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Automatic Modulation Control
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<th>Model of Receiver</th>
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WEST HARTFORD, CONN., U. S. A.; OFFICIAL ORGAN OF THE INTERNATIONAL AMATEUR RADIO UNION

OCTOBER
1937
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Number 10

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

It is an incorporated association without capital stock, chartered under the laws of Connecticut. Its affairs are governed by a Board of Directors, elected every two years by the general membership. The officers are elected or appointed by the Directors. The League is non-commercial and no one commercially engaged in the manufacture, sale or rental of radio apparatus is eligible to membership on its board.

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

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

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Address all general correspondence to the administrative headquarters at West Hartford, Connecticut.
A CORRESPONDENT kicks holes in one of our recent editorials in which we suggested that, although the definitions of strengths in the RST system were not precisely the same as in the old system, the differences are negligible in practice. He wants to know if we ever compared the two and noticed the discrepancies in the middle range where most reports fall.

Ironically enough, the reason there is no practical difference between the two systems is because almost everybody uses the R list and simply calls it RST for convenience. You can check this for yourself by noting that there aren't enough S's handed out in DX work to-day to justify the assumption that the operators are actually making careful reference to the S scale. As a matter of fact, we seriously doubt that W2BSR meant to change the system when he originated RST; it is our impression that he simply wanted to rationalize the language. We doubt if one amateur in a hundred could actually accurately define a number in either system. We all more or less hit a level which is influenced by conditions, noise, how far away the other station is, and similar factors—all of which operate to make the system meaningless in a quantitative sense but satisfactory from the qualitative standpoint. We doubt if many truthful amateurs would pretend that their S8 report on a G station is the same on a good night as it is when only a few signals are coming through, or that the J they report as S6 is anywhere near the same actual strength as the W station to whom they give S6. We seem to set the figure 5 as representing a fairly satisfactory signal for the circumstances and then work both directions from there to the obvious ends. Almost everybody does the same thing—it's as if we can't help it—so we understand each other.

But there's a laugh in this. It's really deplorable: We act as if we had a different standard of strength for difficult DX yet, aside from the sound of signals, the very way in which we often locate such signals is to ignore the S7, 8 and 9 signals from W stations and carefully examine each S4, 5 and 6 signal to see if it is DX—proving that we know they're weaker. What consistency!

When anyone attempts to graduate signal strengths from 1 to 9, he sets up for himself some sort of a scale, depending upon his ear and his judgment, and we believe that he can rather accurately judge all signals that come in to him during one period of operation, with respect to each other. That's all any such system can do. The fellow with a rhomboid and a sniggie-snooper receives signals at an altogether higher level than the chap with a blooper working on the bed-spring, yet you'll agree that (neglecting directional effects and fading patterns) they'll call the same signs S9, and the same S5 (possibly with variations from S4 to S6 attributable to human inconsistency). So whether we call the system QSA, QRK, R or S, we find every man calling his very loudest signals 9, his very weakest ones 1, and attempting within the limits of human frailty to grade the other strengths in between. And don't we do the same thing on tones! If you don't believe it, just study the tone definitions carefully.

In all the talk that goes on about this subject it is important to remember that these systems of aural judging can give only qualitative reports. For general amateur purposes that is almost always sufficient, since we're not so much concerned about how we're doing in an absolute way as we are with how we're doing by comparison with someone else who may be doing better. Hi! Even the calibrated attenuators with which some receivers have been equipped are but little better, since they are measuring signal input to the receiver and that depends upon whether the antenna is a diamond or a yard of bellwire. For many branches of our work it would be interesting to know the actual field strength at receiving points and we have a hunch that the day will arrive when we won't be satisfied with anything less than reports in terms of microvolts per meter. What we really need, then, is a nice combination preselector and frequency meter and field strength measuring set to retail for about three bucks fifty. Any volunteers?

K. B. W.

WE HAVE in our Correspondence columns this month a letter with this potent thought:

"Straight technical information is as free as air compared with the days when it was nearly all self-instruction, but sensible, practical operation doesn't come out of books."

Think back a bit, you old timers, and reflect, how much truth there is in that. We did, with astonishment. Go back twelve years, for instance.
There was no Handbook then, even, let alone the multitude of lesser helps available to the neophyte to-day; the Handbook did not arrive until 1926. It was in 1925 that Johnny Clayton first introduced equipment designed specifically for beginners in QST; until then the newcomer had to attempt his own version of the equipment used by the big shots of the day. Nor did this represent laxity on the part of QST's editors—that was the way things worked then. There were only a relatively few pieces of equipment that could be incorporated in the amateur rig, and there was proportionately little knowledge as to what they did, and why—little compared with present-day technique. Fortunately, it was so relatively simple that beginners did, then as now—putting together ham gear was a matter of individual experimentation; there were few set rules, and little in the way of established technique. Fortunately, it was so relatively simple that beginners did, then as now—but then more by a slow and arduous acquisition of knowledge and experience than now—get rigs going and get on the air. They learned by doing, in the painful school of experience. Now ham radio technical knowledge is, in comparison, spoon-fed.

But look at the other side of the picture—the operating side. Those were the days when superlative operating was the acme of amateur success—when "Chain Lightning Hill" and many another old timer and old-time circuit were famous because of their handling of amateur equipment, their operation of their stations. The gear then was pitifully crude, woefully ineffective. Yet their performances with it were marvels of finished operation. We are reminded of the early barnstorming airplane pilots, rambling around the country in haywired crates so insecure none would be permitted to leave the ground to-day. Yet they were true airmen, with a feel for flying that is generally conceded to be conspicuously lacking in the modern school of "aircraft engineers." So with ham operators.

Maybe we're guilty of looking backwards, yet it seems that a lot of that old spirit could well be restored in amateur radio. We have some good operators, to-day, true—but far too few. The great bulk of amateurs are—we blush to say it—less interested in operating their stations than they are in the mere unskilled use of them. We have the same condition on the highways. We call them "Sunday drivers." Are you one of amateur radio's Sunday drivers? If so, take a leaf from the book of amateur radio's old timers and try a little real operating for a change. It will take practice, and experience, and even a little self-discipline—but you'll find it worth the effort.

C. B. D.

Radio Course Starts

The winter course in "Modern Radio Theory and Practice" starts Monday, October 4th, at 7:30 P.M. E.S.T. on 6040 kc. over Station WIXAL, Boston. Which is important news.

All too few of us are taking advantage of the remarkably valuable programs of instruction in radio and other scientific subjects made available by the World Wide Broadcasting Foundation under the direction of Mr. Walter S. Lemmon. This is an endowed non-profit organization devoted to educational work. Their courses in radio work the past several winters have been perfectly splendid and are well worth the attention of amateur workers. They provide the equivalent of college class-room instruction in radio. We suggest that amateurs interested in learning a bit more about how radio works take steps to enroll at once. Clubs may profitably arrange for group listening, possibly followed by ragchews on the evening's lesson. Newcomer students of the art will find the course particularly valuable.

There is an enrollment fee of $1, which brings the enrollee a set of blueprints, enabling him to follow the lecturer at Boston who is using the master blueprint. The fee also covers the privilege of sending in questions. The instructor for the winter course is Mr. C. D. Belcher, formerly U. S. Radio Inspector at Boston.

The first section of the course, consisting of 8 regular lectures and 2 introductory lectures, covers the ground through vacuum tubes. The scope of the course is illustrated by the October schedule:

Oct. 4—Introductory Lecture.
Oct. 11—History of Radio—Life-saving at sea, the amateur, commercial operation, broadcasting.
Oct. 18—Simple forms of D.C. Machinery.

For enrollment and particulars, address Station WIXAL, University Club, Boston, Mass. Several thousand amateurs profited by the course last winter, and we think it is emphatically worth any ham's time. Prompt action is necessary to get under the wire, so as to receive your instructions and blueprints for the beginning of the course. WIXAL has 20 kw. and lays down a nice signal over most of the country at that hour.

Incidentally, WIXAL broadcasts Ursigrams on 11.79 Mc. from 4:55 to 5 P.M. E.S.T. on weekdays from Monday through Friday. These are daily bulletins of ionosphere heights, magnetic storm data, etc., prepared by the U.R.S.I., invaluable to serious scientific workers in this field and a great aid to amateurs engaged in forecasting DX conditions, correlating observations with natural conditions, etc.

Better enroll for that course right away.
Radio Control of Model Aircraft
Details of a Simple System Adaptable to Any Unmanned Mobile Unit
By Ross A. Hull* and R. B. Bourne**, W1ANA

Here is another field in which the ham is destined to play a big part. At first glance the controlling of models by radio is not ham radio as we ordinarily understand it. On second glance, though, it becomes a perfect legitimate ham activity and one to which the amateur falls heir because he alone (aside from scientific institutions with experimental licenses) is privileged to do the transmission. The game is as chock full of problems as it is of thrills and it will be interesting to see just how far we can get in a year or two of activity. The work reported here was done exclusively with a model sailplane. It was simplified by the absence of ignition interference but enormously complicated by the absolute need for precise control from the first moment. The same technique applied to gas airplane models should serve to offset the present steady growth of legislation against their use in free and uncontrolled flight.—EDITOR

The application of ham radio in the operation of controlled model boats, airplanes and autos has received relatively little attention to date. But it must be said that those individuals who have played with radio control of models invariably reveal a tremendous enthusiasm for their game. During the last few years, coinciding with the development of successful gasoline-engine-driven model airplanes, we have seen a steady climb in the interest in the subject and have been called upon quite frequently for details of a practical system.

Most hams are usually far from being one-hobby men and one discovers, almost invariably, an interest in the other sciences and the crafts. A common interest in ham radio, aeronautics, model building and photography, is almost the rule. We happen to be built that way and our interest in aircraft led us, this summer, to take an active interest in this problem of radio control. Fortunately, just as our interests really blossomed, we were able to take a brief trip to the soaring contest at Elmira, New York, and found (amongst the usual array of interesting things) a radio-controlled model sailplane, built by Carl W. Thompson, Jr., of Wilmington, and equipped with radio gear by H. M. Plummer, W3DIA. The ship was arranged to fly ordinarily with right rudder and the armature of an old-time sounder operated from the receiver served to give an alternative left rudder. The ship made several successful hops with the control working but an untimely crackup ended the experiment. We were fortunate enough to be able to acquire the remains and so, on our return to Hartford, were able to go right ahead with an attempt at the control problem. Since that time we have had more than a hundred flights (with some fifteen severe crackups!) and the whole equipment has been rebuilt and rebuilt until substantially nothing is left of the original. But if anyone thinks that the program was tedious work, they're crazy! We have had our full share of thrills in this ham game but the business of controlling a dizzy airplane galloping across the sky has set a new all-time high for sheer fun.

THE PROBLEM
A casual glance at the problem would lead anyone to imagine that it is all a perfectly simple business. All one needs is some sort of receiver that produces enough change in the plate current of an output tube to operate a relay of some kind, the relay then being connected to a control device which produces the necessary effect. Closer examination, however, reveals a host of problems which are juicy morsels for any

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**Maxim Silencer Co., Hartford, Conn.
experimentally inclined ham. We have solved a few of them, temporarily at any rate, but it must be said emphatically that the scheme to be outlined is the result of a first try. Our only hope is to open the subject wide in the knowledge that a few hundred of us hammering at the same objective will have the problem really licked in short time.

The basic method which has been widely used for model control is that of a selector switch similar to the affair found in automatic telephone installations. It is a gadget which closes one of a series of circuits, depending on the number of pulses transmitted. The circuit so closed is then caused to operate a reversible electric motor or some such device for producing the movement of the control element. This type of equipment has not been used with any appreciable success in model airplane work due, we believe, to its inherent complexity and to the necessity of carrying considerable weight in the batteries for motive power.

A brief study of the subject showed at once that the results were prone to be in inverse proportion to the complexities of the equipment and it became obvious that some extremely simple system was called for. So we ruled out the selector switch and started from the bottom.

Hitting at Simplicity

Having had earlier experience with the effectiveness and efficiency of rubber band motors, we decided to use one to supply the power for control. With a motor four or five feet long we knew that we could "charge" the thing with at least 1000 turns and obviously this would serve for several thousand control motions. The only problem then was to provide means of triggering off this rubber power and connecting it to the control surface. A further preliminary decision was to use a single control surface only and the logical decision was to use rudder. It was obvious that any reasonably stable plane could look after itself longitudinally. The only basic need was to keep the machine flying in any desired horizontal direction. Anyway, after much fiddling, we ended up with the device shown in Fig. 1—a simple escapement driven by the rubber motor and controlled by an electro-magnet operated in turn from the output tube of the receiver. As can be seen from the sketch, the transmission of a series of dots would result in step-by-step rotation of the escapement and swinging of the rudder from left to right. It was simply a matter of transmitting the desired number of pulses in order to acquire the correct rudder setting. The chief disadvantage of this simple scheme seemed to be that the rudder positions were all in a continuous sequence and that once the rudder had been in the left position and had then been centralized it was possible to get back to left rudder again only by passing through right and center rudder. In actual practice this weakness proved to be of little consequence just as soon as we had equipped an appropriate ground control system. It then became possible to whip through the undesired but necessary positions in a fraction of a second without causing more than a slight flicker in the flight path. But there were more problems to come.

THE RECEIVER

We had left the receiver itself for the last feeling that it would certainly be a cinch. Actually it took about a week of evenings to get a two-tube receiver that would perform with any degree of satisfaction. Even then we had to break down and admit that three tubes were really called for if all the desirable features were to be had. We cannot help feeling that this part of the job is just started. Surely there must be some way of building a simple one-tube receiver capable of operating an inexpensive relay! Fortunately, even the three-tube receiver came well within our weight limit. This sailplane was capable of carrying at least five pounds. Without even trying hard we ended up with a complete receiver, power supply and control system that weighed slightly less than three pounds. With some refinements even the present setup could be pulled down to 2½ pounds—a figure within reason even for single-engine models.

Some of the earlier control systems made use of the beat produced by an autodyne receiver to actuate the control tube—the frequency usually being on the 3.5-Mc. band. This procedure we ruled out at once as a result of practical experience in attempting to obtain a sufficiently stable beat. Since it was futile to control the model without being able to see it and since we were aiming at the utmost simplicity we decided to use the 50-Mc. band. There were two alternatives available—to use a continuous carrier with pulses of tone to operate the relay or to permit the characteristic rush noise of a superregenerative detector to keep the relay open, then applying pulses of carrier to close it. It works out that the former scheme will allow a simpler receiver but that the latter method is infinitely preferable because of the negligible interference which its operation causes. Fig. 2 shows the two-tube receiver with which successful operation may be had if pulses of tone are used on a continuous transmitted carrier. The first part of this circuit is a simple superregenerative detector using a 30 tube and fitted with a simple filter for the quench voltage. The output tube is a 1F4—chosen because of its high mutual conductance. The grid condenser and leak in its grid circuit allow the tone voltage to develop a negative grid bias and so produce a plate current change from about 2 to 0.5 ma. This method of obtaining a plate current change has so far proved infinitely preferable to the use of fixed bias with the tube normally operating almost at cutoff. But the 1F4 is the only tube we have met so far that will do the job. The
total filament current of the set is 0.18 ampere and the plate current when idling about 3 milliampere. This should allow a B-battery life of at least a couple of hundred hours even with the very smallest batteries available. The life of a pair plates bent until the capacity between them would seem to be zero. The placement of the antenna appears to be of very little consequence. We used a piece of No. 28 wire taped to the outer covering of the fuselage.

![Diagram](image)

**FIG. 1.—THE EXPERIMENTAL ESCAPEMENT USED TO CONVERT THE RUBBER-BAND MOTOR TORQUE INTO RUDDER MOTIONS**

The escapement disc, turning clockwise in this case, is driven by four strands of one-quarter-inch model airplane rubber. The rotation is limited to steps of a quarter turn by the escapement arm controlled by the electro-magnet connected in series with the sensitive relay in the output of the receiver. The crank pin on the escapement disc carries the control arm from left to center to right, in accordance with its position. No details of the mounting of these components to the bulkhead in the fuselage are given because they will be varied to suit each individual case.

The apparatus in such a receiver, as we will later indicate, should be mounted on a small piece of plywood. The gear may be packed on the base in almost any fashion, the only requirement being that everything be attached very sturdily and that tubes be placed where they cannot bump elbows with each other or with the audio transformer. A vernier dial was found unnecessary providing a 6-inch extension rod (a piece of balsa wood) was used for tuning. No particular difficulty should be had in adjusting the superregenerative detector though failure to superregenerate or a desire to howl may have to be cured by a change in the value of the grid leak or in the setting of the tap on L1. The length of the antenna and the size of the coupling condenser C5 will also have some effect in these respects.

An antenna not more than two or three feet long should be adequate, while C5 can have its

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**October, 1937**
the operation of the output tube is found if one of the diodes is connected to the grid of the 1F4. This receiver need occupy very little more space than the two-tube model and, as far as we can see, is the more practical rig of the two. In its operation, the rush from the superregenerative detector causes the plate current of the 1F4 to drop to about 0.6 ma. A transmitted pulse of carrier shuts off this rush noise, relieves the 1F4 from its negative grid bias and permits the plate current to rise to about 2 milliamperes. This change is ample to close the relay providing the tension spring is adjusted carefully. Naturally, the relay contacts are connected in opposite fashion in this receiver to those in the two-tube receiver. This model is almost as economical in operation as the simpler set. The plate current of the 1B5 is a small fraction of a milliampere, its filament drain 0.06 ampere. Because use is made of the rush noise from the detector it is important not to load the receiver with an antenna more than is absolutely essential. With this rig we are in the habit of operating without an antenna at all and still manage to get ample control signal at distances of a mile or so with a 30-watt transmitter. For our purposes this was sufficient.

BATTERIES

It is most fortunate that the battery manufacturers have been weight conscious in recent years, the modern midget "B" battery being really the key to the whole situation. In this work we have used two types—the Burgess W30BPX and the Eveready X203. Both of these weigh approximately 10 ounces and are capable of operating even the three-tube receiver for much more than a hundred hours. For the experimenter who insists on the absolute minimum of weight there is the Burgess W30FL weighing 8 1/2 ounces and still capable of almost a hundred hours of service.

For filament and control magnet batteries we have used ordinary flashlight batteries exclusively. They have the merit of low cost and reasonably light weight and are, of course, available anywhere. The very small sizes could be used in cases where every gram counts.

THE TRANSMITTER PROBLEM

Because model aircraft or even model boats will usually be operated at points unavailable to power lines it is very desirable that the transmitter should be operated either from a 6-volt storage battery in an automobile or from dry batteries. So far we have used only an automobile

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FIG. 3—THE CIRCUIT OF THE PREFERRED RECEIVER

C1—17.5µfd. midget variable (Hammarlund HF-15). (Some of the larger types can't take it in a rough landing.)
C2—100µfd. fixed condenser.
C3—0.01µfd. fixed mica condenser.
C4—0.005µfd. fixed mica condenser.
C5—M-30 National padding condenser adjusted to its minimum setting.
R1—1 to 5 megohm 1/2-watt resistor; experiment usually necessary.
R2—2-megohm 1/2-watt resistor.
RFC1—Ohmite u.h.f. choke.
RFC2—Bud 125 millihenry choke.
Li—Each 4 turns No. 14 wire 1/2 inch diameter, turns spaced the wire diameter.
T1—Any very small audio transformer. The one originally used is a push-pull affair with the whole secondary used.

The relay is an Eby Type ER12 with a 5000-ohm winding.
transmitter. It consists of a pair of 45 tubes—with their filaments connected in series—in a simple fixed-tuned-grid tuned-plate circuit similar to that given on page 200 in the current A.R.R.L. Amateur’s Handbook. A 6A6 or 6N7 tube would also serve the purpose admirably. We used the 45 tube simply because the rig was already available. We supplied plate voltage from a Mallory Vibropack giving 300 volts at 100 milliamperes but a pack of lower power or a set of B batteries would be quite satisfactory. When operating with carrier pulses alone the transmitter is, of course, a very simple affair. The use of tone pulses will require a modulator, the general nature of which can be decided very rapidly by anyone familiar with 56-Mc. work or anyone willing to glance through the Handbook. Personally, we are strong for the elimination of the tone business.

The transmitting antenna may be the usual fishpole affair or a half-wave antenna strung between bamboo poles. It may be fed either with a 72-ohm line to the center of the half-wave antenna or with a tuned line to one end. The problem of rigging this transmitter and adjusting the antenna until it is really doing some radiating will not be a problem at all to any present-day ham.

**THE CONTROL STATION**

First experiments were conducted with an ordinary key, the pulses being delivered in the necessary amounts in the usual fashion. This was a failure from the start. It was found almost impossible to remember in what position the rudder was supposed to be and several crankups resulting from a misunderstanding between the pilot and the plane caused us to develop some sort of control device. The first model was a 10-inch wooden con-

![A close-up of the Bourne control stick](image)

**A CLOSE-UP OF THE BOURNE CONTROL STICK**

The stick itself is pivoted at the post right in the center of the picture. Contacts are made between a brass screw head on the stick and depressions on the brass strip crossing it. The curved strip in the rear has notches into which a half-moon shaped rocking ratchet runs. This ratchet, seen near the nut toward the right corner will permit, in its present position, moving the stick from left to right. Upon reaching the right position the ratchet rocks over to the opposite side, then preventing the stick from being backed off once it has been moved toward the center position.

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*Continued on page 68*
With European Amateurs on the Bucharest C.C.I.R. Trip

By James J. Lamb,* W1AL, and John C. Stadler,** VE2AP

THERE is a great deal more to international amateur radio than DX contacts over the air; and the International Amateur Radio Union is of much greater significance than just a formal "paper" organization of national radio societies. The truth of this was emphatically brought home to us in personal visits with representative amateurs of European national societies in traveling to and from the Bucharest C.C.I.R. at which we represented the I.A.R.U. as reported in September QST.

From our first greeting by the German amateurs on landing in Hamburg to the last farewell to our hosts in England, there prevailed the same evidences of mutual respect, sincere will to cooperate, sympathetic understanding and true friendship—all of those things which go to make up that deep-founded thing we call "amateur spirit." It runs as the common strong thread through the lives of thousands of hams of different and even opposite political and religious faiths, surmounts the barriers of nationality and languages, and knows no frontiers. Because of it we felt ourselves to be at home wherever we were and knew we were never among strangers—because there were always radio amateurs.

Immediately after our arrival in Hamburg, we were met by Herr Rapcke, D4BWJ, who had been officially delegated by the D.A.S.D. to meet us. Mr. Norman Guy, a former English amateur living in Hamburg, joined us in an early morning cup of coffee and a short rag-chew at the main railway station—all there was time for before our scheduled departure for Berlin. It was here we were first introduced to a method of identification for "blind" meetings which we were to encounter again—and which proved to be surprisingly effective. D4BWJ simply strolled about the large concourse of the Hamburg main railway station holding a copy of QST so that all he passed might see it. One glimpse of the familiar red cover, and we were meeting him with outstretched hand.

Upon our arrival in Berlin several hours later we were again cordially met and given a second introduction to German hospitality, this time by Werner Slawyk, D4BUF, and Otto Graff, D4BAF, regional traffic head and traffic manager of the D.A.S.D. We were immediately acquainted with the schedule which had been arranged for our four days in Berlin—which, with traditional German thoroughness, was presented to us in the form of a typewritten program in which every waking hour (and some that ordinarily should have been spent in sleep) was accounted for.

