C plate-current.

### ACME-DELTA COMPLETE POWER SUPPLIES

**Standard Input 115 Volts 60 Cycle A.C.**

<table>
<thead>
<tr>
<th>Cat. No.</th>
<th>Volts</th>
<th>Amps.</th>
<th>Rectifier</th>
<th>Ripple</th>
<th>Regulation</th>
<th>List Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>AD60</td>
<td>1000</td>
<td>.350</td>
<td>3-83</td>
<td>0.03%</td>
<td>11%</td>
<td>$100.00</td>
</tr>
<tr>
<td>AD61</td>
<td>400</td>
<td>.175</td>
<td>1.83</td>
<td>.01%</td>
<td>18%</td>
<td>70.00</td>
</tr>
<tr>
<td>AD63</td>
<td>1250 or 1000</td>
<td>.400</td>
<td>2.66A</td>
<td>0.15%</td>
<td>10%</td>
<td>160.00</td>
</tr>
</tbody>
</table>

**Note:** No filter included for 500 volt sets. Auxiliary filter required consists of two AD44 Chokes and one 2 x 8 mfd. Electrolytic Condenser.

**ENGINEERING SERVICE.** Delta is fully familiar with the new requirements of minimum ripple, to which all Amateurs will be obliged to conform under the new law. We are glad at all times to recommend to Amateurs the proper standard AD equipment to fill their requirements if they will write us fully and comprehensively regarding their problems.

**GUARANTEE.** We guarantee all parts of Delta manufacture to be free from defects in materials or workmanship. Furthermore should any of them under normal use and service be found to be defective within five years from date of delivery, we will repair or replace, F.O.B. our plant at Cambridge, Mass., or will replace any defective parts F.O.B. our plant at Cambridge, Mass., provided also that our examination shall disclose to our satisfaction that such parts have not been subjected to abuse.

**TERMS OF SALE.** Prices in this catalogue are list prices and are subject to a trade discount of 40% to Amateurs and Experimenters. All prices are F.O.B. our shipping department at Cambridge, Mass., and are subject to change without notice. Terms are 20% of purchase price with order, balance C.O.D., except in cases of approved credit. Money orders, express checks and certified checks accepted. For established credit, terms are net 30 days, 2%, 10-day discount. In absence of shipping instructions we use our best judgment. Our responsibility ceases with delivery to common carrier.

**SUCCESSIONS TO ACME APPARATUS CO.**

F. S. Dellenbaugh, Jr., Pres. & Chief Engr.


39 OSBORNE ST., CAMBRIDGE, MASS.
TYPE BM-3” DIAL
Similar in appearance to our Type B, the little 3 inch BM Dial (above) has the famous Velvet Vernier Drive. It is particularly suitable for compact receiving and transmitting equipment where space is limited. List Price $2.50.

TYPE N DIAL
A Precision Dial, unusually well adapted to H. F. purposes, the Type N is accurate and handsome. The 4 inch scale and vernier are engine divided on solid German Silver, and read to 1/10 division. The drive, 5 to 1 ratio, is of planetary construction, and incorporates a built-in, insulated flexible coupling. List Price $6.75.

NATIONAL SOCKETS
National Isolantite Coil and Tube Sockets give maximum efficiency in ultra high frequency circuits. They are equipped with a locating groove for convenience in inserting tubes, and are glazed on top and sides. Available in standard 4, 5, 6 and 7 prong styles, as well as 6 prong special for coils. List Price $.60.

H. F. CONDENSERS
Designed as a special series for Short Wave use, National H. F. Condensers have Isolantite stator insulation, constant impedance rotor connections, and insulated front bearings (in two bearing models) to eliminate shorted tuns through the frame, as well as aluminum plates and unusually rigid frames. List Prices range from $1.50 to $6.50.

The extremely small shielded air dielectric padding condenser, above, is designed to replace the older mica types which are unsatisfactory for many H. F. applications. Case 1¼” diameter. List Prices, 75 mnf. $2.00, 100 mnf. $2.25. At left, the Type R152 Transmitting Choke, at right, the Type 100 choke.

FREQUENCY METER
CONDENSER
A special purpose condenser designed for use in amateur frequency meters and monitors. When used with a 100 division dial the 160 or 80 meter bands spread over 80 divisions. 75 mnf. maximum, 40 mnf. minimum, List Price $5.50.

A complete list of National Radio Products appeared in catalogue form in October QST. To those who have no copy, our Bulletin No. 220 will be mailed on request.

NATIONAL
RADIO PRODUCTS
61 SHERMAN STREET
COMPANY
MALDEN, MASS.
Whenever men go to far away places, where radio is the only contact with the world, you'll probably see the familiar black and white striped Burgess Batteries in their equipment.

- You can have this same dependability in your own "ham" station. Burgess Batteries are built on the "Chrome Formula" which defies electro-chemical action when the battery is not in active use. All the "juice" is all the power is saved for you to use as you explore the radio airways of the world.

BURGESS BATTERY COMPANY

Engineers and Manufacturers of Acoustic and Electrical Products

Battery Division—FREEPORT, ILL.
Acoustic Division—MADISON, WIS.

New York  Chicago  Atlanta  Kansas City, Mo.
Boston  Minneapolis  San Francisco  Los Angeles
In Canada, Niagara Falls and Winnipeg

The same batteries that accompanied the Byrd Expedition to both the North and South Poles.
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