During the first afternoon we visited the fine new D.A.S.D. headquarters establishment in Dahlem, where we were conducted on an informal inspection tour through the various departments, including the central headquarters amateur station of the D.A.S.D. communication system and the radio parts store which the society operates for its membership. This novel feature of the organization is an especially interesting one, made necessary by the lack of commercial distribution facilities such as we take for granted in the U.S.A. The D.A.S.D. not only conducts the store for its members, but designs the components and has them made up by manufacturers suitably equipped to do the job at reasonable cost. The net result is that the German amateurs are able to buy essential parts at prices which are about the same we would pay for similar types. The variety is somewhat limited, of course, which tends to place restriction on the design of complete transmitter and receiver assemblies, and might seem to curtail possibilities...
of technical development. However, the D.A.S.D. has standardized transmitter and receiver designs which are generally followed, so what might seem like a handicap to us is actually turned into an asset for their practical purposes. Most of the receivers are of a simple regenerative type, while the transmitters are of progressive unit construction, starting off with a low-power electron-coupled oscillator. The tube business is a monopoly in Germany, and the high "bottle" cost necessarily imposes an economic limit on transmitter power—apart from power restrictions imposed by regulations.

Following the afternoon visit to the D.A.S.D. establishment and supper with D4BUF, we were introduced to German television at his home station. Here we witnessed reception of the regular television program service in which D4BUF is employed and which has been in operation under government auspices for some time. The receiver was of the cathode-ray type, of recent design, and the black-and-white picture reproduction was surprisingly good, considering that the transmission was only 180-line with mechanical ("flying-spot") scanning. This system, we were informed, was to be replaced shortly with the more modern type using electron-camera pick-up with a 441-line picture, following American practice. We also learned of the experimental work which was being done with pictures of 700 lines and more, and of the projection-type cathode-ray reception which had been developed along lines similar to the projection technique which was demonstrated in America at about the same time. The prices of the available receivers in Germany are quite high (the one we saw demonstrated would cost about a thousand dollars) and the programs are received only for demonstration and test purposes. There is practically no "home" television as yet, although it is promised for the early future.

The next morning we were again taken to the D.A.S.D. headquarters (in the "official" motor car furnished by our hosts for transportation throughout our visit) for the formal meeting with Vice-Admiral Gebhardt, president of the D.A.S.D., Vice-President and Treasurer Von Eulow, CQ Technical Editor Rolf Wigand and QSL Manager Bruno Garnatz. Following Admiral Gebhardt's gracious greeting and our response on behalf of I.A.R.U. President Woodruff, we began informal discussion of amateur problems and exchange of views, the conversation on amateur matters continuing through luncheon in the headquarters' handsomely appointed dining room.

That evening, after visiting the Berlin broadcasting transmitter at Steglitz in the afternoon, we were guests at the official dinner given by the D.A.S.D., with Admiral Gebhardt presiding. In addition to the D.A.S.D. officials, here we also met representatives of several government agencies and radio services with whom it was our pleasure to discuss amateur matters.

In the following days we inspected the Berlin long-wave and international short-wave broadcasting facilities, the Telefunken laboratories and the central receiving station at Beelitz. At the broadcasting studios interviews were recorded for subsequent transmission over the Berliner and the short-wave service to America. Riding about between the various points gave us an opportunity to enjoy the beautiful German countryside, which we agree is all we had heard it described as being. This was especially true of Potsdam, where we were taken by Admiral Gebhardt, Werner Slawyk and Otto Graff for Sunday afternoon's outing. That evening we said
"good-bye" to the Admiral with real regret, realizing that we had enjoyed the hospitality of a fine gentleman and a good friend. The same feeling of regret was ours at leaving our other friends—to the last handshake from Bernard Vermehren as the Nord Express pulled out of the Berlin station for Bucharest.

BUCHAREST—AND THE YR'S

Following the pleasant but strenuous four days with the D4's, the tiring 36-hour railway trip from Berlin to Bucharest, by way of Breslau (Germany) and through the mining regions of Poland, brought us to Bucharest in the late afternoon of the second day pretty well fagged out. But no sooner did we step out on the platform in the Bucharest station than fatigue was forgotten. A smiling chap with a copy of May QST in hand stepped around in front of us. "Mr. Lamb?" said he. Forthwith we were surrounded by no less than a dozen YR's and a visiting D4 who had come down to greet us. The QST identification was in this instance a jump ahead of that in Hamburg, because the May issue happened to have a cover illustration showing a southwest shot of J. J. L. by which Paul Popescu-Malaesti, YR5AA, made the identification from that quarter!

That evening we had the first scheduled contact with W1EHI in West Hartford from YR5AA, and were able to report on our safe arrival and good health, and to receive the first news from home that we had had since leaving two weeks before. These schedules were kept twice weekly throughout the time of the conference, through the always-friendly cooperation of YR5AA, YR6EV and others of the gang, even when it must have caused considerable inconvenience to them. The YR gang also gave us valuable assistance in activities connected with the conference.

Except for the YR5AA schedules, there was little time available for ham contacts during the period of the conference and it was not until the last weekend that we were all able to get together again. On the evening of June 5th the Roumanian amateur society, the A.A.R.U.S., received us officially at their headquarters. Here we met Dr. Savapol, YR5AS, president of the A.A.R.U.S., and responded to his greeting by conveying to him the best wishes of Dr. Woodruff and the other officers of I.A.R.U. and A.R.R.L. With the formalities over, we all proceeded to dinner and an evening of informal discussion of amateur problems. The A.A.R.U.S. was at that time preparing to make application to the I.A.R.U., and this meeting gave the opportunity for discussion of the various details of the affiliation, as well as of other matters connected with the international amateur picture. Most of this discussion had to be in French, and accordingly was handled by J. C. S. As a consequence, the A.A.R.U.S. application for admission to I.A.R.U. was brought back to headquarters with our hearty recommendation for approval, and is now being voted on by the member societies of the Union.

On the following day, Sunday, a ham party composed of Dr. Savapol, Messers. Popescu-Malaesti, Andriceu, Nicolescu, Bentaud, Militaru, Ciocos and YF, and ourselves, visited Sinia and Brasov in the mountainous country north of Bucharest. This presented a splendid opportunity to exchange further ideas and to examine especially the possibilities of more effective government recognition of amateur radio in Roumania. One fruitful result of the tentative plans then discussed is that rapid progress already has been made by the A.A.R.U.S., and a new and greatly improved status for amateur radio in Roumania is promised for this fall.

Bright and early Wednesday morning, following the close of the conference on Tuesday, the 8th, YR5AA, YR5EV, 5PC and his YF were at the Bucharest station to see us off on the Simplon Orient Express for Paris. Our last thoughts on leaving them were as if we had said good-bye to American hams whom we knew well. Roumania or at home, the ham spirit was there. Except for the superficial differences of language and customs, we might have been among W or VE friends.

PARIS—THE R.E.F. AND R.B.

Exactly two days and nights of continuous travel in a stuffy compartment brought us to Paris and ground more familiar to both of us from previous visits and acquaintance with French hams. Hardly had we had time to round up our baggage and get settled when a delegation headed by PSEF called on us at our hotel. We were immediately taken to the Paris home of Mr. Auger, where we were joined by Mr. Lory, editor of the R.E.F. official journal. Following a delightful (Continued on page 68)
A Semi-Universal Exciter With Stage Switching and Plug-In Coils

A 40-watt Output Unit Suitable for Operation on Five Bands

By George Grammer*

The double-triode exciter, originally presented in QST some three years ago, has met with considerable favor in amateur circles and has since been subjected to a number of modifications by different constructors. Despite a wide variety of circuits, however, some fairly serious operating disadvantages seem to have been neglected by the designers, although not unobserved by the fellows who have built them.

First, the oscillator in the prevalent arrangement is not all that could be desired. Crystal heating is invariably greater with a triode than a tetrode or pentode, using the same plate voltage on both types. With X- and Y-cut crystals, this means greater creep, naturally, besides limiting the output obtainable with crystal safety from a triode. This objection is less serious with low-drift crystals. The second factor, however, may be more important with any type of crystal; it is the fact that in any triode crystal oscillator the oscillation frequency is considerably more dependent upon circuit constants than is the case with a tetrode or pentode. Furthermore, the triodes in a 53 or similar type of double tube are the worst kind from this standpoint because the amplification factor is high.

It can of course be argued that the importance of this feature can be overemphasized because the frequency changes occur only when the circuit is being tuned, and it isn't common practice to twiddle dials while a transmission is in progress. For work well inside a band it probably doesn't matter—except in some special cases—whether the frequency is 7075 or 7080, so long as the signal stays put on either one—and it generally will. But it's a different matter when the frequency is close enough to the edge of a band so that a few kilocycles make the difference between "in" or "out." Add to this the fact that many crystal manufacturers furnish calibrations on the basis of a pentode oscillator and you have a sum which may add up to the wrong answer. So much for the oscillator.

Turning now to the doubler stages, it seems to be customary to connect all the stages in a successively-doubling string, picking output from the one on the desired band. When this is done the idle tube sections usually draw considerable plate current because the plate tanks go out of resonan-
bands are to be covered, since the combination oscillator-doublers and ditto doubler-quadruplers not only require about the same number of tuned circuits, but also leave one up against the problem of what to do with all of them on the lowest frequency—as well as to get enough output on the highest. Furthermore, stage switching can be done at a point where r.f. current is low and circuit diagram is given in Fig. 1. This does not pretend to be a complete-switching unit, although it can be operated on any two adjacent bands without changing any coils, and on four bands with only two plug-in coils for the 807. Essentially, the circuit consists of a beam tetrode oscillator, two doubler stages (in one tube) and a screen-grid beam tetrode amplifier which can be

where lead length is of less consequence than in the tuned circuit itself, so that losses and layout are not a major headache.

A combination of the stage-switching idea, with modifications, and the beam tetrode tube offer the opportunity to get an output of 40 watts (with the new ratings on the 807) on as many bands as necessary—without overloading anything. The exceptionally low excitation requirements of the 807 allow us to take liberties in the layout without worrying about having enough excitation, and at the same time permit conservative operation. The disadvantages of the "53" arrangement first cited can be eliminated by doing two things: first, using a tetrode or pentode oscillator instead of a triode; second, making provision in the switching so that unused triodes do not receive excitation. With the high-mu double triodes this means that the plate current will drop to a safe idling value so long as the rated plate voltage is not exceeded, since the tubes are intended to operate at zero bias. It is not necessary to go over the rated 300 volts to get more than enough excitation for the 807, even on 28 Mc.

A PRACTICAL EXCITER

A practical form of such an exciter or low-power transmitter is shown in the photographs. The connected to either of the three preceding stages. The oscillator, first and second doubler plate coils, \( L_1, L_2 \), and \( L_3 \) respectively, need not be changed for crystal ground for a given band. The switching circuit is so arranged that the grids of unused stages are automatically disconnected from the preceding stage and grounded. The idea readily could be carried out for five-band operation by adding another double triode and continuing the switching system, in which case all crystals could be on the 1.75-Mc. band. However, it seemed to us that the simpler unit here described would be of greater general utility, since comparatively few amateurs care to use 1.75-Mc. crystals exclusively.

In the 807 plate circuit, the tank condenser, \( C_4 \), has sufficient capacity range to permit covering two bands with a single coil. The lower-frequency band will be found toward maximum capacity and the higher-frequency toward minimum in each case. The 807 may be used as a doubler, if desired, for four-band operation from a single crystal; the output and plate efficiency are only slightly reduced from straight-amplifier operation.

The remaining circuit details require little explanation. Capacity coupling is used throughout. The plates of the first three stages are parallel-fed so that the plate tuning condensers can be
mounted directly on the metal chassis. This is convenient, but not essential; if the condensers can be insulated, series feed can be used. Parallel feed in the grid circuits is a practical necessity because with series feed not only the grids but also the biasing circuits would be switched. The 6V6G oscillator, 6N7G doubler-doubler and the 807 screen all operate at the same voltage; with applied. The 6V6G screen runs at a little over 100 volts. A jack is provided for reading plate current to each tube. Series feed is used in the 807 plate circuit, the tank condenser being insulated from the chassis. The various grid leak values specified have been found in practice to give optimum results.

Condenser C19 is a homemade affair of very low capacity, its function being to provide a little feedback additional to that within the oscillator tube itself so that the less peppy crystals will be sure to "start". Even with the additional feedback it is impossible to light a neon bulb on the grid of the 6V6G, and the crystal does not heat in operation. Incidentally, the metal chassis very effectively conduct heat from the tubes, so that the crystal holder may warm up after a period of time. This kind of heat is not the same thing as that caused by excessive crystal vibration amplitude, however.

The above-chassis layout is quite simple, as the top-view photograph indicates. Along the back, from left to right, are the crystal, 6V6G, and 6N7G. Directly in front of them are the three low-level plate coils, L1, L2 and L3. These are wound on ordinary receiving forms, and plug into sockets mounted above the chassis on the metal pillars furnished with the sockets. Next in line comes the 807, with part of a tube shield around its lower half for additional shielding, and finally the 807 tank circuit. The chassis is of electrolyte, measuring 7 by 17 by 3 inches.

Below chassis, things are less simple in appearance because of the necessity for running connections to the stage switch. The three tuning condensers, C1, C2 and C3, are mounted directly underneath their associated coils, and are fastened directly to the under-side of the chassis. The "hot" leads from the coils come down through grommeted holes in the chassis; grounds to the coils are made direct to the chassis, on top.

In the oscillator section at the left, the grid choke is just to the right of the crystal socket; the grid leak, R1, connects between the low-potential end of the choke and ground. The plate choke is

(Continued on page 78)

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FIG. 1—CIRCUIT DIAGRAM OF THE EXCITER

To avoid complicating the diagram, the two sections of the 6N7G double triode are shown separately.


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October, 1937

19
Election Notice

To all members of the American Radio Relay League residing in the Dominion of Canada, Atlantic Division, Dakota Division, Delta Division, Midwest Division, Pacific Division, and Southeastern Division:

You are hereby notified that, in accordance with the constitution, an election is about to be held in each of the above-mentioned regions to elect both a member of the A.R.R.L. Board of Directors and an alternate thereto. In the case of the Dominion of Canada, the election is to choose a Canadian General Manager and an alternate Canadian General Manager for the 1938-1939 term. In the case of the United States divisions, the election is to choose a division director and an alternate division director for the 1938-1939 term.

Your attention is invited to Sec. 1 of Article IV of the constitution, providing for the government of the A.R.R.L. by a Board of Directors; Sec. 2 of Article IV, and By-Law 12, defining their eligibility; By-Laws 13 to 23, providing for the nomination and election of division directors, and By-Law 14 providing for the simultaneous election of alternate division directors; By-Laws 27 to 34 providing for the nomination and election of a Canadian General Manager, and By-Law 28 providing for the simultaneous election of an alternate Canadian General Manager. Copy of the Constitution & By-Laws will be mailed any member upon request.

Voting will take place between November 1 and December 20, 1937, on ballots that will be mailed from the headquarters office in the first week of November. The ballots for each election will list, in one column, the names of all eligible candidates nominated for the office of director by A.R.R.L. members residing in that region; and, in another column, all those similarly named for the office of alternate. Each member will indicate his choice for each office.

Nomination is by petition. Nominating petitions are hereby solicited. Ten or more A.R.R.L. members residing in any one of the above-named regions may join in nominating any eligible member of the League residing in that region as a candidate for director therefrom, or as a candidate for alternate director therefrom. No person may simultaneously be a candidate for the offices of both director and alternate. A separate petition must be filed for the nomination of each candidate, whether for director or for alternate director. The following form for nomination is suggested:

Executive Committee
The American Radio Relay League
West Hartford, Conn.

Gentlemen:
We, the undersigned members of the A.R.R.L. residing in the Division (or in the Dominion of Canada), hereby nominate (Name of candidate), of (City and State), as a candidate for director (or for alternate director, or for Canadian General Manager, or for alternate Canadian General Manager, as the case may be) from this region for the 1938-1939 term. (Signatures and addresses)

The signers must be League members in good standing. The nominee must have been both a member of the League and a licensed radio amateur operator for a continuous term of at least four years preceding the receipt by the Secretary of his petition of nomination. He must be without commercial radio connections: he may not be commercially engaged in the manufacture, selling or renting of radio apparatus normally capable of being used in radio communication or experimentation, nor commercially engaged in the publication of radio literature intended, in whole or in part, for consumption by licensed radio amateurs. Further details concerning eligibility are given in By-Law 12. His complete name and address should be stated. All such petitions must be filed at the headquarters office of the League in West Hartford, Conn., by noon E.S.T. of the 1st day of November, 1937. There is no limit to the number of petitions that may be filed, but no member shall append his signature to more than one petition for the office of director and one petition for the office of alternate director. To be valid, a petition must have the signatures of at least ten members in good standing; that is to say, ten or more members must join in executing a single document; a candidate is not nominated by one petition bearing six signatures and another bearing four signatures. Petitioners are urged to have an ample number of signatures, since nominators are frequently found not to be members in good standing.

Present directors and alternates for these regions are as follows: Dominion of Canada, Canadian General Manager, Mr. Alex Reid, VE2BE, St. Lambert, P. Q.; alternate, none. Atlantic Division, Director, Mr. Walter Bradley Martin, W3QV, Roslyn, Pa.; alternate, none. Dakota Division, Director, Mr. Carl L. Jabs, W9BVH, St. Paul, Minn.; alternate, Mr. Fred
W. Young, W9MZN, Mankato, Minn. Delta Division, Director; Mr. E. Ray Arledge, W5S1, Pine Bluff, Ark.; alternate, none. Midwest Division, Director, Mr. Floyd E. Norwine, Jr., W9EFC, St. Louis, Mo.; alternate, Mr. O. J. Spetter, W9FPG, Topeka, Kan. Pacific Division, Director, Mr. S. G. Culver, W6AN, Berkeley, Calif.; alternate, Mr. J. L. McCargar, W6EY, Oakland, Calif.; Southeastern Division, Director, Mr. Bennett R. Adams, Jr., W4APU, Homewood, Ala.; alternate, Mr. S. J. Bayne, W4AAQ, Birmingham, Ala.

These elections constitute an important part of the machinery of self-government in A.R.R.L. They provide the constitutional opportunity for members to put the direction of their association in the hands of representatives of their own choice. Members are urged to take the initiative of the machinery of self-government in A.R.R.L.

Those of you who keep your copies of the Rules up-to-date should make these alterations. And now to change over our 30-mc. rigs! Let all amateurs take note that there is to be no more telephony in this band between 28,000 and 29,000 kc. instead of the former 28,000 to 29,000 kc. The change was made by amending the figures in Rule 376 and a similar change is understood to have been made in Rule 403. Those of you who keep your copies of the Rules up-to-date should make these alterations.

And now to change over our 30-mc. rigs! Let all amateurs take note that there is to be no more telephony in this band between 28,000 and 29,000 kc. but that they may now go all the way to the 30-Mc. end of the band with voice. All of the band remains open to telegraphy.

Financial Statement

The League had a loss of a little over three thousand dollars from ordinary operations in the second quarter of this year, before disbursements against special appropriations—an amount which is normal for that season of the year. By order of the Board, the operating statement is here published for the information of the membership:

STATEMENT OF REVENUES AND EXPENSES, EXCLUSIVE OF EXPENDITURES CHARGED TO APPROPRIATIONS, FOR THE THREE MONTHS ENDED JUNE 30, 1937

<table>
<thead>
<tr>
<th>Category</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Membership dues</td>
<td>$9,627.80</td>
</tr>
<tr>
<td>Advertising sales, QST.</td>
<td>23,004.53</td>
</tr>
<tr>
<td>Newdealer sales, QST.</td>
<td>11,189.04</td>
</tr>
<tr>
<td>Handbook sales</td>
<td>6,162.23</td>
</tr>
<tr>
<td>Booklet sales</td>
<td>2,272.00</td>
</tr>
<tr>
<td>Calculator sales</td>
<td>329.59</td>
</tr>
<tr>
<td>Membership supplies sales</td>
<td>2,258.91</td>
</tr>
<tr>
<td>Interest earned</td>
<td>406.60</td>
</tr>
<tr>
<td>Cash discounts received</td>
<td>300.98</td>
</tr>
<tr>
<td>Bad debts recovered</td>
<td>25.43</td>
</tr>
</tbody>
</table>

$35,649.07

Expenditure

Total expenses: $51,207.77

Net Revenues: $3,441.30

Net Loss before Expenditures against Appropriations: $3,225.47

New Commissioners

Just before it adjourned in August, the Senate confirmed the appointment of two new commissioners to the F.C.C.:

Mr. Frank R. McNinch, chairman of the Federal Power Commission, is becoming the temporary chairman of the F.C.C. in the place left vacant by the recent death of Mr. Prall. Rated an exceptional executive, Mr. McNinch is simply taking a leave of absence from the F.P.C. to help straighten out the F.C.C. in some of its recent difficulties and is thereafter expected to return to his permanent post.

Lieutenant-Commander T. A. M. Craven, the past two years the chief engineer of F.C.C., was elevated to a commissionership to fill the vacancy left by the recent resignation of Dr. Stewart. Thoroughly qualified both as a radio engineer and as an administrator, this appointment has very general approval. Commander Craven has attended almost every radio conference in which the United States has participated since the war. He will be the logical choice to head the U. S. delegations to Habana and Cairo. As was reported in QST at the time, he was the chief negotiator of the high-frequency allocation system worked out at Washington in 1927 and which has since remained the basis for world allocation. "Tam" has A.R.R.L.'s hearty congratulations; he has been pretty thoroughly "exposed" to amateur radio.

(Continued on page 35)
Modernizing the Simple Regenerative Receiver
A Two-Tube Band-Switching Model of Proved Performance

By Vernon Chambers,* W1JEQ

An attempt to improve the operating convenience of the simple regenerative receiver has brought about the layout pictured and described. The main feature, band-switching, has neither greatly increased the cost nor complicated the construction. The simplicity of the circuit makes worthwhile the building of such a set even if it is to be used only as a spare or as the receiving section of an emergency or portable station. Indeed, even the budding ham's technical knowledge might well profit from the attempt be made to follow the original set-up as closely as possible.

Before going into the actual description of the receiver we may have one more thought, addressed particularly to the beginner. The circuit, except for the band-switching details and the values of some of the components, is practically the same as the one described in the fifth edition of the A.R.R.L. booklet, How to Become a Radio Amateur. A splendid idea for anyone not too familiar with the practical fundamentals of radio is to study and understand the operation, both mechanically and electrically, of the mentioned receiver thoroughly. This done, he will find himself with a great deal of worthwhile information, useful when the construction of this modernized set is attempted.

The first step is to procure a panel and base. At the same time, since we have now entered the aluminum cutting end of the job, we may as well manufacture the two and only brackets needed.

The panel, measuring 9¾ by 6 inches, is cut from a sheet of ½-inch aluminum, as is also the base and one of the brackets. The base is started from a piece of stock 9 by 6 inches. A line, parallel and 1½ inches in from one of the 9-inch sides, is scratched with a sharp-pointed tool. With the 1½-inch section bent down until it is at right angles with the 4½-inch piece, we have a chassis 9 by 6½ by 1½ inches. A 9-inch length of ½-inch aluminum angle serves to fasten the base and panel together.

FOR CHANGING BANDS

IN THE MODERNIZED VERSION OF THE SIMPLE REGENERATIVE RECEIVER COIL SWITCHING ELIMINATES THE INCONVENIENCE OF PLUGGING IN COILS FOR CHANGING BANDS

On the front panel, the coil switch is to the right of the bandspread tuning dial in the center and the regeneration control is to the left. The band-set condenser control projects from the left side of the chassis.

setting up of such a receiver, not only as a simple piece of equipment with which to experiment but also as a working model to demonstrate fundamental radio circuits.

The pentode detector and audio amplifier circuit employed is the same as that of many regenerative receivers with the exception of the coverage of four bands, 1.7 Mc. to 14 Mc., by means of the band-switching arrangement instead of by plug-in coils. Many days of considerable building and rebuilding were spent before the suitable tube line-up and switching system was found for even so simple a circuit, and for that very reason the recommendation is passed along.

*Laboratory Assistant.
location. But special care should be taken with the following items.

With the band-setting condenser mounted as shown, a considerable decrease in stray capacities results from the use of short leads. Elevating the 6K7 tube base above the chassis provides a much shorter cathode connection—something of no small importance in this set. The switch is of the six-position type and, since there are only four coils, two sets of contacts are left unoccupied. To allow spacing of the 14- and 7-Mc. coils, the two with which coupling effects are most likely to cause trouble, one or even two of the spare contacts may well be left between their points. We then have the 14-Mc. coil at the left end of the switch, next to the tube, the extra contacts, and then the 7-, 3.5- and 1.7-Mc. coils mounted on the remaining three sets of points. A word of warning: Don't attempt to mount the coils at anything other than right angles with each other. Also try to separate them as much as possible, still keeping in mind the necessity of short leads. If these precautions are taken, little or no trouble should arise to impair the proper functioning of the circuit.

The circuit, shown in Fig. 1, is of the pentode detector and one-stage audio amplifier type, employing two tubes, the 6K7 and the 6C5, both of which operate at a low current drain, making feasible battery operation. Coupling of the antenna to the cathode of the detector through the small variable condenser, C5, proved to be the most satisfactory method. Although operation on any band with maximum capacity is permitted, adjustment of the condenser to match various antennas allows the circuit to be brought up to its most sensitive operating point. Screen voltage is varied by means of the potentiometer Rs to control regeneration, which is obtained by tapping of the cathode near the ground end of each detector coil. This tap should be placed so as to allow the tube to go into oscillation with about 30 volts applied to the screen grid. A second way to determine the correct placement of the tap is to select a position for the tap that will cause oscillation to occur when the control, Rs, is half turned on. These hints are given in case the coils are wound with wire different from that specified.

The r.f. choke in the plate output lead protects oscillation with about 30 volts applied to the screen grid. A second way to determine the correct placement of the tap is to select a position for the tap that will cause oscillation to occur when the control, Rs, is half turned on. These hints are given in case the coils are wound with wire different from that specified.

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Results, 1937 DX Competition

By E. L. Battey,* W1UE

The final tally of scores in A.R.R.L.'s Ninth International DX Competition at long last completed, Tom York, W1BJ, and Yours Truly are once more beginning to act like ordinary human beings. It's a relief not to dream of numbers every night!

What a contest it was! Unanimously voted the "best yet," the results bear out this fact. This year the contest was in two sections, the first (March 6th-14th) for C.W. participants, the second (March 20th-28th) for Voice operators. In the 1936 DX Contest Results we said of Signal Corps U. S. A.

JAMES A. WILSON, EX-W2BXU, K5AY, WHO TOPPED THE WORLD WITH 253,635 POINTS—1618 QSO'S!

Receiver is rebuilt FBXA; Transmitter—59-47-46's, with 200 watts input.

XE2N's score of 189,081 (1370 QSO's), "We believe XE2N has made a record that will stand for some time." Brothers, we spoke out of turn. Never again will we make predictions concerning DX contests! Read on.

That DX contests are fun all participants agree, but it sometimes seems that the real fun comes after the contest when you get together with the gang to compare notes. "Did you hear . . .?"—"Say, where was . . .? I heard you calling him"—"Just wait until next year!"—"What score did you make?"—and all the other questions (and answers that go with them) that follow a contest bring enjoyment equal to actual participation. We hope that the report here presented will bring back memories of your contest operation.

The official score list gives the accomplishments of 1391 C.W. operators (1024 W/VE, 367 in 61 outside localities) and 876 'Phone operators (241 W/VE, 135 in 45 outside localities). The results of the C.W. and 'Phone portions are tabulated separately since they were actually separate contests.

The Winners

The winners in the contest are the first-listed in each A.R.R.L. Section, and in each outside locality, both for the C.W. and 'Phone Section; 64 C.W. certificate awards and 59 'Phone awards are being made in the United States and Canada; 61 C.W. awards, 45 'Phone awards go to countries outside W/VE. Heartiest congratulations to all winners!

Although, competitively speaking, there is no "national high" and no "world high," keen interest is always displayed in just which operators made the highest scores, which made the most QSO's, who worked the greatest number of countries, etc. Some of the "double-dyed-in-the-wool" DX-ers actually compete for highest place rather than for honors within their own Section or country. With these points in mind we have dug out some real eye-opening facts.

The C.W. Section

ALTHOUGH an old name in DX circles, Ralph Thomas, W2UK, pulled sort of a "dark horse" stunt on us when he very quietly and unassumingly, after we thought we knew the leading scores, came through with the highest score among W/VE's—119,796 points representing...
268 QSO's, a multiplier of 149. Not content with breaking all DX Contest score records, W2UK worked 71 different countries, thereby establishing a new "countries worked" record for contests. He ran 1 KW. to a pair of '52's on 3.5, 7, 14 and 28 Mc., operating 87 hours, 52 minutes. Hamdom congratulates you, W2UK, on a real "hamfeat"!!!

A healthy second is Clark Rodimon, WISZ, with 116,070 QSO's, 68 different countries, a multiplier of 146. WISZ ran about 650 watts input to a pair of 80,5's on 3.5, 7, 14 and 28 Mc. A veteran of DX Contests, "Roddy" says he "never had so much fun since ... " It must be fun to be able to run up a score like that!

The highest scorer in each W district: W1SZ 116,070, W2UK 119,796, W3PC 56,304, W4CBY 89,838, W5VY 29,092, W6CXW 110,544, W7AMX 28,875; W8FJN 69,328; W9TB 76,160. The highest Canadian: VE2AX 56,341.

Leaders in number of QSO's are: W2UK 268; W6CXW 266; W1SZ 265; W2AIW 246; W6GRL 242; W4CBY 217; W9TB 216; W9ARL 212; W6JBO, W1TW (2 oprs.) 210; W6FZL, W8FJN 207; W2JME, W6GRX 198; W4AH 187; W3PC 184, VE2AX, W5LEC 182 and W1DHE 181. For a permissible 90 hours of operating (and some of these lads operated less than 90 hours!) these figures sure represent some fast work!

Those having the highest multipliers (total of different countries worked on each band used): W2UK 149; W1SZ 146; W6CXW 139; W4CBY 138; W2AIW 135; W6GRL 125; W9TB 119; W6FZL 117; W8FJN, W9ARL, W1TW (2 oprs.) 112; W6JBO 110; W6GRX 108; W2JME 106; W5LEC 105, VE2AX 103 and W1DHE, W1TS, W3PC, W4AH 102.

W6CXW OPERATING TABLE; CONTROL SWITCH AT RIGHT OF RECEIVER; FINGER-TIP SELECTION OF SIX DIFFERENT ANTENNAS IS POSSIBLE BY MEANS OF THE SWITCHBOARD AT THE LEFT
3.5-, 7-, 14- and 28-Mc. bands using an input of 150 watts.

In third and fourth places respectively we find K6CGK 163,600, and K7PQ, 162,968. K6CGK made 1110 QSO's and a multiplier of 50, K7PQ made 1058 QSO's, a multiplier of 52. K7PQ used 5 bands, 350/600 watts, K6CGK 4 bands, 90 watts. It was a close race between these fellows.

Next in line, and excellent scores too, come:

Next in line, and excellent scores too, come:

**THE LAYOUT AT W9ARA, HIGHEST W/VE SCORER IN THE 'PHONE SECTION OF THE CONTEST--A SMOOTH-LOOKING STATION THAT REALLY PERFORMS**

F8EO 151,650; K5AC 129,792; ZL4AO 103,800; K6ILT 102,949; PM8AD 94,176; D4XCG 92,389; PAOAZ 90,285; G6NF 79,289; G16TK 78,081; YM4AA 75,600; VK3MR 74,702; G2PL 73,964; OA4J 72,590; K6JPD 71,586; OE3AH 71,532 and YR5AA 70,584.

The highest scorer on each continent: Africa—ZS2A 57,240; Asia—J4CT 8352; Europe—F8EO 151,650; North America—K5AY 253,635; Oceania—K6CGK 163,600; South America—OA4J 72,590.

QSO champions are: K5AY 1618 contacts; XE2N 1270; K6CGK 1110; K7PQ 1058; F8EO 1021; K5AC 905; ZL4AO 876; D4XCG 836; PAOAZ 774; OA4J 727; K6ILT 711; YM4AA 707; YR5CF 590; OK2OP 571; G6NF 565, and OE3AH 558.

The highest multiplier was made by XE2N, who worked 5 bands. . . . 4-band operation was commonplace . . . . These contests provide excellent memory training in trying to keep track of the stations already worked . . . . K6CGK made 21 contacts the first hour of the battle . . . . Incidentally, CGK claims the longest contest log in the world; his C.W. log measured 21 feet, his 'phone log 5 feet, making a total of 26 feet, all in one piece! Typical success story: After trying off and on since 1910, W3BEN completed W.A.C. in 4 hours, 19 minutes during the contest . . . . The "Sunday Drivers" of amateur radio, the inveterate "testers," came in for their share of cussing . . . . One out of every five stations worked by G6RB was a W9 . . . . W2A1W guesses the guy with the eighteen pencils on the cover of March QST must have run up a whopping score—he used but one pencil and a sharpener and got 08,445! . . . W9AFN heard 84 different countries . . . . It was amusing to hear some operators bemoan the lack of DX while their own signals were QRMing more DX than could be worked in a week . . . . W9OXO's first QSO was with G6RB—a nice job of following the sample log in February QST . . . . W5QFDN made W.A.C. six times, once in 4½ hours. . . . W5CPT was right there with his low power—with 8 watts input he made W.A.C. twice during the contest . . . . W9GDL in Nebraska heard and called 67 different countries . . . . W3G-EA's sunshine was turned to rain when after calling SUICH for nearly an hour he came back to . . . .

W9TB, ILLINOIS WINNER AND SEVENTH HIGH AMONG W/VE PARTICIPANTS IN THE C.W. PORTION OF THE CONTEST

Transmitter line-up: 59-three '47 doublers-802-P.P. RK-20's-four 860's P.P.-Par. final, 1-KW. input, 'phone or C.W., all bands, 3.5 through 28 Mc. Interesting features of the station are temperature-controlled crystal oven with eleven 3.5-Mc. crystals with selector switch, elaborate standard frequency apparatus consisting of 100-kc. crystals in temperature-controlled oven, buffer and multivibrator with harmonic selector on the panel, and seven separate antennas, one for 3.5, two each for 7, 14 and 28 Mc.

W3G-E-B! . . . K7PQ worked W6GRX on 5 bands . . . . VE1EA worked G2PL on 5 bands in a little over 16 hours . . . . XE2N QSO'd W4AUU on 5 bands in one day. . . . W8EMW heard about 80 different countries on 7 and 14 (Continued on page 80)
Concentrated Directional Antennas for Transmission and Reception

Rotatable Loops and Antenna-Reflector Systems of Reduced Dimensions

All the "angles" pertaining to directional antenna systems are not just those we usually talk about. Besides angle of concentration in the vertical or horizontal plane, angle of rotation, angle of the wires, there is also the all-important "angle" of, "how much space?" Rhombics and multiple arrays of conventional form give high gains—but even for the 14-Mc. band they take considerably more yardage than most of us have available. Therefore, concentrated directional systems which are more readily fitted into the usual back yard have a distinct appeal from the space "angle". While they may not give such tremendous power gains, as compared to a simple halfwave dipole, they can give front-to-back ratios which noticeably improve the signal-interference ratio for the owner in reception and for the other fellow in transmission. By forming half-wave units into different shapes, thereby reducing the over-all dimensions, John Reinartz has achieved several different types of compact directional systems. In the following articles, W1QP outlines the electrical design and performance of half-wave loops, and Dr. Simpson describes the folded-end antenna-reflector system constructed for his station on suggestions from W1QP.

Half-Wave Loop Antennas

By John L. Reinartz, W1QP

An unusual type of loop antenna for both transmitting and receiving has been in use at W1QP for some time and has been found particularly useful on the higher frequencies. At 2 1/2, 5, 10 and 20 meters, this antenna has shown itself well suited for amateur use, especially where room is at a premium. Even attic space is sufficient for its erection. When mounted out of doors, it compares very favorably with the usual type of half-wave "straight" antenna in all respects and has the advantages of a high degree of directivity and polarization sensibility. An additional advantage is that this antenna can be used for direction finding. Feeding the antenna is no problem because feeder radiation or pickup is negligibly small and because symmetrical loading of the feeder line is accomplished as a matter of course. Because the antenna is simple, construction difficulties do not present themselves in any marked degree and are not beyond the facilities of the amateur. In its simplest form, the antenna can be erected in less than 30 minutes.

The basic idea of the antenna centers about a half-wave length antenna conductor, preferably of aluminum or copper tubing, bent into a circle. In its preferred form, as shown in Fig. 1A, the antenna is made up of two such circles spaced a few inches apart by means of supports of insulating material (which may be wood that has been soaked in oil or paraffin). Of course the circles do not quite close since that would short-circuit the antenna and render it useless. The recommended opening in the circle, d, is 0.2 inch per meter; thus for 20 meters, the opening is 4 inches. The recommended spacing between the two circles, s, is 1 inch per meter; for 20 meters, the spacing is 20 inches. The circles are so mounted that the openings coincide. Because the antenna has a directional front-to-back ratio which in practice

FIG. 1—DOUBLE-CIRCLE, SINGLE-CIRCLE AND SQUARE HALF-WAVE LOOPS WITH DIFFERENT FEEDER CONNECTIONS

The spacings "d" and "s" are described in the text. The arrows indicate the direction of maximum concentration in transmission.
amounts to a power ratio of 4 or approximately 6 db, it is important to be able to change the direction in which the antenna points. A gain in signal is obtained in the direction of the current loop side of the antenna; a reduction in signal is experienced in the direction of the voltage loop or open ends. This statement holds good for both reception and transmission. Therefore, when the antenna is mounted in a vertical plane, for rotation about a line in the plane of the loop, the open end is placed at “3 o’clock” or at “9 o’clock”. When the antenna is mounted in a horizontal plane, the direction of transmission and reception is given by an arrow starting from the open end and drawn across the middle or current loop. The field strength gain in the forward direction, it should be mentioned, is about 28%, as compared to a straight half-wave dipole.

The feeders can be connected to the antenna in a number of ways, the best way depending on the type of feeder. The spaced type of feeder is recommended for 28 Mc. and higher frequencies in order that the transmission losses may be kept at a minimum. For 14 Mc. it is perfectly feasible to use any of the good low-impedance or 72-ohm lines that are on the market. When a tuned, spaced line is used, the connections are to opposite ends of the circles, one on the Number 1 and the other on Number 2 circle, across the diagonal. This means that each feeder is symmetrically loaded to the antenna, a condition which is hard to obtain with a normal end-fed half-wave antenna, such as a Zepp.

When a low-impedance, or 72-ohm, feeder line is used, it is connected in a similar manner but at the current loop, one feeder wire going to one circle a little off from the middle of the antenna and the other feeder going to the other circle a little off from the middle of the antenna in the opposite direction. The optimum distance between the connection of the feeders and halfway point on the antenna depends on the impedance value of the feeders and may be from 0.1 inch per meter to 0.5 inch per meter of the fundamental wavelength. The optimum distance can be determined by the fact that the load drawn by the antenna is greatest when the feeders are connected at the optimum distance. Another indication of proper adjustment is that, with this adjustment, no change in tuning results when the antenna coupling is removed.

A modification of the double-circle loop antenna consists of but one circle or one square, mounted either vertically or horizontally, as shown in Figs. 1C and 1D. Again, a half-wave length of wire is formed into a square, and is left open by the amount, d, previously mentioned. Then the point opposite the opening is cut and a 72-ohm feeder line is connected into this cut, exactly as would be done in the case of a center-fed half-wave antenna. The difference between the square or circular antenna and the center-fed half-wave straight antenna is that the square or circular antenna is unidirectional rather than bidirectional. Both the square and circular antenna will give remarkable results, even when mounted in an attic. Both of them are easily made steerable. The circular antenna can be mounted in a horizontal plane and suspended with waxed string from the attic rafters. With this arrangement, the

**FIG. 2—THE SQUARE RADIATOR-REFLECTOR SYSTEM IS MADE COMPACT BY BENDING THE END EIGHTH-WAVE SECTIONS OF THE WIRES, MAKING THE DIMENSIONS A QUARTER-WAVE ON EACH SIDE.**
A Square "Signal Squirter" for 14 Mc.

By Burton T. Simpson,** W8CPC

The idea for this antenna was suggested by John Reinartz. Upon the theory that the radiation from a half-wave antenna comes largely from the middle quarter-wave portion, it is argued that not much energy should be wasted by turning back each end. By doing this much space would be saved. To make the radiation unidirectional, a reflector was constructed on the same principle, thus forming a square. The schematic of this antenna system is given in Fig. 2, while constructional details are suggested in Figs. 3 and 4.

To form the frame, four lengths of fir wood, the type of wood used in making ladders, 16 feet 1 inch long by 1½ by 1¼ inches, were formed into a square. A center block 30 inches square by 1¾ inches thick is placed in the center. Across the corners are braces of the same material. From the corner braces to the center block are four more braces from the same material. In the center of the block a post 5 feet long by 1½ inches square is erected and four braces from the top of this to the corner braces are placed. You now have the main structure for the antenna which is 16 feet 1 inch square.

Four lengths of copper tubing 15 feet by ¼ inch are used for the antenna radiator and reflector. Starting at the radiator side, two stand off insulators 2½ inches long are placed exactly 4 inches apart. The ends of the 2 pieces of copper tubing are flattened and a hole placed in them to fit over the 2 insulators. From these ends Bassett cable is fastened and runs to the tank coil of the transmitter where it is link-coupled. Insulators are placed at intervals along the front and sides to accommodate the rest of the copper tubing. However, at the side ends the copper tubing must not be flattened because the final tuning is done by the insertion of brass rods in the open ends. It will be found that about 7 feet will be turned on each end. Turning the ends of the tubing

FIG. 3-CONSTRUCTIONAL DETAILS OF THE ANTENNA ASSEMBLY AT W8CPC

The diameter of the copper tubing is drawn to enlarged scale for clarity.
shortens the calculated length of the antenna. This one happens to be 31 feet long.

Beginning at the reflector side of the antenna, two stand-off insulators are placed about 12 inches apart and the other two lengths of copper tubing are fastened to these by a strap. Then, four insert for tuning is removed. Figure 4—Details of the mechanical system used to rotate the WSCPC antenna tubing are fastened to these by a strap. Then, with the required number of stand-off insulators, this is extended the length of the back and bent forward at the corners. With the exception of the 2 front portions which constitute the center of the antenna, the rest of the copper tubing must be fastened to the stand-off insulators by straps. It is important to have the distance between the antenna and reflector exactly 16 feet 6 inches.

It is necessary to have 5 lengths of brass rod to fit snugly into the copper tubing for tuning purposes. Four are inserted in the tubing on the sides; the fifth must be longer than the others to close the gap in the reflector after the meter inserted for tuning is removed.

Underneath the center square wooden block is a steel plate 14 inches square by 1 inch thick. This is bolted to the block of wood and has a groove for ball bearings. At the center of this is screwed a 1-inch steel rod to rotate the antenna. The steel plate fits exactly on the top of a similar steel block fastened to a 7-foot tower which rests on a platform built on the top of the house. The bottom of the steel rod fits in a gear box which is connected to a similar steel rod entering the radio room. On the end of this is a wheel backed by a brass plate showing the points of the compass. Details of the mechanism are given in Fig. 4.

TUNING UP PROCEDURE

In the open space in the reflector the r.f. meter is connected by short leads, and the Bassett cable link is inserted in the center of the tank coil of the transmitter. The transmitter is now turned on and the brass rods in the ends of the copper tubing are pushed in or out until the highest reading of final amplifier plate current is obtained. Then the brass rods in the ends of the reflector are manipulated for the highest reading in the r.f. meter. This will cause the final amplifier milliammeter to read lower. Again tune the antenna for highest final input, which will cause a decrease in the reflector r.f. reading. Retune the reflector in the same manner for maximum reading of the r.f. meter. This is repeated until both meters give the highest reading. Now tape the brass rods at the sides, remove the r.f. meter and close the reflector gap with its brass rod, tape it—and the job is completed.

At WSCPC this antenna works very well. In a typical instance, with the “squirt” pointed toward England, G5ML gave an “S9 +” report. With the antenna pointed in the opposite direction, he gave “S2”. By using a relay in the cable circuit this antenna also acts as an excellent receiving antenna with quick change-over.

More on PITC

About the only thing that will stop a landslide is another landslide. We have reference to the announcement on page 56 of the September issue of QST wherein it was stated that steps were being taken by A.R.R.L. to arrange a fund for providing modern radio gear for remote Pitcairn Island. This resulted from the considerable number of unsolicited contributions received from readers of the original PITC article in the August issue.

But it seems that not only did individual readers have this idea—a group of manufacturers did, likewise. These manufacturers went ahead and lined up a complete station layout, including a Wincharger for charging the storage battery which was to serve as the primary power basis. In view of this effort, which by the time we learned of it had already progressed to a point where it could not readily be recalled, A.R.R.L. is abandoning its plans, has returned the contributions.

Right now we don't know just what the outcome will be. The islanders have as yet had no opportunity to express themselves on the subject. We don't know what their desires are; it may be that they want only 600-meter stuff, or it may be that Andrew Young can be persuaded to turn ham. We don't even know what the British government will have to say about it. But these things will be determined, and the story will, we hope, eventually be told in QST. Until then, thanks, gang! Your hearts are in the right place!

QST for
Negative-Peak Automatic Modulation Control for Plate-Modulated 'Phone Transmitters

If every one of our 'phone transmitters could be made over-modulation proof, that greatest affliction to amateur 'phone communication would be remedied forthwith. For, despite the constant campaign against over-modulation and the government regulations against it, there is still altogether too much "side-band splatter" and other evidence of the spurious resulting from pushing the modulation level beyond the permissible limit. It is realized that instances of exceeding the transmitter's modulation capability are mostly unintentional. Voice level and speaker's position with reference to the microphone can't be kept rigidly fixed. What is needed is automatic "means to insure," built right into the transmitter, which is practically fool-proof. Such means we now have at hand. Previous articles have described speech-amplifier compression circuits. The contributions of Messrs. Plummer and Waller presented here-with describe how to employ the modulator itself as the control agency. Although similar, the systems described were worked out independently by the two authors and are printed in the order received, W2CMI's first and W2BRO's second. Since these systems not only give automatic overmodulation insurance but also provide volume compression, higher average percentage modulation increases the effective signal and gives the operator a considerable extra dividend on his investment.

Over-Modulation Control and Volume Compression with Variable-Mu Speech Amplifier

By W. Bradley Plummer,* W2CMI

In keeping with the rapid advances that have been taking place recently in the design and control of amateur equipment, it seems fitting that automatic volume control circuits should be incorporated in modern 'phone transmitters. The advantages to be obtained include the maintenance of high modulation level, the elimination of obnoxious overmodulation and relief from the troublesome necessity of adjusting the voice to the microphone or the amplifier gain to the voice as must now be done in order to obtain uniform performance. Volume compressing methods which have been described previously are capable of accomplishing these objectives, but the circuit arrangement treated here has the advantages of requiring no audio coupling transformers, of being largely self-adjusting and, in addition, of providing attenuation to the amplification of the audio signal only after a high modulation level has been reached. A high audio surge will cause the a.v.c. action to take effect almost immediately, and this effect will then persist for as long as several seconds, if desired, permitting the speaker time to take a breath without a great change in amplifier gain.

The control voltage is applied to the grid of a variable-mu screen-grid tube in exactly the way that it is done conventionally in receivers; when the grid bias is increased negatively, the overall gain of the stage is decreased, accomplishing the desired control. The novel feature of the circuit is the method used to obtain this controlling voltage. Fig. 1 shows the experimental circuit which was used, while Fig. 2 shows a practical circuit incorporating the same features applied to a typical higher-power line-up.

The functioning of this circuit is based upon...
the fact that the instantaneous potential applied to the plate circuit of the modulated stage of a transmitter should never become negative, for if it does the sudden interruption of plate current sets up transient signals which largely account for the “splashing over” which is characteristic of over-modulation. It is desired, then, to have the a.v.c. take control before the potential at point obtained as soon as the potential at “A” becomes some pre-determined low value. This is accomplished by connecting a source of d.c. voltage to the plate of the control rectifier making its plate positive relative to ground. Now as soon as the potential at “A” becomes less positive than the rectifier plate, current will begin to flow in the tube, since its filament is negative relative to its plate. This current causes a voltage drop in $R_1$ which is carried to the control grid of the variable-mu amplifier tube, the 6D6 in this case, causing a reduction in gain of the amplifier.

In order to avoid audio feedback, this control voltage must be adequately filtered, which is done in the usual manner by use of resistances and condensers, as shown. The main filter condenser $C_1$ must be large, for it must smooth out the sudden voltage surges to which it is subjected by virtue of the fact that current flows through the rectifier only during a very small part of any audio cycle. It will be noted that the a.v.c. voltage is available only after sufficient time has passed for $C_1$ to charge through the rectifier. Since the circuit through which this charging current flows has low resistance, only a fraction of a second is required. But the discharge of $C_1$ occurs slowly, the current flowing entirely through $R_1$ or through the condenser itself as normal leakage. Thus, a delay of a few seconds or more may be obtained by choosing the proper value for $R_1$.

It was found desirable to operate the controlled tube at a relatively high audio level—not as the first tube following a low-level microphone, for example. The reason for this is that less trouble from audio feedback through the control circuit is then experienced, so that $R_2$ and $R_3$ may be made smaller, reducing the time required for the a.v.c. to take effect. It was also found that the 6D6 was unusually sensitive to stray electromagnetic fields, but this undesirable pick-up is negligible when the tube operates at high signal levels.

The performance of this circuit is entirely satisfactory not only from the consideration of the constancy of output voltage with varying input signal voltages, but also when its freedom from distortion is considered. By use of an oscilloscope, with constant input wave form the output wave form was seen

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**FIG. 2—THE AUTOMATIC CONTROL CIRCUIT APPLIED TO A HIGHER-POWERED MODULATOR UNIT**

Values given also apply to the circuit of Fig. 1.

- $C_1, C_2$: 8-µfd. electrolytic.
- $C_3$: 0.01-µfd.
- $C_4$: 0.05-µfd.
- $C_5$: 10-µfd.
- $C_6$: 25-µfd. electrolytic.
- $C_7$: 0.1-µfd.
- $C_8$: 10-µfd. 50-v. electrolytic.
- $R_1$: 500,000 ohms (or less).
- $R_2$: 2-megohm or less (sometimes zero).
- $R_3$: 10,000-ohm.
- $R_4$: 5-megohm.
- $R_5$: 2600-ohm.
- $R_6, R_7$: 250,000-ohm.
- $R_8$: 20,000-ohm.
- $R_9$: 10,000-ohm.
- $R_{10}$: 819-ohm.
- $R_{11}$: 100,000-ohm.
- $R_{12}$: 500,000-ohm (variable).
- $R_{13}$: 2000-ohm.
- $R_{14}$: 20,000-ohm.
- $R_{15}$: 3000-ohm.
- $R_{16}$: 10,000-ohm.
- $R_{17}$: 481,500-ohm.
- $R_{18}$: 18,500-ohm.
- $R_{19}$: 115,000-ohm.
- $R_{20}$: 18,000-ohm.
- $R_{21}$: 500,000-ohm.
- $R_{22}$: 20-ohm.
- $T$: 2.5-v. filament transformer, high-voltage insulation.
- $E_c$: 90 v. (when h.v. = 700).
to remain unaltered when the input voltage was varied throughout a range of 20 to 1. During this variation the output voltage varied only about ten percent. A variation of 40 to 1 in input voltage varied the output voltage about twenty percent. This represents a change in amplifier gain of more than 30 db, which should be adequate for ordinary amateur uses. Fig. 3 gives a graphical picture of the relation of output voltage to input voltage.

Another characteristic of the circuit which would be of particular value in case it were desired to operate with reduced power is illustrated in Fig. 3. In consequence of the means by which the control voltage is obtained, the audio output of the modulator automatically adjusts itself to variations in d.c. voltage applied to the modulated stage.

Extensive laboratory tests of this circuit have been made using both microphone and phono-graph pickup as well as the test signals used to obtain data for the curves. The quality of both speech and music was found to be unimpaired when the input signal level was varied over a wide range. That instantaneous overmodulation can occur if a sudden loud impulse is applied to the amplifier is recognized, but it can exist only during a fraction of a second, reducing the resulting interference to a minimum. The values given for $E_0$, $C_1$, $R_1$, $R_2$ and $R_3$ are not at all critical, and may well be modified to suit individual situations. An alteration in the detail of the audio rectifier circuit could adapt this scheme readily to public address systems.

Negative-Peak Control with 6L7 Speech Amplifier and All-A.C. Operation

By L. C. Waller,** W2BRO

EVERY experienced 'phone operator knows how much disturbance an over-modulated carrier can cause in our over-crowded 'phone bands. Such a signal frequently renders an entire 'phone band practically useless to those unfortunate amateurs who happen to be located near the offending station. It may even cause bad interference to stations at a great distance, under certain conditions. Of course, it is illegal to over-modulate a 'phone transmitter, or to modulate one "in excess of its modulation capability"; but nevertheless many stations do not have modulation-monitoring apparatus which is adequate for the purpose.

It is difficult, by ordinary means, to prevent some over-modulation, even when a cathode-ray oscilloscope is available for monitoring purposes. If the gain control is set so that practically no modulation peaks "over shoot," then the average modulation is certain to be quite low. In addition, two persons seldom speak at exactly the same sound level, and one person does not always speak at the same level. The distance of the speaker from the microphone is still another important variable factor.

With these thoughts in mind, the writer set about to see what could be done along the line of automatic modulation control, or modulation limiting. With a.v.c. circuits as applied to r.f. stages as a guide, it seemed natural to consider some sort of audio a.v.c. wherein the over-all gain of the speech amplifier is automatically controlled. Of equal importance is the source of controlling voltage.

The control voltage should preferably come from the modulator itself or from the modulated r.f. carrier, rather than from the speech amplifier. Such things as carrier shift due to d.c. plate voltage changes and audio voltage variations due to modulation transformer frequency characteristics should have no effect on the modulation-control system. In addition, the system should operate on the negative modulation peaks, rather than on the positive peaks, because it is excessive negative peaks which cause carrier cut-off and a broad, side-splattering signal.

A basic system which seems to meet all these requirements is shown in Fig. 4. A 6L7 is used as the control tube in the familiar volume-expander circuit (circuit No. 10 in the RC-13 Receiving-Tube Manual), working "backward" as a volume contractor. The No. 3 grid normally operates at $-2.5$ volts, at which bias the gain of the stage is quite high, the mutual conductance of the 6L7 being in the order of 1200 micromhos. When the negative bias on the No. 3 grid is increased to about $-10$ volts, the mutual conductance and gain of the tube are reduced to very low values.

The negative automatic-modulation-control (a.m.c.) voltage is obtained from the output of modulation transformer $T_1$ through a half-wave, high-vacuum rectifier. A Type 836 is shown in the diagram, although almost any high-vacuum tube can be used provided it has a rating high enough to withstand the peak inverse voltage applied. When the negative a.f. peaks at point "X" on $T_1$ exceed $1160$ volts (that is, $1250-90$), the 90 volts being an "advance" bias from $B_1$), the rec-

** RCA Radiotron Div., RCA Mfg. Co., Harrison, N. J.
tifier passes current, developing a d.c. voltage drop across \( R_1 \). The rectifier arrangement is similar to the negative-peak over-modulation indicator described previously in \( QST \).\(^2\) The d.c. voltage from \( R_1 \) is fed through an r.f. and a.f. filter to the No. 3 grid of the 6L7 as an a.m.c. bias. In the example shown, whenever the negative modulation peaks exceed 93 per cent modulation (1160/1250), the gain of the 6L7 is reduced rapidly, the speed depending on the time constant of \( R_2 \) and \( C_1 \), the latter being an a.f. by-pass condenser. Thus, the a.m.c. bias starts to “take hold” a little before the carrier is over-modulated. If the time constant of the circuit is made too long, quite a few a.f. peaks may cause over-modulation before the gain is reduced, especially on a loud, sudden signal. If the constant is too short, trouble from “motor-boating” may be experienced, due to phase shift in the a.f. amplifier. The percentage of modulation at which the a.m.c. begins to act can be controlled by changing the value of the “advance” bias from \( B_1 \). It is very important that r.f. voltage be kept out of the 6L7 stage. The a.m.c. bias lead from the audio rectifier should be carefully shielded, and should include adequate r.f. filters.

The No. 1 grid of the 6L7 is biased to about -10 volts, the cathode being tapped at +10 volts on the voltage divider. This would place a no-signal bias of -10 volts on the No. 3 grid also, except that 71/2 volts are bucked out by battery \( B_2 \). Thus, the desired no-signal bias of -21/2 volts is actually applied to the No. 3 grid. The a.f. signal applied to the No. 1 grid, from microphone transformer \( T_2 \), should have a peak value not exceeding one volt; larger values may cause a.f. distortion.

No wave-form distortion is caused by the action of the a.m.c. voltage, because it serves only to reduce the over-all gain of the entire speech system. The excessive a.f. peaks are not merely lopped off, but are suitably reduced, along with peaks of lesser amplitude. The volume control \( R_4 \) can be adjusted over a fairly wide range and the modulation still be kept within proper limits. If the operator speaks very low, or at a considerable distance from the microphone, the carrier can still be completely modulated if \( R_4 \) is properly set initially.

The writer tested this a.m.c. circuit with a cathode-ray oscilloscope, using a modulated-envelope type of pattern. Control \( R_4 \) was set so that, without a.m.c., a saoo volts t.H.V. +1250V. CIRCUIT low whistle caused heavy over-modulation. Transmitter ground and a.f. amplifier ground must be connected together.

The battery circuit of Fig. 4 has one serious disadvantage. The advance-bias battery \( B_1 \) would place a no-signal bias of -10 volts on the No. 3 grid also, except that 71/2 volts are bucked out by battery \( B_2 \). Thus, the desired no-signal bias of -21/2 volts is actually applied to the No. 3 grid. The a.f. signal applied to the No. 1 grid, from microphone transformer \( T_2 \), should have a peak value not exceeding one volt; larger values may cause a.f. distortion.

No wave-form distortion is caused by the action of the a.m.c. voltage, because it serves only to reduce the over-all gain of the entire speech system. The excessive a.f. peaks are not merely lopped off, but are suitably reduced, along with peaks of lesser amplitude. The volume control \( R_4 \) can be adjusted over a fairly wide range and the modulation still be kept within proper limits. If the operator speaks very low, or at a considerable distance from the microphone, the carrier can still be completely modulated if \( R_4 \) is properly set initially.

The writer tested this a.m.c. circuit with a cathode-ray oscilloscope, using a modulated-envelope type of pattern. Control \( R_4 \) was set so that, without a.m.c., a low whistle caused heavy over-modulation and carrier cut-off on the negative peaks. With the a.m.c. connected, and \( R_4 \) in the same position, a loud whistle produced no over-modulation—just a perfect pattern. The loud signal, if made very suddenly, allowed a few peaks to over-shoot; however, the oscilloscopic pattern “sprang” back to a perfect picture so rapidly that the eye could hardly detect the flaw, and the ear (with a receiving monitor) not at all.

Tests made with a number of other stations on 14-Mc. 'phone showed the modulated carrier to be very clean and sharp, without a trace of “side-splatter.” In addition, the signal seemed to have an unusual tendency to penetrate QRM. This was not expected originally, but on analysis it apparently results from the fact that the average modulation percentage is held at a considerably higher level with a.m.c. than without it. Low-level sounds and syllables that ordinarily would cause little modulation of the carrier can be boosted considerably because of the higher-than-normal setting of the main gain control. Then, when the higher-amplitude signals come along, they are automatically limited in their effect on the carrier.

### “ALL-A.C.” CIRCUIT

The battery circuit of Fig. 4 has one serious disadvantage. The advance-bias battery \( B_1 \)

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\(^1\)H. E. Seyen, “Over-modulation Indicator,” p. 49, \( QST \), March, 1933; L. C. Waller, “Applications of the 'Magic Eye,'” \( QST \), Nov., 1933.
causes the a.f. by-pass condenser $C_1$ to charge up to almost the full voltage of $H_1$, as the result of the rectifying action of the 836 and the Class-C amplifier tube when the plate voltage is removed from the latter during stand-by periods. Thus, when the carrier is placed on the air after a stand-by, either $C_1$ must be shorted temporarily to dissipate the charge, or the speech system is effectively cut off until the charge leaks off through $R_1$, $R_2$, and $R_3$.

To avoid this trouble and to eliminate the batteries, the circuit of Fig. 5 is suggested.

In Fig. 5, the proper voltages for the 6L7 and the advance bias for the rectifier are all obtained from the voltage divider which supplies the d.c. voltages for the speech amplifier. With this arrangement, it is necessary that the power pack deliver 250 volts for the 6L7 plus 90 volts for the advance bias, because the cathode of the 6L7 is tapped in at +90 volts above ground. Thus, the advance bias for the a.m.c. rectifier is supplied by the bleeder, and the charging of $C_1$ is eliminated. In the example shown, the power pack voltage is 340 volts, or 250 + 90. If the modulated Class-C amplifier happens to be operating at 2500 volts, an advance bias of about 180 volts may be required, and a power pack voltage of 430 volts. In general, an advance bias of about 7 per cent of the final amplifier's d.c. plate voltage will be found suitable. This circuit, being all-a.c. operated, is the one recommended for general use.

The use of a.m.c. on amateur 'phone transmitters, with a properly-designed and adjusted circuit, should effectively remove all the problems which have for so long been caused by over-modulated carriers. If put to general use, the practical effect of a.m.c. will be effectively to widen our 'phone bands. In due time, no doubt, the use of such automatic modulation control, may even become mandatory. In any event, the operator of a 'phone transmitter employing a.m.c. will not have to watch continually his modulation monitor or be forever adjusting the speech gain control.

Southwestern Division Convention
Tempe, Arizona, October 23rd and 24th

Yes, the Southwestern Division Convention for 1937 is to be held in Arizona under the auspices of the Tempe Amateur Radio Association. All the activities will take place at the State Theatre, which is owned and operated by "Red" Harkins, W6BUQ, and who is also the Chairman of the Convention Committee. Put the dates down—Saturday and Sunday, October 23rd and 24th, respectively. A good program is in progress of preparation at the time of writing this announcement and further information may be obtained from "Red" Harkins, W6BUQ, care of State Theatre, Tempe, Arizona.

What the League Is Doing
(Continued from page 31)

Further important promotions in the Engineering Department are now to be expected, which we shall duly report.

Membership Committee

It will be remembered that the Board appointed a committee to work for increased A.R.R.L. membership and for methods of making membership more attractive, etc. This Board's Committee, consisting of Messrs. Martin (chairman), Blalack and Norwine, has been actively at work. They are approaching the S.C.M.'s and clubs for suggestions, they are running some advertisements in QST, and they have prepared a large circular on the advantages of A.R.R.L. membership which is being handed out at the door at conventions and hamfests this autumn. Watch for it and read it. It of course will probably be winter before the Committee is really down to bedrock in the intricacies of its studies.
A Versatile Emergency Transmitter

By Walter J. Stiles, Jr., W8DPY

As you may have gathered from the title, this transmitter is a bit of emergency apparatus. It had its birth shortly after the flood emergency in northern Pennsylvania in March, 1936, and has now passed its first year of service with very satisfactory results.

Now let us assume that during a period of operation in the field we should have the misfortune to drop and break one of our 6L6G tubes. Under such circumstances we merely have to throw switch SW1 to position "A", place one of the remaining good tubes in the oscillator socket and we are again on the air with a good 25-watt signal. Now assume our crystal feels in the mood to leave and divides itself into several parts for one reason or another; we merely reach into a pocket and produce grid coil L1, place same in crystal socket, load oscillator tube to approximately 15 watts output—and there we are back again in the fight. There are many other ways in which we could get output, but it is very seldom that more trouble than that just mentioned would be experienced.

In this emergency set, inputs with all apparatus in the circuit runs about 40 watts with a 300-volt motor-generator and about 110 watts with 750 volts on the plates. The voltage on the oscillator runs about 300 in the first and 450 in the latter case. Outputs are approximately 30 and 75 watts respectively.

The circuit is designed to function in any one of three different manners. This allows for certain pieces of equipment to become inoperative during an emergency when no replacements are available and still operation can continue. To clarify this further let us look at Fig. 1. We find here a 6L6G tube used as a cathode-biased oscillator working either straight through (SW2 closed), or as a Tri-tet with its output on the second harmonic (SW2 open). This is followed by a pair of 6L6G tubes in a Class-C amplifier. The latter is so designed, by tying the grids together, that it operates with zero bias. This allows the oscillator to be keyed and perfect break-in operation is had even with spot-frequency work. If you have ever sat before a transmitter in a real emergency you can readily appreciate good break-in operation.

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The construction of this transmitter in the metal case shown in the picture should not be considered the ultimate ideal for a perfect set-up. It was built in this manner merely because the case was on hand and because it fits very nicely into the water-proof box I have for my emergency gear. However, it does make a solid set-up and with a heavy power pack mounted in the bottom it just won’t bound off the table every time you hit the key. Further, the metal type construction adds to the ease with which the 6L6G tubes can be neutralized.

A.R.R.L. QSL Bureau

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

W1—J. T. Steiger, W1BGY, 35 Call Street, Williamsest, Mass.
W2—H. W. Yahnel, W2SN, Lake Ave., Hel­metts, N. J.
W3—R. E. Macomber, W3CZE, 418 10th St., N. W., Washington, D. C.
W4—B. W. Benning, W4CBI, 520 Whiteford Ave., Atlanta, Ga.
W6—D. Cason Mast, W6KIV, 423 East E St., Ontario, Calif.
W7—Frank E. Pratt, W7DXZ, 5023 So. Ferry St., Tacoma, Wash.
W8—F. W. Allen, W8GER, 324 Richmond Ave., Dayton, Ohio.
VE1—J. E. Roue, VE1FB, 84 Spring Garden Rd., Halifax, N. S.
VE2—C. W. Skarstedt, VE2DR, 236 Elm Ave., Westmount, P. Q.
VE3—Bert Knowles, VE3OB, Lanark, Ont.
VE4—George Behrendt, VE4RO, 186 Oaklawn Blvd., St. James, Winnipeg, Manitoba.
VE5—E. H. Cooper, VE5EC, 2024 Carnarvon St., Victoria, B. C.
K4—F. McCown, K4RR, Family Court 7, Santurce, Puerto Rico.
K6—James F. Pa., K6LBH, 1416D Lunalilo St., Honolulu, T. H.
K7—Leo E. Osterman, K7ENA, Customhouse, Wrangell, Alaska.
K8—George L. Rickard, KA1GR, P. 0. Box 849, Manila, P. I.

Schedules for WWV

For transmissions and schedules of standard time intervals and ionosphere bulletins see “WWV Services Again Expanded,” June, 1937, QST.

Each Tuesday, Wednesday and Friday (except legal holidays), the National Bureau of Standards station WWV will transmit on three frequencies as follows: 10:00 to 11:30 A.M., E.S.T., 500 kc., noon to 1:30 P.M., E.S.T., 10,000 kc., 2:00 to 3:30 P.M., E.S.T., 20,000 kc.

October, 1937
How Would You Do It?

Keeping Relays Quiet: Announcing the New Problem

Our hero is not very happy about the solutions to the 8th problem. It seems that the problem is actually a very tough one. Many of the solutions received are solutions in one sense of the word, but they are all either a bit weak in the knees or so close an approach to impracticability as not to matter much.

Anyway, first prize goes to W8OMM for a swell drawing and description of a double-box of sound-proofing material all dolled up with no less than 12 feed-through insulators. It is undeniable that some such sound-proof box is a perfectly good solution. The only snag is that it makes the whole affair rather cumbersome and makes it very difficult to perform adjustments on the relay. But it is the most sensible approach to date. We do not reproduce W8OMM's drawing because the idea can be conveyed very simply in words. There is just a small box in which the relay reposes and through the walls of which three pairs of feed-through insulators are inserted. The outer box, somewhat larger than the inner one, has its lower portion filled with absorbent cotton and it is on this that the inner box rests. Fairly flexible wires connect the terminals of the inner box to the terminals of feed-through insulators on the outer box. In the original design, one pair of insulators is on each side of the box, the other on top. There are fifty dozen different sets of sound-proofing "boards" available. Choose one that is tough enough to be sawn fairly clean and suitable for a quick assembly with nailed joints.

W1ALJ gets second prize for his excellent description and sketch of a sponge-rubber mounting for the relay. He suggests purchasing at the 5 & 10 store a sponge-rubber kneeling pad 3/4 or 3/4 inch thick (depending upon the weight of the relay). The relay is then mounted in the center of a strip of this rubber and a strip is stretched between two blocks at the end of a small baseboard. W1ALJ suggests that holes should be pushed through the rubber with an ice pick, this being preferable to screwing the screws through the rubber. He also suggests that any chinking due to a movable pole piece striking a stationary member of the core may be silenced by connecting a thin piece of felt or rubber to one of the metal faces concerned. He further suggests that should the rubber business fail to effect a complete cure the whole affair could be put in a box built of Celotex.

Other suggestions included the use of pools of mercury for the contacts—a scheme that we have tried on many occasions but have turned down because of the difficulty in getting metal for the contacts which does not soon amalgamate with the mercury. Others suggested the elimination of the relay and the connection of the receiving antenna to a node on the transmitter antenna coil. This scheme is not effective if the transmitter frequency is juggled much and, furthermore, makes a very poor receiving antenna out of a good transmitting antenna because the receiver is hitched at a point where minimum signals always should be available.

We still need the design of a quiet relay.

And again the contest rules:

1. Solutions must be mailed to reach West Hartford before the 20th of the publication month of the issue in which the problem has appeared. (For instance, solutions of problem given in the March issue must arrive at QST before March 20th.) They must be addressed to the Problem Contest Editor, QST, West Hartford, Conn.

2. Manuscripts must not be longer than 1000 words, written in ink or typewritten, with double spacing, on one side of the sheet. Diagrams and sketches may be in pencil, must be neat.

3. All solutions submitted become the property of QST, available for publication in the magazine.

4. The editors of QST will serve as judges. Their decision will be final.

(Continued on page 118)

Problem No. 10

Our hero is still in difficulties. He is determined to make a thoroughgoing job of the lead-ins to the station (which, by the way, is getting pretty fancy these days). At the moment, he has a board under the lower sash of the window but the joints leak and some very chill breezes will be blowing through the gaps and through the space between the sashes unless something is done about it before the winter. Some sort of packing could be provided, but this introduces difficulties when the window has to be opened to get at the grounding switch. O. H. feels that there must be some refreshingly new angle on this lead-in business and needs a complete description of something really snooty. It has to provide him with some sort of grounding arrangement—something that will keep the underwriters happy. He is in hopes that the new scheme will eliminate the complication of installing a storm window, but if the worst comes to the worst, he will leave the storm window off and let the family continue to complain. (He pays the oil bill.)
W2CSY, Riverhead, N. Y.

Another case of the motorman going out for a trolley ride is that of Murray G. Crosby, who spends his working time researching and designing in the Receiver Laboratories of R.C.A. Communications, Inc., at Riverhead, Long Island, and operates amateur radio station W2CSY as his hobby.

Murray's amateur experience dates back to the 200-meter days and his first station license was 9AOX. This early experience was all with the key, but the present major use of W2CSY is with 'phone operation, although brass is pounded occasionally. The main reason for the 'phone is the fact that Murray's brother, Harry, operates 'phone station W9FDI out in the home town, Elroy, Wisconsin. This allows Murray to keep in constant touch with his folks and to talk with any member of the family. To do this, schedules are kept two or three times a week and it is only under severe conditions that contact is lost.

The transmitter at W2CSY is entirely home-made. RK-28's in push-pull are used in the final stage and are modulated at low-level with about 300 watts input. All types of low-level modulation have been tried including suppressor-grid, control-grid and linear-amplifier, and at present the final stage is acting as a linear to amplify the suppressor-grid modulated output of an 802 doubler acting as an exciter. Inverse feedback is applied to improve the linearity and a cathode-ray oscilloscope (home-made) is employed to observe the quality of the transmitter output. A 59 crystal oscillator excites the 802 exciter through a 46 frequency doubler.

Two types of receivers are in use at present, a Radiola AVR-1 all-wave receiver which is shown to the left in the photo and an ACR-175 which is in the middle of the receiving table. To the right of the ACR-175 is the cathode-ray oscilloscope. The loud speaker is mounted in a baffle which is decorated with QSL cards. The "stand-by" position of the switch on the ACR-175 is arranged to operate a relay which turns on the transmitter while simultaneously turning off the receiver so that fast break-in operation may be accomplished.

The transmitting antenna is a one-wavelength "V" for 14,175 kilocycles, which is the most-used frequency. The receiving antenna is an inverted "V." Both antennas have their main directivity lobe aimed at Elroy, Wisconsin.

W8QAN, Pittsburgh, Pa.

Concrete evidence of one most positive fact — "once a ham always a ham."

Amateur radio activities of W. K. Thomas, W8QAN, started in 1908 with self-assigned "DGM." In late 1912 he held the call 8DE and was the proud possessor of the station shown in one of the photographs — the button-top shoe and...
and linseed oil-splattered wall affair. Any old timer will recognize the equipment used in those days.

Enlistment during the World War stopped his amateur activities but immediately upon return home the call SLF was assigned and was in active service up to about five years ago. At that time Thomas thought he was through—sold out and allowed his call to expire.

The other photograph proves the original statement to be true.

Since the late photograph was taken a few changes have been made but the three racks are still in service. The left-hand rig is used exclusively for ORS work at 600 watts input and for OPS work at 450 watts input. It consists of an 89 keyed oscillator, RK-25, RK-20 and a pair of 805's in the final. The center rack is used on 20 and 10 meters, both c.w. and 'phone, and consists of an 89 oscillator, RK-25 buffer-doubler, RK-20 second buffer, and a pair of 100TF's, with 1 kw. available for c.w. Separate power supplies are used for both rigs.

The right-hand panel now holds complete audio-frequency equipment, speech-amplifier and modulators (838's). An RCA cathode-ray oscilloscope has taken the place of the old exciter-final.

The antenna change-over switch mounted on the horizontal wood bar is simply the mechanical contacts of a d.p.s.t. relay mounted in an open-ended Victron box. To keep a.c. away from the antenna leads the magnet part of the relay is behind the desk with "string" control attached to the magnet arm and guided to the movable contacts by round wooden knobs.

Desk layout: HRO receiver, field meter and 'phone monitor, frequency meter-monitor and crystal mike.

The equipment just described is a far cry from 1912 yet both most completely accomplished the purpose for which they were designed. And the operator still contends, "once a ham, always a ham."

The Cover

A GOODLY percentage of the Headquarters gang have been spending their Sunday mornings recently trying their hand at flying Ross Hull's radio-controlled sailplane. The cover picture was taken at one such session. The fellow holding the control stick (the one that looks like a movie actor) is Arthur L. Lawrence, Secretary of the Soaring Society of America—and chief instructor to the Hartford group. Adjusting the gadgets inside the plane is C. C. Rodimon, W1SZ, while Byron Goodman, W1JPE, does a strenuous bit of observing.

Massachusetts State Convention
(New England Division)

Boston, Mass. October 2nd.

THE Eastern Massachusetts Amateur Radio Association and the South Shore Radio Club are the sponsors for this year's Mass. State Convention and Boston Hamfest to be held at the Hotel Bradford, Boston, Mass., October 2nd.

As usual a program worthy of the efforts of the committee has been prepared and everyone who attends will be fully repaid in enjoyment.

If further information is desired drop a line to Don Meserve, 140 Forest Ave., Hudson, Mass.

Midwest Division Convention

Kansas City, October 9th and 10th

Get all set for an unusually good convention of the Midwest in Kansas City's new municipal auditorium the second week-end in October. Sponsored by the Heart of America Radio Club and the O.B.P., an unusually interesting and full program has been arranged.

Getting acquainted starts Saturday morning at the auditorium, during which session there are also Class A and B exams by the local inspector and a code speed contest under the direction of Tex McElroy. In the afternoon the Mayor welcomes the gang and meetings start. Speakers include George Bailey, Vice-President of the League; Floyd Norwine, Director of the Midwest; and by Goodman from Headquarters. Round tables for A.A.R.S. and N.C.R., for phone and C.W. gangs each under competent leadership. Technical speakers include representatives from R.C.A., Jefferson, Raytheon, G.E., T.W.A., and Bell-Labs. A television demonstration, a 5-meter contest, and a Wouff Hong initiation Saturday midnight. Some inspection trips. Herb Hollister presides over the banquet Sunday afternoon.

Yep, prizes—lots.

Pretty good, wot? Swell time assured.
HINTS and KINKS
for the Experimenter

Power Supply for Battery or A.C. Use

FROM time to time various experimenters have suggested the use of a b.c. type transformer in conjunction with Ford coils to secure 350 volts or

![Diagram of Power Supply for Battery or A.C. Use](image)

from time to time various experimenters have suggested the use of a b.c. type transformer in conjunction with Ford coils to secure 350 volts or

so for the operation of a receiver or portable transmitter from a 6-volt storage battery. An arrangement which strikes us as being a highly practical one now comes from James McBride, W4BAF, whose supply can be used either on 6 volts d.c. or 110 volts a.c., whichever may be available. In the interests of reliability, W4BAF's rig uses a standard vibrator of the type universally incorporated in auto radios.

The circuit diagram of the power supply is given in Fig. 1. The transformer is a standard b.c. job with a 6.3-volt winding, this winding being used as the primary with 6-volt battery supply. This winding should have fairly heavy current-carrying capacity, since the battery current runs as high as 12 amperes under load. The vibrator used by W4BAF is of the synchronous type with the contacts strapped together to use it non-synchronously. The rectifier is an OZ4, a gas tube without a hot cathode. A conventional filter is used.

The diagram shows the various switches necessary to change from battery to a.c. supply. All switches are shown in the battery-supply position. When operating on a.c. the vibrator is cut out of the circuit and the 6.3-volt winding resumes its normal function of furnishing filament power for the tubes.

The coils L2 and L4 are part of a filter intended to cut out "hash" from the vibrator. They are probably subject to some experimenting to obtain best suppression of noise, but coils consisting of 20 or so turns of No. 12 wire, wound to 1-inch diameter, are suggested.

W4BAF's power supply delivers 90 milliamperes at 350 volts with either a.c. or battery supply. It has proved to be highly effective in operating a 6C6-41 receiver and 6L6 transmitter both portable and at home.

Drilling Glass, Porcelain and Pyrex

THE perennial problem of drilling holes in glass has had many solutions; we present here another, successfully used by H. W. Loney, ex-9DHO, and J. P. Gilliam, W9SVH. The special tool depicted in Fig. 2 is an important part of the process. The drawing gives all the necessary details for its construction. For the actual drilling, the authors write:

![Diagram of Drill for Cutting Glass](image)

Material - 8" drill rod heat to red & quench in cold water
Do not draw temper

**FIG. 2—DRILL FOR CUTTING GLASS**
Place the drill as shown on the attached blueprint in a hand brace, engine lathe or slow speed drill press. If the material to be drilled is flat, such as plate glass, make sure that the supporting surface is flat. Apply turpentine to the point of the drill and press firmly against the work in the desired location. Then turn the drill slowly and apply sufficient turpentine to keep the drill wet at all times. Use care when breaking the point through the work so as to avoid chipping. After the point has broken through, turn the work over and drill from the opposite side, repeating this operation as often as is necessary to keep the edges of the hole nearly parallel.

This has been the most successful method of drilling these materials that we have been able to find. We find it quite possible and practical to drill narrow strips of glass where the holes are close to the edge. Repeated tests have proved that when using a hand brace it is possible to drill ¼-inch diameter holes through 7/32-inch plate glass in 35 seconds.

"Pyrex is somewhat tougher than ordinary glass and will cut considerably slower. Four Pyrex custard cups were drilled in approximately four minutes. Ordinary porcelain such as is used for antenna insulators may be drilled with the same speed as plate glass."

Phone Monitoring Kink

FROM Caldwell Smith, W5FKW, comes a suggestion for making use of the grid current that usually flows in the first r.f. stage of a receiver during transmitting periods, even though the "B" supply is switched off. W5FKW simply inserts a headset in series with the grid return so that the quality of 'phone transmissions can be checked. One method of doing it is shown in Fig. 3. The 'phones should be removed from the jack or short-circuited during reception.

This arrangement is nothing more than the familiar diode detector, the grid of the first r.f. tube acting as the diode plate. Makes a good 'phone monitor, and requires nothing more than a jack.

Yet Another Use for the Magic Eye

THE resistance-coupled push-pull and phase-inverting types of audio amplifier are essentially made up of the same parts and are open to the same troublesome objection: There is in the absence of frequent testing no assurance that good symmetry exists, and without it maximum power and minimum distortion cannot be realized. The 6ES electron-ray indicator provides an inexpensive and convenient means of assuring that both power tubes receive the same signal in such an amplifier.

In Fig. 4, $R_1$ and $R_2$ are identical input volume controls, of resistance depending on the service; $R_3$ and $R_4$ are determined by the tubes used. $R_6$, depending on the service, is high enough so that in phase-inverter connection the setting of $R_2$ will not be too critical. $R_4$ is 1 megohm, $R_7$ is 1-megohm volume control, $R_8$ is 0.1 to 1/4 megohm, $C_1$ is 0.01 µfd. The 6ES functions as a grid detector and its pattern closes at some certain signal, determined by the setting of $R_7$.

Push-pull operation: Apply signal across $R_1$ plus $R_2$, leaving link $L$ open. Give (for example) $R_1$ an arbitrary scale. Then for each setting of $R_1$, with the s.p.d.t. switch $S$ in Position 1, set $R_7$ for exact closing of the pattern, and without changing setting of $R_2$ flip $S$ to Position 2 and mark the setting of $R_2$ which gives exact closing. Repeat at various levels. This method gives balance independent of the whims of irregular carbon volume controls: once calibrated, these are set to like readings; the calibration is checked as often as necessary.

Phase inverter operation: Apply signal across $R_1$, with the s.p.d.t. switch $S$ in Position 1, set $R_7$ for exact closing of the pattern, and without changing setting of $R_7$ flip $S$ to Position 2 and mark the setting of $R_2$ which gives exact closing. Repeat at various levels. This method gives balance independent of the whims of irregular carbon volume controls: once calibrated, these are set to like readings; the calibration is checked as often as necessary.

(Continued on page 116)
Conducted by Byron Goodman

Denmark:

On August 15, 1937, the Experimentereende Danske Radioamatorer celebrated its tenth anniversary as the Danish National Amateur Society. During its ten years the E.D.R. has grown, under the capable management of its officers, from a small body of 70 members to one of over 550, with 29 licensed amateurs in 1927 and 306 in 1937. Throughout this time their patron and protector has been famous Professor P. O. Pedersen, Director of the Royal Technical College of Copenhagen. The E.D.R. has been a member-society of the Union for eight years.

During the past three years the growth of the society has been quite rapid, under the leadership of presidents Paul Heinemann, OZ4H; James Steffensen, OZ2Q; and Ahrent Flensborg, OZ1D, who also served as secretary from 1932 until his election to the presidency in 1936. Much credit is also due Helmer Fogedgaard, OZ7F, editor of "OZ," the society's official monthly publication, for his work in building up the periodical to the point where it is now one of the finest European amateur magazines. Their anniversary issue of 64 pages is a splendid tribute to the society and the many pages of past issues.

Although the E.D.R. has not sponsored any world-wide contests, they have conducted, in conjunction with the other Scandinavian countries, several small contests. One of the big events of the year is their summer-camp activity, when OZ7EDR is set up as a portable in some suitable spot and everyone takes a turn at operating, with plenty of swimming and that good Danish cooking for those not operating the rigs. This year the camp was located at Genner, was visited by D's and LA's.

The headquarters society joins with the other member-societies in offering hearty congratulations and best wishes to the E.D.R. on their tenth anniversary.

WAC:

The past few years have seen a tremendous growth in the number of WAC certificates issued, due presumably to better conditions and greater DX activity. It is interesting to see just how many certificates have been issued to the various districts and countries, and we therefore list below the number of WAC certificates issued up to July, 1937:

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October, 1937
The California kilowatts seem to speak for themselves, except that the G's have them topped.

To get an idea of the number of certificates issued during the past 18 months, compare the above figures with those given in the July and November, 1936, issues of QST.

QSL Bureaus:

Following is a list of the foreign QSL Bureaus to which QSL cards may be sent for distribution. Remember that many of these bureaus now refuse to handle SWL cards and reports, and therefore listener reports should be sent directly to the station heard.

Alaska: Leo E. Ostergaard, Customs House, Wrangell.
Antigua: R. V. Tibbits, High Street, St. Johns, Antigua, B. W. I.
Argentina: Radio Club del Argentina, Rividada 2170, Buenos Aires.
Australia: Willy Blaschek, O.V.S.V., Bahngasse 29, Klosterneuberg.
Barbados: see Antigua.
Belgium: Baron Bonnaert de la Roche, ON4HM, Chateau de Neuberg.
Bermuda: Alfred E. Redman, "Elsing," Middle Road, Devonshire.
Bolivia: Henry E. J. Smith, c/o Standard Oil Co. of Bolivia, La Paz.
Borneo: see Malaya.
Brazil: L.A.B.R.E., Caixa Postal 26, São Paulo, British Guiana: see Antigua.
British Honduras: D. Hunter, Box 178, Belize.
Canada: Alfred E. Redman, "Elsing," Middle Road, Devonshire.
Bolivia: Henry E. J. Smith, c/o Standard Oil Co. of Bolivia, La Paz.
Borneo: see Malaya.
Brazil: L.A.B.R.E., Caixa Postal 26, São Paulo, British Guiana: see Antigua.
British Honduras: D. Hunter, Box 178, Belize.
Canada: John J. Carr, 78th Pursuit Squadron, Allbrook Field.
Ceylon: Radio Club of Ceylon and South India, P. O. Box 282, Colombo.
Chile: Luis M. Decamari, Castilla 761, Santiago.
China: L.T.A.A.C., Box 688, Shanghai.
Costa Rica: Federico Gonzales, Box 384, San José.
Cuba: Adolfo Dominguez, Milagros 37, Víbora, Habana.
Czechoslovakia: C.A.V., Post Box 69, Praga I.
Denmark: E.D.R., Postbox 79, Copenhagen K.
Ecuador: Carlos Cordoves, Box 20, Rio Bamba.
Federated Malay States: Reginald J. Bee, Malayan Public Works Services, crude, Klang, Perak.
Finland: S.R.A.L., Pohjola, Box 42, Helsinki.
France (and any country with prefix beginning with "F"): Reseau des Emetteurs Francais, 6 Square de la Dordogne, Paris, 17.
Greece: G. Tavaniotis, 17-a Bucharest St., Athens.
Guam: C. B. Speiser, Naval Communication Office, Agana.
Haiti: Via A.R.R.L.
Hawaii: James F. Pa, K6LBH, 1416D Lunalilo St., Honolulu.
Hong Kong: H.A.R.T.S., Box 651.
Hungary: National Union of Hungarian Short Wave Amateurs, VIII, Maytater ter 6, Budapest.
India: R. M. Tanna, Satya Sadan, Santa Cruz.
Italy: Dr. Ing. Robetor Ombene, via S. Nico­lo 1, Milan.
Jamaica: Cyril M. Lyons, 2-B North St., Kingston.
Japan: J.A.R.L., P. O. Box 377, Tokyo.
Java: see Netherlands East Indies.
Jordan: Mutta, J.H.B., Meduluceva 9, Zagreb.
Kenya: R.S.E.I., Box 797, Nairobi.
Latvia: L.R.B., Post Box 901, Riga.
Lithuania: L.R.M., Post Box 100, Kaunas.
Luxembourg: J. Wolff.
Madeira: see Portugal.
Malaya (and Borneo): J. Macintosh, c/o Posts & Telegraphs Dept., Penang, Straits Settlements.
Mexico: L.M.R.E., Sinaloa 20, Mexico City.
Netherlands: N.V.I.R., Post Box 400, Rotterdam.
Newfoundland: Newfoundland Amateur Radio Assn., c/o E. S. Holden, P. O. Box 650, St. John's.
New Zealand: N.Z.A.R.T., P. O. Box 374, Dunedin.
Nordway: N.R.R.L., P. O. Box 2253, Oslo.
Republic of Panama: R. D. Prescott, Box 32, Panama.
Peru: Radio Club of Peruano, Apartado 538, Lima.
Philippine Islands: George L. Rickard, P. O. 840, Manila.
Poland: P.Z.K., Bielawskiego 6, Lwow.
Puerto Rico: Francis M. McCown, Family Court No. 21.
Reunion: R.E.P., Rue Pierre D'Asept 8, Luxembourg.
Rumania: see Portugal.
Rwanda: see Burundi.
Samoa: see Tonga.
Spain: see Portugal.
Switzerland: see Hisar, 28 c.w., 24 c.w., 20 c.w., 20 c.w., 20 c.w., 20 c.w., 20 c.w., 20 c.w., 20 c.w., 20 c.w., 20 c.w., 20 c.w., 20 c.w., 20 c.w., 20 c.w., 20 c.w., 20 c.w., 20 c.w., 20 c.w., 20 c.w., 20 c.w., 20 c.w., 20 c.w.

THE WELL-KNOWN SWISS STATION HB9J

Joan Lips has built up an enviable record as an operator through his splendid work in many international contests. The rig is 50-RK22-RK20 running at 50 watts input, and the antenna is a full-wave end-fed on 7 MC. All bands from 160 to 5 meters are used. HB9J is WAC and WBE, 'phone and c.w., on two bands, and has worked 108 countries.
A NEW SEASON of amateur radio operating is with us, a fresh page on which to record our ability to communicate. There will be all the usual A.R.R.L. activities, and we are studying the possibilities of a Red Cross Relay, and a special QSO Party for “all A.R.R.L. members” as 1938 additions to the usual program. Besides bigger and better operating fun, the new year in amateur radio will provide fresh opportunity for each of us to study technique and prepare ourselves in operating and organization methods that will add to our public service record, so long outstanding in emergencies. To have equipment is one thing; to be able to use it well with organized skill and effectiveness is another. The tried and tested way to operating progress and individual progress as well is to get lined up with S.C.M.’s for appointments along the lines of natural interest and qualification. Along with fun for those amateurs in special organization posts there will be serious study given our emergency service with local tests to further coordination, effect contacts with agencies to be served, and to make possible the registration of all amateurs at local centers so that the actual facilities will be known and frequency-band organizations in each amateur group can be worked out. Come flood, hurricane or earthquake, each amateur should have planned emergency power facilities, and be able to render good account of himself. As the Field Day and Low Power Contest have suggested, “organization preparedness” is our aim. We suggest “individual preparedness” as your responsibility.

Of course you want to get in on all activities. If your station is not at present active in the League's field organization drop a postal to your SCM (address page 5), give him the lineup of your equipment, and tell him your main operating frequency and special interest. Ask about appointments and he will send information or have us send it to you. League Trunk Lines, O.R.S. and O.P.S. nets will be made up of the best qualified member-operators expressing interest.

We want every active operator to be part of the League's field organization—to register his facilities as part of A.R.R.L.'s Emergency Corps so he can receive the special plans and information on QRR work.

A new A.R.R.L. appointment, that of A.R.R.L. Emergency Coördinator, will be added to the list of organization posts this year. One will be appointed after a thorough survey of the field with recommendations of prominent amateurs and clubs, in each large community (over 25,000 citizens or over 20 active amateurs) as soon as Section Communications Managers have completed their studies. More information on the responsibilities and functioning of an A.R.R.L. Coördinator, and how each of us individual amateurs should cooperate with him in local-community planning, and registering of facilities, will be found in next QST.

"Shack walls." We recently received a letter containing informal expression of what many an amateur has sought to put in words concerning the fraternalism and constructive values in our ham work. It speaks for itself, so without further explanation we quote: “My shack is plastered with all the cards the walls can hold. I like to spot W5CEZ’s card on the wall. This expression is not for vanity’s sake, for I have few ham visitors. It’s done for the comradeship these cards give—they each represent a QSO; maybe a short, snappy contest QSO or maybe a nice ragchew but one way or the other they are a memory—of a QSO. By the same token I have tacked up on the wall all my certificates, my ORS appointment, my AARS certification, my OBS appointment, my TL appointments, an award from an A.R.R.L. ‘SS’ Contest, and of course my League membership certificate and licenses. These certificates, along with my QSL cards, represent a great piece of my amateur radio experience. I treasure them all. Happy experiences are really two-fold in their joys for, in addition to the actual experiences, we have the pleasure of the memories they bestow upon us. That’s what the walls of my shack mean to me.”

—W9IYA.

The A.R.R.L. Sweepstakes dates? November 13th–14th, November 20th–21st. Full details of this time honored activity next month. Polish up the stations for new QSO-opportunity. All set for the “SS”!

—F.E.H.
Cincinnati Get-Together

Amateurs of Southern Ohio and Northern Kentucky gathered on Sunday, August 15th, to enjoy the annual picnic and get-together held under the joint auspices of the Greater Cincinnati Amateur Radio Assn. and the N.C.R. Unit of that Section; 109 attended the all-day affair in the fair grounds outside of Cincinnati. The program, which was entirely informal, consisted of a lot of very enthusiastic picnic activities, such as a tug-o'-war with prizes of lollipops to the winners and consolation prizes, also lollipops, to the losers and an egg-throwing contest. Both lunch and dinner were served. A.R.R.L. Director Mathews, W9ZN, organized a baseball team consisting of old-timers of the Spark days, and another team composed of both c.w. and phone operators. The two teams, with substitutes, included: Sparks—W9DSW W8AMT KB8AZ WSNK W9ZN W8FEB W8DQC WSQQA W8FNS W8FNE W8BOS W8HS T W9ASN. C.W. & 'Phone—W8JW W8JWX W8EFS WS8PK W8LBR W8SLK W8QAD W8NSM W8PNW W8EDX W9RBQ and three W.S.L.'s, J. Riege, Bulke, Vic Adam. The Sparks won by a score of 19 to 6 and the old cheer "Spark forever" rang out anew.

Los Angeles Radio Program

The program under the auspices of Los Angeles Section amateurs over broadcast station KMTR has been resumed. The period 12:00 midnight to 12:30 A.M. each Saturday night (Sunday morning) is set aside for these broadcasts. The program is informal and suggestions are requested. Clubs are invited on to ask questions and to provide talent for the broadcasts. Contributions of talent and suggestions may be made through James Guest, W6HCN, operator at KMTR, or to Don Draper, W6GXM, S.O.M. for the L.A. Section. KMTR operates on 570 kcs. "With 1000 watts of power; rentals with W6CDA-NPG.

New Guinea Expedition

The American Museum of Natural History Expedition's advance party to New Guinea left October 5th, and another ship of the same type will follow in January. The scientists expect to be there for a full year from January 1st. The Museum plans are made in cooperation with Mr. Richard Archibald, research backer. Personnel includes three scientists, two radio men, a pilot and a flight engineer—some of the same men recently busy in searching for the Soviet fliers. Of greatest interest to U. S. amateurs will be the fact that the radio men are both amateurs—Harold Hammad of W2JEF, and Raymond Booth, W3—, who will man the base and advance stations, respectively. Contact from the base (Hollandia) will be maintained on frequencies assigned by the Dutch government in the next few weeks. There will be ample radio equipment for all needs. A 500-watt transmitter, crystal set 807, R346 double, and 50k. output (mod. 901a) will be the base station; 26 amateur band crystals are being taken along. Tests with W10XRA have been completed on regular aircraft frequencies, 500 k, 3105, 6210 and 12,420 kcs. "Phone will be used as much as possible with shift to c.w. as necessary to get through tropical QRN and interference. After flying the planes down the Pacific, radio will also be used for contact with advance parties and when flying in food to be dropped to those parties. Two HRO receivers will be used, two portable transmitters, and the planes will be equipped with direction finder and additional 26-watt portable using 827's. The large ship transmitter is a 100-watt job (210-865-R346a) and receivers are Bendix made. W2JEF promises many contacts from the expedition from time to time. New Guinea is near Java and while there will be but a modest traffic load for the U. S. A. amateur contacts for the expedition personnel from this country will be valued.

Do you report your activities to the Section Communications Manager for your Section each month on the 16th? He would welcome a word from you regarding your doings. See page 5, this issue QST, for his address.

It won't be so hard for the Y.L.'s to drag the lads to the movies, if the producers continue to include the ham touch noted by W7EFC in a recent cartoon entitled "Porky's Train." In this comic a train dispatcher transmitted the following in about 500 cycle i.c.w.: "QST QSL Leon Schlesinger to Hollywood for picture of Porky." It was sent at about 15 w.p.m.

VE2KI

A Science Service release dated August 10th tells of Pere Arthème Dutilly, Canadian scientist-priest, who is exploring the Arctic on a one-man botanical expedition. In his tiny boat, built in Holland, Pere Dutilly expected to pass the coast of Labrador about July 20th and be near Chidley 2.5 miles from the Arctic northward. Between that date and August 15th he expected to enter the Straits leading to Hudson's Bay and arrive at Churchill on August 15th. His itinerary takes him northward to Cape Eskimo, Chesterfield Inlet, Baker Lake, Southampton, Repulse Bay and igloolik. He will return to Quebec about October 1st.

Pere Dutilly has radio gear aboard, operating in the 14- and 28-Mc. amateur bands under the call VE2KI (his own call). Transmissions are scheduled on 14 Mc., Saturdays at 2:30 p.m. EST and Sundays at 2:00 and 3:00 p.m. On 28 Mc. look for him Sundays at 9:00 a.m. EST. Broadcasts are also made under the call CYNT on 25, 35, 57.72, and 160 meters. VE2KAR takes tiling much traffic for New York from VE2KI/VE5KI on the Arctic ice breaker St. Therese. Please report contacts VE2KI/5KI to A.R.R.L.

Beginners in Cleveland, Ohio, note: The Delta 7 Radio Club with office W8KKC, 9792 Euclid Ave. on Franklin Blvd., has regular beginners' classes in radio every Monday and Friday from 7:30 to 10:00 p.m. There is no charge of any kind. W8LWZ, W8QLB, W8BJL and W8MWS, club members, are willing to instruct anyone who wishes to get a license.
PRIZES FOR BEST ARTICLES

The article by Mr. Eric Ledin, W6MUF wins the C.D. article contest prize this month. Each month we print the most interesting and valuable article received marked "for the C.D. contest." Contributions may be on any phase of amateur operating or communication activity (DX, 'phone, traffic, rag-chewing, clubs, fraternalism, etc.) which adds constructively to amateur organization work. Prize winners may select a 1937 bound Handbook, QST Blank, and League Emblem six logs, eight pads radiogram blanks, DX Map and three pads, or any other combination of A.R.R.L. supplies of equivalent value. Try your luck. Send your contribution to-day!

Club QSO's
By Eric Ledin, W6MUF*

A HAM club, no matter how embryonic, has more possibilities for real QSO's than a KW on 14 Mc., or any other band when that band is hot. Why it should be more difficult to start a chat with the stranger sitting next to you than to raise him on the air for an hour of rag-chewing is one for Ripley.

One other tell-tale Zepp feeder shares the blame in our town for everything from power leaks to noisy tubes. It is natural that there should be a well-worn path between our shacks. When the new super bowed out in favor of a battered one for Ripley.

The necessity of new blood and the acquisition of every new ham in the neighborhood is, I am certain, obvious to every officer of such organizations. Sending an announce- ment, however, is not enough. A little genuine "good-hand ing" and a little more attention towards the actual mechanics of the meetings will go a long way.

One club immediately made the rounds of all those present, calling on each one to rise and give his name and call letters, if any. Because, visitors, we were deprived of "hand ing" which at once made us feel at home. This club, incidentally, raised funds entirely by raffling a few prizes at each meeting, and I saw no one hesitate at buying cheap chances on good tubes, a call book, or a condenser.

Another simple stunt was to offer entertainment when the speaker fails to show up, that is of drawing call letters from a hat, the goats being required in order, to speak 10 minutes on subjects similarly drawn. Offhand we can remember two speeches which were highly amusing. "Why I stick to my present antenna" was drawn by a chap who was in the throes of wrestling with an obsolescent new rheostat, and "The best DX I have ever worked" was drawn by a painfully honest and embarrassed ham who somehow hadn't been able to get out of the district.

We are forming a small radio club, but we intend that it shall be a replica of our first mental picture that night we set out in the now decreed silver. By attending the limited number of club "churn" in which we have gleamed much and discarded more. One simple idea may save the evening, but a dozen would save the club.

Briefs

Word just received from S.C.M. Treadaway, W5DKR, is that Louisiana hams will have their get-together meeting Oct. 23d-24th instead of Oct. 30th-31st.

The Royal City Amateur Radio Association would like to get in touch with all Canadian radio clubs. Every club in the Dominion is asked to write to the secretary giving address so that R.C.A.R.A. may communicate with you. Address F. B. Hughes, 221 Eleventh Street, New Westminster, British Columbia.

Three Days at the Races

The 1937 World's Championship Mohboft Races were held at Atlantic City, N. J., August 12th-14th-15th. Owing to the peculiar dog-leg course followed by the contestants it was impossible for the boats to be seen constantly from the docks. Because of this and satisfactory activity along the same lines in the 1936 Regatta, W3DOD and W4BRB were asked to report the races via 56-Mc. 'phone. With the aid of our "hand" and a little more attention towards the actual mechanics of the meeting we had a lot of fun.

This was seen from the judges' stand, from where the C.G. boat was directed to the rescue! All in all we had a lot of fun. We have been invited to return in 1938, and the local club is making plans to equip several launches with the necessary gear to cover the entire course with two-way radiophone.

As W3DOD said, "It was all very nautical but nice!"

—W4BRB

At 10:23 p.m. MST on August 24th, W7CPY signed with K6NZQ on 14-Mc., 'phone, having taken a message for K6LN. At 10:31 p.m. he raised K6NTV in the same city as K6LN, gave him the message and it was immediately phoned to K6LNK. Total elapsed time-less than 15 minutes!

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How's DX?

How:
Although 14- and 28-Mc. DX is probably going to be great stuff this winter season, we would like to see some of the gang get up on 7 Mc. for a sort of a revival. The band isn't used an awful lot for DX except on the west coast where the old reliables still hold down their trans-Pacific traffic schedules. It's true, of course, that many Europeans have become discouraged from using it simply because of the splashy European 7-Mc. 'phones that take up so much of the band, but some determined effort might bring things around to a happier condition.

On the other hand, we stand prepared to promote a gigantic campaign to raise some of the old reliables still hold down their trans-Pacific traffic schedules. It's true, of course, that many Europeans have become discouraged from using it simply because of the splashy European 7-Mc. 'phones that take up so much of the band, but some determined effort might bring things around to a happier condition.

Where:

And still these new places crop up! Just when we thought the band had been reached by some of the big guns, following a flurry of WSCRA crop up with information like VQSAS (14,150 kc., T7e) is at Solomon Island in the Chagos Archipelago, 1200 miles from Mauritius, the country his prefix indicates. So even if you have worked Mauritius, don't pass up VQSAS just because you use VQ. It's another country for you . . . . And K6LHA and K6TE (both 14,080 kc., T9e) are on at Wake Island, and have been giving many a new country. They need Europe for WAC . . . . . . Old VK2OC is now at the Solomon Islands signing VR4OC (14,070 kc., T9), and if he has the same good signal he had in VK-land should provide many with a rare country.

The Operating Table at W2GYZ, Ridge-Wood, N. J.

Pat Jessup, ex-W2AUG from the 1920 days, came back to wireless with a bang in 1934, after working off in 1927. An all-around op if there ever was one, Pat holds down a place in the N.N.J. traffic net every evening and manages to work plenty of DX on weekends. Separate rigs on 80, 40, and 20, are used, with 1 KW on 80 and 750 watts on the other two bands. A 33-foot vertical is used on 20, and a 7-Mc.-centered Herz on the lower-frequency bands. The three transmitters all use primary keying for break-in. Pat has WAC, WAS, and 92 countries.

Another nice one, worked by WIDF, W1SZ, W2GYZ, W2CVS, W2BEW, and W2CMY, and others, is H.Z. Murat, Yves Murat, who logs Pasni 21, San'a, Yemen (pronounced "yeah man!" when you work him). He comes through in the early evening . . . . The address of FYSE is H. Ravin, Post Office, Cayenne, French Guiana . . . . W6ITH reports a "phone QSO with TG1AX (14,105 kc.), another rare country. Reg says that if you work H02U (14,100 kc., 'phone or c.w.), you will be pleased to know he is on a round-the-world ship, and if he were to receive mail there. We hope he'll get smart and get a license, and quit using up part of our good bands.

When:

A few of the gang came through on our plea for more 7-Mc. reports, and the big run now seems to be that there aren't enough DX stations on. The band delivers though, since W2JKH worked CN8AS, GT1AR, VY6AS, VY6AA, and a flock of Europeans, VE's and K6's . . . . W3FNIM worked NO8AR and N1EC. W2IOI reports CT1AR, and W2BMX has kept a sked with ZL6GI since last April . . . . Is the old Asian gang still on 40, or have they all gone to 20? Ten meters is back with more or less of a bang, and you'll miss some good tricks if you pass it up. ZBIC reports a QSO with ZB2KT (28,600 kc.) for the first ZB2KS on ten, as a starter . . . . W0LQ worked G, VK, ZL, VP2, and ZU, down there recently, and W1WR knocked off an HR . . . . This is the time of year to get in on the 10-meter DX, so go to it.

WOTWC, when he isn't collecting driver stories, manages to get in on some good DX. Among the latest are VK4KC (14,300 kc., T9) in Papua, VVSAB (14,300 kc., T9), K1AF (14,375 kc., T9), XUSHN (14,330 kc., T9), SU1HR (14,300 kc., T9), VQBX (14,300 kc., Z7), FASSDA (14,400 kc., T5), and YU7TE (14,450 kc., T7) . . . . We're going to do in so much good 'phone dope that it is only possible to list some of the juiciest, which includes VP7A (14,140 kc.) UX8BH (14,030 kc.), FE3AB (14,280 kc.), X2ZDY and X2ZBZ (14,355 kc.), V86AK (14,290 kc.), PK4AWS (14,100 kc.), PK2WL (14,220 kc.), V81AI (14,042 kc.), G5NI (14,100 kc.) FT4AN (14,275 kc.), GNS8J (14,127 kc.), G02AK (14,130 kc.), Q6AAJ (14,020 kc.), VP5PZ (14,150 kc.), OQ6AA (14,055 kc.), and EA9AH (14,000 kc.). And that's only about a third of them! . . . . 'Phone dope from W1HKK/1 includes Y12BA (14,282 kc., CN8AM (14,120 kc.), and W1XZA (14,200 kc.). Others who report Y12BA are W2GYS, W2BMDX (who logs him at 14,350 kc.), W0THC (at 14,150 kc.), and W2GXX/1. It appears that you can look for him most anywhere . . . . W2GXX/1 worked another YI, this one just new on the list. The call is Y12BG (14,100 kc.), who reports Y12XY (14,180 kc., T9). W2IXY suggests Y12BG (14,070 kc.), and HABN (14,130 kc.), if you need those countries on 'phone . . . . And W1APA deserts the c.w. ranks long enough to chat awhile with PK4AWS (14,340 kc., T9) has been tough for many to raise, although W6HIP.
What:

ZL4FK again raises the question that has probably occurred to all of you that have done much listening on the DX bands. 4FK says that, especially when conditions are poor, 'phone signals from W seem to have greater strength than c.w. signals, and we've noticed much the same thing here on Asian signals. The reason for it is that, when c.w. signals have a tendency to be hollow and acquire tails, a 'phone signal will fill in the gaps caused by the fade because the receiving operator unconsciously supplies the missing syllables. So, if there is no selective fading you can probably work weaker-signals on c.w., but when bad selective fading sets in, 'phone pulls through better.

Or don't you agree?

Who:

Jack Berliant, W2APV, is now operating at HI5PA (14,000 kc.), while Isaacs is in Columbia. Isaacs hopes to get on with HI5PA. W1WZ can never be counted on to be idle. Some of his latest DX includes V61AA, VS1AF, V571RF, VR4OC, and KS7E at Wake Island. VKom worked ST1AB at Desain, Eritrea, on 7 Mc. The operator was in the Italian Army down there . . . . You made a mistake if you passed up the R.E.N. Contest this year. LY1KK got a gold medal for first place in the Irish event and W2GZ/7's second place brought him a silver one in the foreign competition. Elizm, GI6TK, and GI6TK placed in that order for the domestic prizes . . . . And speaking of trophies, the one WIS2Z got for winning the S.A.R.C. contest is an absolute knockout. Why don't things like that happen to us? . . . . W5KCO suggests that a Scott's Postage Stamp Catalogue is very helpful in getting counties, which would be a good spot to plug in the A.R.R.L. Map, wouldn't it? . . . . For some of the DX stations looking for North Dakota for WAS, W210G suggests W2O2P on 20 and W9ZQ on 40; and W9ZKY (14,965 kc.) will be glad to give you Mississippi . . . . . The low power lads are still right in there and knocking over some pretty good stuff. One who is coming along right well is WB9PE, whose 45's recently accounted for VE6T, ZL, ZS and FBAD in one morning. He has been hearing 5G5CC and V571RF but no luck so far . . . . Then there's W6KJY, whose 35 watts to an 802 final has given him WAC and some swell reports. He uses a simplified Collins coupler to tie in his 80-meter Zepp, and thinks it is the old dope . . . . And W4ETT, with a single 6L6 oscillator on 7 Mc., has worked a flock of Europeans and all U. S. but Idaho . . . . Speaking of DX rag chews, A4YT, FN1C, and VU2LK all qualified for the RC3 at the same time by a three-way QSO that lasted 2 hours and 30 minutes. Oh well, we're not really interested in DX—much!

Wac:

F3JD made a 'phone WAC in three hours, working W4TZ, VU2CQ, H39CB, PY2DR and CN8A.J . . . . WSQ5B worked five continents within 24 hours after he had received his license in the mail, and worked J2IN in 14 days later for his WAC! Paul's first contact in ham radio was with YR5AA, one hour after receiving his ticket . . . . Latest 'phone WAC's go to PK1GKL, PK4DG, HK5, W0CCH, W6EQ, PA0QG and ZS1B . . . . Don't forget that you can get those 29-Mc. endorsements for your WAC certificate. See last month's I.A.R.U. column.

Briefs

The Schenectady Amateur Radio Association will hold its Annual Hamfest on October 2d at the Hotel Mohawk, Schenectady, N. Y. Registration begins at 10:00 A.m., program starts at 1:00 P.M., and continues throughout the evening. Fee, $1.75 in advance, $2.00 at the door. A good time is assured.

The Fourth Annual Hamfest of the Federation of Long Island Radio Clubs will be held at the Bethpage Country Club, Bethpage State Park, Farmingdale, L. I., Sunday, October 3d. It will be an all-day affair with 56-Mc., hidden transmitter hunt, ball games, golf, technical contests, movies and bridges for the YL's, technical talks and other interesting items. A banquet will top off the day, with prizes and dancing. Dinner tickets are $2.00 per person. Don't miss this gala get-together—come early, stay late ----

Four hours, 35 minutes is the duration of a rag-chew claimed by W9WPA and W9ZDR, both R.C.C. memb­er.

While swimming at Crystal Lake, near Springfield, Ohio, WSQR/W3CLQ called CQ under water by knocking together a couple of rocks—just to see how it sounded. He called several times, then signed. Several seconds later he heard WSHTI calling him with an S9-plus under water signal and a 100% QSO resulted! WSHTI was 3½ mile distant on the other side of the lake.

During the V. F. W. encampment in Buffalo, N. Y., 56 Mc. was used by WS8RV, mobile, WSNOR, portable, and a receiver in a motorcycle side car for dispatches to the parade and other activities. WS8OK and W8IOW, with the Sea Scout base radio station, WS8QBT, also helped out. WS8RX, Q8D, QEE and PUX also did a good bit of relief work. Amateur radio was used as the official communication channel for news reporters and once to summon an ambulance for first aid.

DX Schedules

W0VQD, 7522 Paxton Ave., Chicago, maintains 14-Mc. schedules with KB0JG, Guam, on Monday, Wednesday and Friday, 7:30 A.M. EST, and invites traffic for P.I., Guam, etc. K00QG schedules XUSRL. W0VQD has been handling considerable traffic from the Yankee, WCFZ, and the Restorer, WCDJ.

W9QP, on 14,304 kc., schedules K5AA, 10:00 P.M. EST, daily except Sat. and Sun.; KG6BR, 10:45 P.M. EST, daily except Sat. and Sun.; KB4U, 8:00 P.M. EST, Monday and Friday; VR6MO, 5:00 A.M. EST, Tuesday.
O.R.S.-O.P.S. Results

The July quarterly activities were highly successful, the relative standings in the Relay Station and Phone Station groups as indicated below. The summer O.R.S. Party rules emphasized the possibilities of all-band operation, and under the special scoring system tried the scores approached a possible organization groups look forward to a new all-season competition, to be announced in October bulletin to appointees, with details on the October station tests.

OFFICIAL RELAY STATION SCORES

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A.R.R.L. Official Broadcasting Stations

The following listed stations address information regularly "to all amateurs" rendering a distinct service to fellow amateurs. First information on changes in F.C.C. regulations, new data on expeditions, special tests and activities, DX conditions and records of prime interest to the amateur world reaches amateurs first through the medium of League weekly broadcasts and the latest-revised list of stations that follows. Stations in all districts assure good coverage on the information which in many cases is so well sent it is used for code practice. Listen for the "QST" from these stations. Report results to the stations you copy too, so the operators when their signals are successfully received and appreciated.

W1APK, W1AQK, W1AUY, W1AW, W1BFF, W1BVR, W1BWY, W1FEL, W1GAE, W1GZL, W1HEK, W1JYE, W1JZ, W1KFN, W1N2.

W1ACY, W1AZY, W2FF, W2OP, W2GC, W2HBR, W2KBR, W2SN.

W3AEJ, W3AQJ, W3BQ1, W3BQD, W3BHR, W3BP, W3BN, W3EXW, W3FPW, W3GFC, W3UVA.

W4AXR, W4BDQ, W4CE, W4CZA, W4DAGH, W4EJ, W4EJ.

W5BQI, W5CQJ, W5DQ, W6DER, W6DFP, W6FPW, W6FSK, W6F2IJ.

W8AM, W8BRI/CDU, W8CIZ, W8FWB, W8GZZY, W8ITC, W8ITW, W8JGM, W8MQS, W8QM, W8YR, W8ZD.

W9BBD, W9COH, W9E2ZC, W9FEL.

W9AQ, W9DLG, W9DME, W9DOZ, W9DZY, W9EWP, W9GJM, W9HOD, W9JQ, W9JTW, W9MiW, W9NDE.


W9PFW, W9PZU, W9R, W9RUJ, W9WZT, W9WZJ, W9YEE.

VE2EE, VE3AHK, VE5KR.

MacGregor Arctic Expedition

At 7:00 p.m. EST, August 17th, W8ITK worked W1OXAB, the Schenectady MacGregor Expedition, on 14 Mc. and had the pleasure of taking the first ham traffic from the party, ten messages to the folks back in the states. W1OXAB was on approximately 14,360 kc. and operator Sayre, W2QY, advised that he had had no luck at all in raising hams while using call W1OXAB on 12,862 kc. or 17,310 kc. He also reported that he was using the ship call WAWG considerably on 12,460 and 16,580 kc. The expedition's QTH on August 17th was approximately 73 degrees north, near Thule, Greenland. They expected to reach their base within the next two weeks and set up permanent equipment for the duration of their stay. W1OXAB uses 600 watts input and W8ITK reports an FB Trk signal. W2QY requests that east coast amateurs listen for him on the frequencies mentioned. W2QY is attempting a twice-weekly schedule with WAWG at the request of the Carnegie Institute, Dept. of Terrestrial Magnetism.

1.75-Mc. 'Phone Emergency Nets

Organization of emergency nets on the 1.75-Mc. 'phone band is under way in a number of eastern and central states. In Ohio WSPFN (Chillicothe) is Net Control Station of a group which operates between 1885 and 1888 kc. each Tuesday night at 11:00 p.m. EST. Included in the roster are W8SMGK, Cincinnati; W8LAX, Dayton; W8L6L, Zanesville; W8DTH, Columbus. W8MGN, Meshoppen, N.C.S. of the stations in that state. W8MV, New Hartford, N. Y., is member of a group which includes W8BSX, W8ITN, W8AXL, W8KXY, W8PFV and W8CCU; CGU is usually on 3.9 Mc., the rest on "160." This group conducts tests each Monday and Wednesday night. Additional members are desired in N.Y.C. and Syracuse. Get in touch with W8MMV for further details.

QST for
BRASS POUNDERS' LEAGUE
(July 16th-August 16th)

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<th>Call</th>
<th>Orgt.</th>
<th>Det.</th>
<th>Rel.</th>
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<tr>
<td>W6PH</td>
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<tr>
<td>W6PH</td>
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<td>W6PH</td>
<td>180</td>
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<td>75</td>
<td>255</td>
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</tbody>
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**MORE-THAN-ONE-OPERATOR STATIONS**

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<tr>
<th>Call</th>
<th>Orgt.</th>
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<th>Rel.</th>
<th>Credit</th>
<th>Total</th>
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<tr>
<td>W6PH</td>
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<td>75</td>
<td>255</td>
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</tbody>
</table>

These stations "make" the B.P.L. with total of 500 or over. One hundred deliveries or more are delivered. Credit also rate B.P.L. standing. The following one-operator stations make the B.P.L. on deliveries. Deliveries count!

W6QOR, 412 VE3EE, 158 W8BN, 125
W3DDW, 230 VE3WW, 163 W3HD, 121
W8FPH, 250 W8BQ, 124 W8BD, 110
W8DTM, 125 W8FPH, 119 W8DI, 112
W8CUZ, 122 W8FMJ, 144 W8BLH, 107
W9FH, 194 W8ARC, 155 W8JY, 128

**A.R.R.L.** Extra Det. Total

<table>
<thead>
<tr>
<th>Call</th>
<th>Orgt.</th>
<th>Det.</th>
<th>Rel.</th>
<th>Credit</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>W6MC (W6QDN)</td>
<td>19</td>
<td>58</td>
<td>55</td>
<td>29</td>
<td>90</td>
</tr>
</tbody>
</table>

W6LI (W6GKM) made the B.P.L. on all message deliveries.

**MORE-THAN-ONE-OPERATOR STATIONS**

<table>
<thead>
<tr>
<th>Call</th>
<th>Orgt.</th>
<th>Det.</th>
<th>Rel.</th>
<th>Credit</th>
<th>Total</th>
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<tr>
<td>W6WJX (W6CXL)</td>
<td>1</td>
<td>1</td>
<td>1</td>
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</tr>
</tbody>
</table>

A total of 100 or more, or 10 deliveries each D. Or. will put you in line for a place in the B.P.L.

---

More 20-Year Club Members

The 20-Year Club applications are rolling in so fast it is impossible to present the dope on each Old Timer "all in one issue" of QST. Instead we'll list each month the call letters of new members, plus as many "write-ups" as there is room for, in time (we hope) using all the write-ups submitted. Here are the new candidates: W1AJ W1DF MP WIEE W1FRF W1FJN W1AX W2BR W2CJX W2DZA W2EC W2JZ W3RDG W3RF W3A VJ W3QB W3BZ W3CA W3DRQ W3PL H W3GPA W3JL W3H M J W3P W3R7 W6G W6LM W6ID W6MB W6YU W7CO W7D Y W7GGC W8FRC W8Y8R W8KHM W8QQ W8WS W9AC W9AX W9DG M W9FRC W9KFW W9TRE W9W3E W9VY W8BH.

1.75-Mc. Stations Needed to Send Code Practice

Many beginning amateurs find "learning the code" their greatest stumbling block. They call upon licensed amateurs to help them master the dots and dashes but often there are no operators in the immediate area. Each active radio season A.R.R.L. sponsors a program of Code Practice on the "160 meter" band. Operators working on this band are invited to cooperate in this worthwhile work. We have many beginners and, if we will but think back, we will recall that assistance in getting started was quite welcome. During the past several years the 1.75-Mc. stations sending code lessons have helped hundreds learn the code. This season we would like to have more stations engaged in our program. Just send us the schedule you will follow in sending code practice, being sure to give your frequency (as near exact as possible) and hours and days you are able to send. We are interested in knowing how to conduct code practice by radio. The schedules of all 1.75-Mc. code practice stations are mailed to each would-be-amateur requesting same—and hundreds of these requests are filed yearly. What is your plan? Will you lend a band? W2DSH, Arlington, B. L. N. Y. is the code practice volunteer of the '37-'38 season. He will start lessons on October 7th on 1833 kc. using both voice and code, voice for announcements. Transmissions will be from 7:00 to 8:00 p.m. EST every Thursday (except holidays). Let's have many more volunteers!

Amateurs Handle U.S.S. Augusta Traffic

One of the biggest thrills recently enjoyed by radio amateurs was the handling of amateur 14-Mc. traffic originating with the U.S.S. Augusta (Shanghia, China) shortly after the much publicized shelling of that vessel. Routing was via XUSLR-K60JG-W6DOB-W5HN. Traffic via this route was coming the whole length of the circuit at one time in eighteen minutes.

VE5GS found the QST article on PPTG, Pitcairn Island, of particular interest. While operating GCSV, RMS Matoa, he worked PPTG and, on the same voyage, met two of the operators, Warren and Young.

ELECTION NOTICES

To all A.R.R.L. Members residing in the Sections listed below:

(If you have completed the closing date for receipt of nominating petitions for Section Manager, you may proceed to announce the election.

The complete name, address and the date of expiration of his term of office.) The notice superseding previous notices.

In cases where no valid nominating petitions have been received from A.R.R.L. members residing in the Sections listed below, no election will be held. In response to our previous notices, the closing dates for receipt of nominating petitions are set ahead to the dates given here-in. It is the duty of each member residing in the Sections listed to send in his nominating petitions to the communications manager of the Section within the date specified.

The following one-operator stations make the B.P.L. on deliveries. Deliveries count!

Due to a recent election in the Eastern Fla. Section, nominating petitions are hereof solicited for the office of Section Communications Manager in this Section and the closing date for receipt of nominations at A.R.R.L. Headquarters is hereby specified as noon, Friday, October 15, 1937. The following form for nomination is suggested:

**Section Closing Date Present SCM Proposed Term of Office Ends**

<table>
<thead>
<tr>
<th>Section</th>
<th>Closing Date</th>
<th>Present SCM</th>
<th>Proposed Term of Office Ends</th>
</tr>
</thead>
</table>

**1. Maritime**
Oct. 15, 1937 Arthur M. Gowen

**2. Nevada**
Oct. 15, 1937 Edward W. Hain

**3. Alabama**
Jan. 3, 1938 James P. Thompson

**4. P.-P. F-V.**
Dec. 14, 1937

**5. Eastern Pa.**
Oct. 15, 1937 William C. Shelton

**6. Wisconsin**
Nov. 1, 1937 B. C. Forge

**7. Nevada**
Nov. 1, 1937 Don R. Vaughan-Smith

**8. Connecticut**
Nov. 1, 1937 Frederick E. Jr.

**9. Western N. Y.**
Nov. 1, 1937 Charles Smith

**10. San Diego**
Oct. 15, 1937 Harvey Ambler

**11. Southern Texas**
Dec. 1, 1937 Armond O. Young

**12. Saskatchewan**
Dec. 1, 1937 Wilfred Shafe

**13. Virginia**

**14. Alabama**
Jan. 3, 1938 James P. Thompson

*In Canadian Sections nominating petitions for Section Manager must be addressed to Canadian General Manager.*

Alex Reid, 169 Logan Ave., St. Lambert, Quebec. To be valid these petitions must be filed with W6LM on or before the closing date specified.

The following persons are hereby nominated to the office of Section Manager:

**Commack, N. Y.**

**North Carolina**

**New Mexico**

**New York**

**Virginia**

**Washington**

**Western Pa.**

**Noise Reduction**

Invalidated.

In Canadian Sections nominating petitions for Section Manager must be addressed to Canadian General Manager. Alex Reid, 169 Logan Ave., St. Lambert, Quebec. To be valid these petitions must be filed with W6LM on or before the closing date specified.

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

*The elections will take place in the different Sections immediately after the closing date for receipt of nominating petitions as given opposite the different Sections. The ballots mailed from Headquarters will in alphabetical sequence the names of all eligible candidates nominated for the position by A.R.R.L. members residing in the Sections concerned. Ballots will be mailed to members residing in the Section concerned. Ballots will be mailed to members residing in the Section concerned.

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

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

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

**Communications Manager, A.R.R.L.**

La Salle Tower, Hartford, Connecticut.

We, the undersigned members of the A.R.R.L. residing in the Section of the Amateur Radio Relay League hereby nominate, as candidate for Section Communications Manager for this section for the next two year term of office.

(Please and date)

Communications Manager, A.R.R.L.

La Salle Tower, Hartford, Connecticut.

We, the undersigned members of the A.R.R.L. residing in the Section of the Amateur Radio Relay League hereby nominate, as candidate for Section Communications Manager for this section for the next two year term of office.

(Please and date)

Communications Manager, A.R.R.L.
ELECTION RESULTS

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

**MD-DEL-D.C.**

Edgar L. Hudson, W3BAR

July 15, 1937

**W. Virginia**

C. F. Hoffmann, Jr., W3OW

Aug. 25, 1937

**Oklahoma**

Carver L. Simpson, W5CEZ

Aug. 25, 1937

**South Carolina**

Ted Ferguson, W5QG

Aug. 25, 1937

**Eastern New York**

Robert E. Haight, W2LU

Sept. 18, 1937

**Eastern Mass.**

Sam Gross, W1WGO

Sept. 18, 1937

In the Eastern Pennsylvania section of the Atlantic Division Mr. John Buck Morgan, W1QWI, and Mr. Alex A. Polityka, Jr., W3FLA, were nominated. Mr. Morgan received 282 votes and Mr. Polityka received 87 votes. Mr. Morgan's term of office began August 11, 1937.

In the Arizona Section of the Southwestern Division Mr. Victor G. Clark, W5KGF, and Mr. John K. Oliver, W6KOL, were nominated. Mr. Clark received 29 votes and Mr. Oliver received 20 votes. Mr. Clark's term of office began August 13, 1937.

**Station Activities**

**CANADA**

**MARITIME DIVISION**

MARTINE-SCM, A. M. Crowell, VE1DQ- Nova Scotia: W3BHI has been visiting friends and relatives in Halifax. VE1AW will soon have the new QTH complete. PQ has been doing some nice 14-Mc. phone work. BC and OW will soon be heard again, the latter with her own rig on c.w. Through the kindness of Major Borrett, Station Director of C.H.N.S., several announcements of interest in connection with the convention were carried, which were much appreciated by the group. DB is putting out FB on 14-Mc., c.w. PQ has been keeping the nightly contact with VE5 and W6 on 14-Mc. phone. JM is home on vacation from VE5 land. EC is selling his present transmitter due to having to move around a lot and is building a more portable rig. GP is still with the R.C.M.P.-Marine Division. BV has been working plenty of DX on 14-Mc. phone and c.w. with only 40 watts input to his pair of 40's. BE has been having many fine QSO's on 14-Mc. phone from his "Most Easterly Station on the Continent." HE still piles up the QSL cards at the local QSL Manager's, HE is having a good time. SS is doing a swell job of marketing the old brass rig for a change. GR is going strong on 3.5 and 14 Mc. KJ moved to new QTH and has the 6L6 putting out FB on 14 Mc. KT is pounding out with 5S0 on 3.5 Mc. More congrats to EA and KH who have both annexed themselves to XYL's. Come on, fellows, let's have some more news for next month. Drop us a line or a buzz to any of the Halifax gang will do the trick.

**ONTARIO DIVISION**

ONTARIO-SCM, Fred H. B. Saxton, VE8 HG- The joint picnic held by the Toronto Clubs was a real success. Over 150 hams, including two W8's from Ohio, were present with their YL's, XYL's and friends. The Hamilton Club, who won the Field Day competition in 1936, were presented with the "R.C.M. Trophy," which will be held by them until July 30th when it will be given to the winner of the 1937 competition. ADB is operating on 14-Mc. with a Marconi DET3. GO has 50-foot mast. VE8BZV is now VE8MN. Welcome to the section, "Daddy." NG visited PM and IB (Old Wally) at Weston. GT reports working plenty of DX in the morning hours on 422. BC is having a 59-501 Goyer rig on 3.5, 7 and 14 Mc. Yours truly and the XYL visited VE3PLA for a few days. 9ALa portable has been working splendidly keeping the summer home in touch with Toronto. EM is rebuilding her old rig and so far has OS, ON, CX, PY, HK, FY3, VP1, VP2, VP5, VN, I, XE, CM, KS, K5, VKL and XG to her credit. A newcomer, APS, was with First Canadian Divisional Signals in France. Welcome to amateur ranks.

Traffic: VE8HJ 14 SG 9 QB 2 GT L

**QUEBEC DIVISION**

QUEBEC-SCM, Stan Comach, VE6EE-We understand that AR has told the minister "I do." Congrats, Ray. CR's new job sounds swell. FG erected another mast and new antennas with DD, LI and BB acting as helpers. DD revived his rig at LV and the Mayor now sports a single 1912. VE3BB has been visiting Sherbrooke and Montreal recently. Allan at V06T is putting a nice signal into this location. Ex-2BB is now VE8MN and LC is running a schedule with Dad. GE bought a 1938 Super-Skyrider and DU now owns an ACR-175. F3EJ has gone commercial and the joy is keeping John very busy. CX has had a very nice time over with the G's and returned on the Queen Mary. HH has rebuilt his rig. HT has distinguished visitors in the persons of W1K6, Vice-Pres.-A.R.R.L., and his buddy W1WV, RF has been visiting CB, GU, NL and KO, EC has a sign with her letters on the toll-bridge and has had quite a few visitors as a result. WSGV was a visitor at DD, AY has been heard on the air again. DV is applicable for O.R.S. VE6GQ was down from Winnipeg visiting IA. IR has discarded his crutches and now gets along with a cane. Glad to hear it, Corey. JK has been working plenty of DX from his country residence. Continuing the list of calls I would like to hear from, will follow the please drop me a line. Fall leaves are on the ground in October: AJ, Bl, BI, DI, EQ, FT, LD, MN, NX, GP, HO, IM.

Traffic: VE6B 7 EC 51 KF 15 HH 3 LC 7 EE 5 DR 8

**VANALTA DIVISION**

ALBERTA-SCM, Alfred D. Kettlenbach, VE4ALX-AFT, new O.R.S., leads the traffic handlers. KP and LR are planing with 56 Mc. GE visited ham in Hanna; he is now W.A.S. CT is working 14 Mc. EX, Edmonton's YL ham, married Aug. 14th and will live in Calgary. BB is rebuilding and JK is sending out the daily schedule to the VE3K gang. EA gave the Edmonton Club a talk on new B.C.L. receivers. FR is building new rig for 14 Mc. HM will visit the Headquarters gang at W. Hartford. JJ is pleased with the successful winding up of the hamfest business. LQ staged a kick in Calgary, MR is building a new station in a single 19 in place of his 112's, XX has excitior unit of new rig on the air. UV is heard on 14 Mc. ZP is having fine time cruising Northland with United Air Transport. AB is visiting in B.C. ABN installed keying oscillator. ACFZ is on the air last.

Traffic: VE4AFT 18 GE 9 WX 4 IQ-QK 2.

BRITISH COLUMBIA-SCM, D. R. Vaughan-Smith, VE6EP-SW made B.P.L. in schedule with Victoria Y Camp station, SIC at Glinis Lake. HP made a superb score in July. O.R.S. Party, JL and OX are called, opp. on the local coast service. AX pulled the pins for England. ZLB is the stooge at 1KJ were visitors in July. AT is proud possessor of an XYL and is living at Haselton. AB superintending the installation of Airways station at Victoria. MM kicks around nicely with a bare 14 watts. ABK is the station of the Ontario School Boys' Expedition to Northern B.C. GF has his 14-Mc. phone nearly finished. KQ is 2nd op. on "Empress of Russia" and will keep his bro., in touch. CM, K5, K6, VE2BB, VP5 and ABA are new stations on the 3.9-Mc. band. NG has her rig working nicely and will soon be on 14 Mc. IB has fun with a half-watt peanut tube portable. VE5G is hounding the passing of Floyd Beebe, W7FBC, whose home was in Vancouver.


**PRAIRIE DIVISION**

MANITOBA-SCM, A. J. R. Simpson, VE4BG-AAW spent his vacation with the W9's down in Minneapolis. IP returned from California with a new Breder receiver. GL brought back a new Hallicraft receiver from across the line. OSK is using 14 Mc. with Movin' on 26 Mc. Y was visiting P. P. W6KOP from Salt Lake City was a guest at ZK. ZK's first QSO was with 6KOP and weekly schedules have been maintained without interruption for three years. UX has been up North at Rankin Inlet operating under VE3ZK. It has been installed at the Flin Flon and will probably be heard soon under his old call UX. Other news from the North country is that MW had the gas engine used for driving his generator catches fire and the radio shack burned down to the ground. QP is still piling up brass for the mining at Island Lake, RO.

(Continued on page 100)
A New Sub-Division Plan

21 Rockview Ave., N. Plainfield, N.J.

Editor, QST:

The problem of improving our system of frequency allocations and operating methods is both interesting and difficult. It seems to me that the French proposal is not suited to our requirements in this country and holds a real danger to us all. Due to the large number of amateurs in this country, we must utilize every kilocycle on the popular bands such as 3.5, 7.0 and 14 Mc. If we do not, some foreign government will sooner or later point to our "successful" operations in % of a band and say, "Let us put the rest of the world in there, too; a few more won't hurt."

Zoning has its points, but only if the bands are completely occupied by us Yanks. This may seem selfish at first glance but I think it plain horse sense for the reason given.

As your recent editorial threw this whole subject wide open, may I toss in the following suggestions. They will inconvenience a good many amateurs in some degree if carried out, but I feel that they will prove immensely beneficial to the game in providing better operating conditions. They will also test every amateur's skill as they will require him to be reasonably versatile in his radio operation:

1. Abolish 1.7-2.0-Mc. 'phone.
   Any service that causes 67 per cent of the public's complaints against amateurs should be eliminated if possible.

2. Abolish the Class "A" license.
   "How to build it" 'phone dope is now widely available. The man with a retentive memory and a license manual is given a bonus over his more methodical brother.

3. Devote the 1.7-2.0-Mc. band to Mr. Handy's traffic organization.
   This band is ideally suited to a great portion of the short-haul traffic work, c.w. only.

4. Assign 3.5-4.0-Mc. to c.w. exclusively for long distance traffic nets.
   These frequencies are only harmonically related to the 1.7-Mc. band. This would give a total of 488 kc. for the use of traffic men. At present they are using less than 400 kc. for all practical purposes.

5. Leave the 28-Mc. (modified) and 56-Mc. assignments alone.

6. Make the remaining portion of 3.5-4.0 (3.5-3.8) Mc. exclusively for 'phone for one month and make this assignment completely c.w. the following month.

7. Do the same thing to the 7.0-7.3-Mc. assignment. (Perhaps we can secure the cooperation of the foreigners to stay off 'phone during the c.w. months).

8. Do the same thing to the 14.0-14.4-Mc. assignment (no c.w. busting up 'phone and vice-versa).

Suppose it is set up like this:

<table>
<thead>
<tr>
<th>3.5-3.8 Mc.</th>
<th>7.0-7.3 Mc.</th>
<th>14.0-14.4 Mc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan. c.w.</td>
<td>'phone</td>
<td>c.w.</td>
</tr>
<tr>
<td>Feb. 'phone</td>
<td>c.w.</td>
<td>'phone</td>
</tr>
<tr>
<td>Mar. c.w.</td>
<td>'phone</td>
<td>c.w.</td>
</tr>
<tr>
<td>Apr. 'phone</td>
<td>c.w.</td>
<td>'phone</td>
</tr>
</tbody>
</table>

The advantages of this plan that occur to me are as follows: B.C.L. complaints would be reduced in number. Our traffic handlers would be provided ample facilities to carry out their activities with less trouble than they now have. Either one or the other of the DX bands would always be available for c.w. The same would also be true of 'phone. The 3.5-3.8-Mc. section would also alternate every month between the two types of service. A man with a 7-Mc. sked. could hook on a modulator in the A3 months, or shift to 20 if he must pound brass. The 'phone boys on 1.7-3.9 and 14 Mc. at present could likewise shift to the key or shift bands. The plan will not inconvenience the progressive amateurs that are equally at home on both 'phone and c.w. on several bands. This type of amateur is unquestionably the best because of his versatility, and amateur radio can be improved if his number is increased. Our DX contest would have to be revamped but that should be an easy job for the Hq gang. The prospect of a whole band full of 'phone with some elbow room, or one full of c.w. without "How's my modulation?" or its French, Spanish or Portuguese equivalent would be decidedly worth while.

The plan is easily enforced. If someone starts an A3 CQ on a band devoted to A1 (of course, we all listen before we transmit) he will soon wake up. A period of a month makes it reasonably sure that at least one DX "hot spot" will take place (every 21 days, isn't it?). While some slight confusion may occur at the end of the period, if the hour is set at 3:00 a.m. local time little trouble will occur as the bands are quite dead at this hour.

In closing, I would like to say that I have tried
to examine the entire amateur's picture impartially and fairly. It is really more than a one-man job as evidenced by the appointment of the new engineering committees. I do believe it is basically sound but it is up to you and the gang to discuss and find its weak spots. Those that object to every change as a matter of principle, or because of selfish interests, should bear in mind that their present practice will be changed before long. It behooves us to examine every possibility carefully so that when the change takes place it will provide "the greatest good for the greatest number."

---D. A. Griffin, W4DE

Silent Pirates

Mayaguez, P. R.

Editor, QST:

Oh, yes, dear Editor, K4RJ, K4KD, K4BRN, K4DTH and yours truly have been laughing this week—ho hoo hoo and a bottle of rum! There is a bunch of Class C K4's that in some funny way got their tickets because they cannot send and receive the regulatory 12 wpm as far as I know, and who operate in the 3.9-4.0-Mc. 'phone band on 'phone communication between themselves and the Dominican Republic amateurs who answer on 7-Mc. 'phone.

Early this week there arrived at San Juan two engineers of the F.C.C. and when the boys read the news in the papers they went QRT and the band is dead now until the F.C.C. representatives go back to the U.S.A.

This is really pitiful because these chaps were having a very interesting game and now they must QRX for a while. Oh, yes, they don't care for 160 meters at all.

---Luis Gandia, Jr., K4BU

Theobert QRM

Milford, Neb.

Editor, QST:

W2GOC draws an 89 plus for his letter in August QST! Forgetting the desire for increased space, consider our crowded amateur bands from a practical view. Every band, day or night, carries probably 47 per cent of traffic which could best be carried on a different band, or in a different manner. Listen on the 'phone bands; you'll hear cross-town duplex, fully-modulated 100- to 500-watt carriers doing the job. Listen to the boys on 14-Mc. visiting someone a few blocks away, their signs riding thousands of useless QRMing miles. The stupid operating is really the main-raiser fellows; simple common sense is the answer to more pleasant amateur radio. Common faults, both 'phone and c.w. include: useless and unnecessary testing, with power right into the transmitter; failure to examine often and to operate upon the transmitting frequency as much as possible.

Now another thing. We have seen jealousy and general cussedness try to knock our League. It is up to us members to do a little missionary work on our own. Few of us do muchplugging for our A.R.R.L. We leave that to the F.C.C. and when the boys read the news in the papers they went QRT and the band is dead now until the F.C.C. representatives go back to the U.S.A.

This is really pitiful because these chaps were having a very interesting game and now they must QRX for a while. Oh, yes, they don't care for 160 meters at all.

---Luis Gandia, Jr., K4BU

A Word to the Unwise

Elyria, Ohio

Editor, QST:

I had just rebuilt my rig. It worked FB. Spent all my cash and had a borrowed r.f. ammeter in the rig at the time. Like 90 per cent of the hams do, I left the antenna on when the rig was not in use. This during the summer when electrical storms are a private telephone line was a real hit. The lightning scored a perfect hit—nothing left. Sanganow went up like firecrackers. I'm glad I wasn't near and that the house didn't burn down. But it looks like I'll be off the air for some time.

---J. H. Crumley, W6LXX

(Continued on page 56)
It is now six years since we first began making SW-3 Receivers. We still make them.

There is no need to discuss the merits of these little receivers at this late date, for they are now part of the history of amateur radio. They have become the workhorse of the short waves; you see them everywhere in general, and in tough spots in particular. When W8DPY set out on that desperate flood-emergency expedition that was destined to win the Paley Award, he took his SW-3. When Byrd isolated himself in that Antarctic hut for the long winter season, he took an SW-3. Thumb back through the pages of the National Geographic Magazine and check off the long list of expeditions to the far corners of the earth, that had to have reliable communication. . . . Ten to one that receiver back in the shadows of the tent is an SW-3.

Many changes have taken place in the six years since the little SW-3 first made its bow. The RAC transmitter is gone, and crystal control has become commonplace. Receivers have gone superhet, with hairline crystal-filter selectivity, to cope with badly crowded amateur bands. Amateur shacks are crowded with all kinds of new-fangled gear these days, but there is still always room for the SW-3. Maybe they are there just in case . . . (There might be a flood in this valley!) Maybe it's because the darn things do pull in the signals still, somehow or other. Maybe it's just sentiment, the gruff affection they always seem to win from the men who use them long and hard.

We feel that same affection for them, too. That is why we like to talk about them. But what we really started to say was something else again. We have some half dozen different receivers listed in our catalogues ranging widely in performance and in price. But all of them have one thing in common with the SW-3; there is a certain no-nonsense efficiency about them that makes friends and keeps them. You may not be going to Ak-Bulak to observe an eclipse, but wherever they go these National Receivers serve just as faithfully as the SW-3 has, as the new NC-80 will.

That is why their resale value is so cockeyed high. National Receivers just don't change ownership.

James Millen
**YAXLEY SILENT Volume Controls**

There are two reasons why you should use Yaxley Volume Controls in your phone rig.

First... these controls are built with the famous Yaxley SILENT construction. You can use Yaxley Controls in high-gain preamplifiers where the slightest noise would be amplified a thousand-fold.

Second... Yaxley Volume Controls are available in the Yaxley No. 1 taper which provides an approximately linear decibel attenuation, thus giving an added convenience in adjusting your transmitter.

Yaxley SILENT carbon element controls are available in different tapers with resistance values from 5,000 ohms to 9 megohms. Yaxley wire wound controls are made in a resistance range from 1/2 ohm to 150,000 ohms.

See Yaxley Volume Controls at your distributor's.

---

**Radio Strip Poker**

184 So. Main St., Manchester, Conn.

Editor, QST:

I think WNINIF has a FB idea with his radio poker scheme, but may I add that instead of playing conventional poker, why not strip poker? Take off 1 watt power input each time a player loses a hand. I'm sure that this will appeal to the "Flea Power" boys.

—Bill Batchelder, W4ZK

Pse QSL, OM

4310 Evans Chapel Road, Baltimore, Md.

Editor, QST:

... Around March 1938 I became interested in the short waves and I thought it would be very fine to start a collection of short wave verification cards including QSL cards from amateurs, and I am sorry to say it has netted me but approximately 50 per cent of results. The amateurs are the chief offenders.

I know I have sent out reports to amateur stations numbering 500 and I have about 250 who have replied... I include return postage with every request to an amateur for his QSL card, and on an average it costs me 10¢ for each request I mail. When one sends out a large number of reports and it costs 10¢ per report, it soon amounts to great expense and when only one-half reply it makes that expense greater.

I know many short wave listeners fall to enclose return postage to an amateur when asking for a QSL card and I have no use for that type. It is they who jeopardize the chances of one who does include postage. If I were an amateur I would deposit the ones without postage in the wastebasket, and answer the other 100 per cent. But it seems as if the a.w.l. who does enclose postage cannot suffer the same fate. From experience I know what I am saying. It seems only fair that every amateur receiving a correct report from an a.w.l. who does have the courtesy of enclosing postage, should send his card to that a.w.l. If he does not wish to send his station card, the least that can be done is to send a postcard as a reply. It would show that he is at least courteous enough to reply. But as I have said before that courtesy is distinctly lacking in the amateur operator class. The foregoing may sound harsh, but it describes my feelings and also the feelings of others who enclose postage and receive nothing in return.

I thought by joining the A.R.R.L., it would benefit my chances of receiving QSL cards, but it has not done so in the least. I belong to a South American organization, the Rueda del Oeste, a society founded in 1923 in Argentina, and one of the rules reads that all the members must answer all correspondence received from other members. If they fail in this they are liable to expulsion from the organization. It is a great pity that the A.R.R.L. and member societies do not have such a rule. I venture to say that if they did it would be many members being ruled out for failure to answer reports of s.w.l.'s...

—Carroll H. Weyrich

3202 River Ave., Camden, N. J.

Editor, QST:

I would like to get the QSL situation straightened out with some s.w.l.’s. I appreciate very much all the heard cards that I receive from them and hope they continue with their FB hobby of saving QSL’s. I answer 100 per cent every a.w.l. that sends me a heard report. In the Radio Amateur Call Book my QRA is printed with “All QSL’s Ans’d”. I mean that any ham sending me his QSL will be positive of getting mine and any a.w.l. that bears on me the air and sends me a report as to my signal strength, time and date will also get one, but some have a hobby of looking through the Call Book and sending out a card with the following “Pse QSL OM I heard u QSA 5 on all Bands.” Such and others similar to this cannot be verified.

—Joseph A. S. Werner, W3CZN

---

Say You Saw It in QST — It Identifies You and Helps QST
The 80-T and 700-R Transmitters join hands in offering you a simple and inexpensive means of increasing power. Just return your 80-T to us for full credit when purchasing the 700-R. We convert your 80-T right into the larger unit.

**80-T** Transmitter — 1500 to 30,000 Kilocycles — Phone CW Switch — No Neutralization — Excitation Control — Antenna Matching Circuit. Nominal rated output — 18 watts phone — 80 watts CW.

**700-R** Transmitter — 1500 to 30,000 Kilocycles — Built-in Modulation Monitor — Safety Fuses and Relays — High Frequency Insulation — Unit Construction. Nominal rated output — 250 watts phone — 700 watts CW.

*Write for full details*

**HARVEY RADIO LABORATORIES, INC.**

12 Boylston St., Brookline, Mass.
THIS SEASON
Start RIGHT with
BLILEY CRYSTAL UNITS

Type LD2 Crystal Unit

The most popular amateur crystal on
the market. Drift less than 4 cycles
/MC/°C. 40-80-160 meters.

Type HF2 Crystal Unit

Specifically de-
signed for the higher
frequency amateur
bands. Simplifies 20,
10, and 5 meter
transmitters.

Type VF1 Variable Fre-
frequency Unit

Frequency in-
stantly variable up to
60 kc, on the 80 meter
fundamental, or 24-
KC, on 20 meters.

Type BC3 Crystal Unit

Four years ago
this proven X-cut unit
sold for $4.95. Con-
siderably improved, it
is now available at a
new low price.

BLILEY ELECTRIC CO.
ERIE, PENNA.

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

Try a Little Later

205 South 3rd St., Albuquerque, N. Mex.

Editor, QST:

I have just finished reading Mr. R. Villasenor’s letter
regarding “Foreign Fones,” in the August issue of QST and
I would like to add a few words from this side of the fence.
In the first place I appreciate, as well as a good many other
fellows I know, the fact that the “Foreign Fones” are out
of the American ‘phone band. While I enjoy QSO’s with
as many W stations as I can work, there comes the time when
a little ‘phone DX is a pleasure, and ask you how could we
ever hear these low-powered DX stations if they were
mixed in among the kilowatt American stations? I have had
a number of FB QSO’s with XE2FC, as well as VK’s, PK’s
and VE’s, who were out of the American ‘phone band using
such low as 14 watt output. I don’t think these QSO’s would
have been very successful had they been in the 14,150-
14,250 section of the band. I am glad their governments allow
them to operate where they do and hope they stay there. I
am not partial to the ‘phone gang as I like W-meter c.w.
and work it a lot but I usually stay away from the ends of
the ‘phone band and am not bothered with ‘phone QRM.
After all, a QSO is not so important that it can’t wait until
another time, unless it is QRR. Why should a
fellow let a
little QRM get him down? If the band is screwy, line noise
is bad, or the QRM is going full blast, just pull the old big
switch and try a little later.

—B. O. Bowden, W6CHU

Standard Frequency Transmissions

<table>
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<th>Schedule</th>
<th>Station</th>
</tr>
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<tr>
<td>Oct. 1</td>
<td>BB</td>
<td>W0XN</td>
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<tr>
<td>Oct. 2</td>
<td>DX</td>
<td>W0XK</td>
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<tr>
<td>Oct. 3</td>
<td>C</td>
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SCHEDULES

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<tr>
<td>3:40</td>
<td>7500</td>
<td>7500</td>
<td>14,500</td>
</tr>
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</table>

The time specified in the schedules is the local standard time
at the transmitting station. W0XK uses Central Standard
Time, and W6XK, Pacific Standard Time.

TRANSMITTING procedure

The time allotted to each transmission is 8 minutes di-
vided as follows:

2 minutes—QST QST QST de (station call letters).
3 minutes—Characteristic letter of station followed by
out letters and statement of frequency. The characteristic
letter of W0XKAN is “O”; and that of W6XK is “M.”
1 minute—Statement of frequency in kilocycles and an-
nouncement of next frequency.
2 minutes—Time allowed to change to next frequency.

W0XKAN: Elgin Observatory, Elgin National Watch
Company, Elgin, Ill., Frank D. Urie in charge.
W6XK: Don Lee Broadcasting System, Los Angeles,
Calif., Harold Perry in charge.

Say You Saw It in QST — It Identifies You and Helps QST
Practical television has been pioneered by American Television Institute. Special machines designed by Mr. V. A. Sanabria have already given practical demonstrations in many cities of the United States.

The illustration shows the interior view of one of the new pieces of television equipment. It is significant that wherever dry batteries are used, these batteries have been made by Burgess. Here again scientists depend on the name Burgess — a name that has always stood for the greatest service and greatest economy in this field.

You, too, will find greater satisfaction, lower over-all costs when you specify Burgess portable power.

BURGESS BATTERY COMPANY
Freeport — — — Illinois
NEW NATIONAL MODEL NC-80X
ONLY
$88.00
Cash Price
(Complete with Tubes, Crystal Filler, 8" P.M. Speaker Chassis)

Ten Tubes . . . 2 Watts Undistorted Output . . Frequency Coverage Continuous from 450 kc. to 30 mc. New I.F. Amplifier . . . Selectivity Continuously Variable between 400 cycles and 5 kc . . . Multiple Scale Dial of the full-vision type. Uses a mirror for overcoming parallax . . . For further information see the manufacturers own ad in this issue of QST.

MODEL NC-81X — Special Amateur Model
The NC-81X is a special amateur model with plenty of band spread. Has the same features as NC-80X but covers the following bands ONLY: 1.7-2.0 mc., 3.5-4.0 mc., 7.0-7.3 mc., 10.0-14.4 mc., and 26-30 mc. Price and payments same as above.

1938 HALLICRAFTER SUPER SKY RIDER
ONLY $123.00
Cash Price
Complete with Tubes, Crystal and Speaker


Model NC-100—Complete with tubes and speaker in cabinet.
$129.00 $24.00 $18.80 $12.50 $9.47

Model NC-101X—Complete with tubes, crystal and speaker.
$135.10 $20.10 $17.40 $11.70 $8.60

Model HRO with tubes and coils.
$179.70 $29.70 $24.74 $18.83 $13.45

Model HRO with tubes, coils and power supply.
$195.60 $35.60 $27.54 $20.10 $14.77

Hammariind Super Pro complete with tubes, crystal and 8" speaker.
$235.70 $44.70 $32.50 $24.70 $18.50

AGR-155 complete with tubes and built in speaker.
$74.50 $14.50 $10.00 $7.30

AGR-111 complete.
$189.50 $39.50 $26.14 $18.83 $13.45

RME-69 complete with tubes, crystal and speaker in cabinet.
$151.20 $26.20 $19.54 $14.77 $11.25

Hallicrafter Ultra Sky rider with tubes and crystal. Speaker $12.00 extra.
$114.50 $19.50 $16.90 $11.37 $8.59

NEWARK ELECTRIC COMPANY
226 W. MADISON ST. Dept. Q CHICAGO, ILL.
NEWARK is proud of the fact that they are one of the leaders in the sales parade with the "Sales Champion" Taylor Tubes. "More Watts per Dollar" apparatus is what Newark recommends—in tubes and all other amateur Radio Equipment. Our new 1938 catalog, now ready for you, has the most complete listing of both standard lines and hard-to-get gear. . . . Send for your copy today! Remember Newark does not know what a "back-order" is! You get Four Hour Service, every time! Order your Taylor Tubes from Newark. Always a complete stock!

TAYLOR TUBES SALES CHAMPIONS

<table>
<thead>
<tr>
<th>Part</th>
<th>Description</th>
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<tr>
<td>T-125</td>
<td>THE NEW CARBON TANTALUM</td>
<td>$13.50</td>
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<tr>
<td>T-20</td>
<td>Real Power at low cost</td>
<td>2.45</td>
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<tr>
<td>TZ-20</td>
<td>Zero Bias—70 Watts Audio</td>
<td>2.45</td>
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<tr>
<td>T-55</td>
<td>Still the Big Champ</td>
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<tr>
<td>T-200</td>
<td>The Powerhouse Tube</td>
<td>21.50</td>
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<td>203Z</td>
<td>300 Watts Audio—Zero Bias</td>
<td>8.50</td>
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<tr>
<td>822</td>
<td>600 Watts Audio</td>
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<tr>
<td>866</td>
<td>Outsells all others</td>
<td>1.50</td>
</tr>
<tr>
<td>866 Jr.</td>
<td>New and popular</td>
<td>1.00</td>
</tr>
</tbody>
</table>

FREE!
Get your own Call Letter Lapel Pin from NEWARK's. Let us serve you on the Taylor Tube's Lapel Pin offer. See Taylor's ad in this issue for full details.

WRITE NOW! FREE!
TAYLOR TUBE MANUAL
and
NEWARK'S 1938 CATALOG
Radio Control of Model Aircraft

(Continued from page 18)

would produce that effect, "straight" being then required to centralize the rudder. The scheme is practical enough but there is the possibility that the pilot would become confused in somewhat the same fashion as he invariably does when using a straight key. It is all simple enough when the machine is flying fairly close and when the rudder movements can be seen. It is a different matter, though, when the ship is a quarter of a mile away and making an up-wind turn. In such a case the response to the rudder movement may be relatively slow and there is always the feeling that the mechanism has failed.

BUG ELIMINATION

After getting what appeared to be perfect operation of this equipment in the workshop, we proceeded with the installation in the plane. The receiver was built in a rectangular aluminium frame and lent itself readily to "shock-proof" mounting—a heavy rubber band being used from each corner of the frame to some members in the fuselage. Then began a series of preliminary experiments, hand-launching the machine for a glide of a few hundred yards. Within an hour we had decided that we should have made the equipment ten times simpler. We began to appreciate the difficulties that some of the fellows must have bumped into with complex selector switch multicontrol systems. The first problem was that in landing one or more of the tubes would usually be bumped out of existence. Then, a couple of severe cracks (the plane hitting a tree) told us the story. In both cases the receiver was substantially demolished and in addition the batteries were pushed through the front of the fuselage and the control equipment wrecked. It appeared that our fancy shock-proof mounting permitted the receiver to plunge forward as the plane hit, pushing the battery supply out the front then recoiling to wreck the remaining apparatus. Promptly, the shock mounting was dispensed with and the receiver built on a small piece of plywood screwed to the bottom of the fuselage. From that time on the machine has suffered equally severe crashes without a tube being broken and usually without the receiver even being knocked out of tune. But the problem of microphonic tubes then reared its head. The shock of the escapement releasing proved sufficient, with most 30-Type tubes, to generate an additional pulse of plate current, so messing up the whole works. This difficulty has been cured simply by selecting tubes which have the least microphonic effect. Doubtless, some almost rigid shock mounting for the detector tubes would provide a complete solution. But we are still a little afraid of shock mounting.

An almost infinite number of problems arise in the design of the plane and in its handling but these are beyond the scope of this story. We will admit, though, that the business of learning to fly on the ground, even with nothing other than a
These are the qualities essential in a good ceramic insulator—not one or two, but all of them. Isolantite*, possessing all the essential qualities, in addition to many other desirable characteristics, is the choice of the foremost manufacturers of radio transmitting and receiving equipment supplied to commercial radio systems and to the United States Government for military and naval use.

*Registered Trade-name for the products of Isolantite Inc.

Isolantite ceramic insulators are also available to the amateur. To be sure of getting genuine Isolantite, patronize reliable dealers and ask for the products of leading component parts manufacturers.

Cardwell announces General Electric Mycalex as standard insulation on all "T", "X" and Midway condensers. Another step ahead to bring to the host of Cardwell users an H.F. insulation of recognized electrical attributes.

- **XG-110-KD**
  
  110-110 mfd., 1711 air-gap, 3000 V rating, for P.P. tanks.
  
  Typical of the new "X" frame units now supplied with G.E. Mycalex and furnished with mounting brackets for chassis mounting.
  
  **Amateur's Price**
  
  Net $10.80

- **MT-150-GS**
  
  Midway Featherweight 16-150 mfd., .070" air-gap, 3000 V peak flashover, G.E. Mycalex Insulation and aluminum mounting ft. for chassis mounting, now standard equipment.
  
  **Amateur's Price**
  
  Net $3.60

- **ES-4-SDI**
  
  Dual trim air midde H.F. ganged neutralizer. Two 1.5-4 mfd. 4500 V sections, completely insulated from each other.
  
  **Amateur's Price**
  
  Net $2.46

- **ET-30-AD**
  
  Dual trim air, 4-30 mfd. for section, .070" air-gap, 3000 V for U.H.F. P.P. transmitters.
  
  **Amateur's Price**
  
  Net $2.96
  
  Also available with same insulated coupling as ES-4-SDI, as ganged neutralizer for P.P. $101's.
  
  **Amateur's Price**
  
  Net $2.46

Ask your dealer for new handy bulletin listing hundreds of variable condensers and accessories for all types of transmitters and receivers, and our new catalog No. 40 free for the asking.

Watch Cardwell ads for new and interesting items you have long needed.

LAUNCHING THE SAILPLANE FOR A GLIDE TO THE VALLEY

Normally the ship is winch-towed to a hundred feet or so before being released. In this particular instance we have a hand-launched kick-off. Hull, in the foreground, has run with the ship as fast as he could lick, then launched it with an almighty shove. At the moment he is busy putting on the brakes.

that demands a very special order of skill and, we know, simply cannot be done without a great deal of practice. But it all adds up to a most extraordinary field for experiment and one for which we can see a grand future.

**FUTURE DEVELOPMENT**

This crude one-control may seem rather primitive to the fellow who has no difficulty in getting a five-stage transmitter to bend to his will. And it may not fulfill the requirements of the model plane experimenter who insists on a full set of controls. It is, though, an excellent first installation for even the most advanced plane builders.

Getting completely reliable and precise operation of nothing more than a rudder is a job full of problems. Acquiring the necessary judgment to use it effectively on even a gas plane (let alone a sailplane) is still tougher.

Before long we will certainly duplicate the rig for elevator control or fix some sort of audio filter to allow the use of a single channel. Possibly, others have already done the job successfully.

Naturally, we are eager to swap ideas with other workers in this field. Somehow or other we hams have to lick the thing.

THE ALLEN D. CARDWELL MANUFACTURING CORPORATION
83 PROSPECT STREET, BROOKLYN, NEW YORK
THIS year, again, the Bowdoin-Kent Island Expedition chose AMPEREX tubes. And again we received their relayed message (reproduced above).

".... using five Amperex tubes with great success"

Thank you, Mr. Gross, and thank you, members of the expedition... we are always pleased to hear such fb reports that confirm the wisdom of an Amperex policy that is based not upon "how many tubes can we sell" but "how well will they work." Amperex tubes must give superior performance... must last longer... and must operate economically.

AMPEREX ELECTRONIC PRODUCTS, INC.
79 WASHINGTON STREET
BROOKLYN, NEW YORK
With European Amateurs on the Bucharest C.C.I.R. Trip

(Continued from page 16)

luncheon at which Mme. August was our hostess, we began an extended discussion of I.A.R.U. matters, particularly with regard to more effective distribution of information among the I.A.R.U. societies and the achievement of the proposed expansion of the 7-Mc. band in the Cairo proposals of the French government which was brought about by the splendid work of the R.E.F. Later that day we made a flying trip to F8EF's summer home outside of Paris, at Pomponne, where his station is located. Here we attempted to keep a schedule with W1EIU but were thwarted by a local thunderstorm which made 14-Mc. reception impossible.

After a rapid drive back to Paris we were received at the home of Mr. Barba, president of the R.E.F., where mutual formal greetings were exchanged and where we each recorded a short statement for subsequent distribution to the society's members throughout France. In the evening of the same day the R.E.F. gave an official dinner at which Mr. Barba, F8LA, presided and at which representatives of the Belgian national society, Lieutenant Guy de Borchgrave, ON4ID, president of the R.B., and Mr. Marcel Dupuis, ON4EY, were also guests. Thus our Paris visit gave us the opportunity to meet representatives of both the R.E.F. and R.B. to discuss Union matters. ON4ID, who is an officer in the Belgian army, had made the air trip to Paris that day for the particular purpose of seeing us and flew back to Brussels that same night.

Discussions with the French amateur officials revealed more clearly the advances recently made by the R.E.F. in furthering amateur recognition by the French government and emphasized the evidence of this improvement in obtaining the 7-Mc. band proposals by the government administration. President Porchgrave of the R.B. explained to us the progress which had been made in Belgian amateur affairs, especially the improved unification of the two amateur groups which had just been accomplished. We, in turn, reported on the international picture as revealed in the conference at Bucharest and discussed with them the various aspects of possible future development.

The following day, Saturday, was devoted to a rapid inspection of the Paris exposition and the interesting 120-kw. regional broadcast transmitter at Villebon. This transmitter employs the latest evidence of this improvement in obtaining the 7-Mc. band proposals by the government administration. President Porchgrave of the R.B. explained to us the progress which had been made in Belgian amateur affairs, especially the improved unification of the two amateur groups which had just been accomplished. We, in turn, reported on the international picture as revealed in the conference at Bucharest and discussed with them the various aspects of possible future development.

The following day, Saturday, was devoted to a rapid inspection of the Paris exposition and the interesting 120-kw. regional broadcast transmitter at Villebon. This transmitter employs the latest version of the "out-phasing" system of modulation, developed by H. Chireix, in which high-efficiency linear amplification is obtained in the final stage. Dinner that evening with Messrs. August, Aubry, Tiffenau and Mme. Aubry ended a busy day.

A "QSL"

TO "HAMS" WHO SOMEDAY WILL WORK HAND-IN-HAND WITH BENDIX IN THE ADVANCEMENT OF RADIO

SOMEDAY the name BENDIX will play a mighty important part in your Radio career. Whether your goal lies in the laboratory, maintenance, or operation, you will find the way made easier with the accurate, dependable aid of Bendix Radio products. The technical and manufacturing resources of the Bendix Radio Corporation are constantly developing new ways . . . better ways to make radio circuits and communications more accurate . . . dependable . . . and convenient.

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Since the beginning of this year alone, UNITED Type 966 rectifiers have been purchased by thousands of new users. The obviously better design of this tube is rapidly attracting the preference of well-informed amateurs the world over. We believe UNITED is the fastest selling tube of this type on the market right now.

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Interchangeable with 866 tubes of all makes

**UNITED ELECTRONICS CO.**
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---

LONDON AND THE R.S.G.B.

A relatively short train-ferry trip from Paris to London was a welcome relief after the longer and more uncomfortable journeys across the continent and back. Leaving us refreshed and eager for our first meeting with the G’s shortly after our arrival Monday morning. Before noon we were at the R.S.G.B. headquarters in the office of Jack Clarricoats, G6CL, secretary of the society and editor of the T & R Bulletin. After luncheon with Jack Clarricoats, Arthur Watts, and Art Milne, we participated in an all-afternoon session with the R.S.G.B. Council in which the proceedings of the Bucharest conference were reviewed, the results reported and relations between the R.S.G.B. and I.A.R.U. with reference to Cairo were discussed.

That same evening we were tendered a complimentary dinner by the R.S.G.B., over which President E. D. Ostermeyer, G5AR, presided, with a number of other well-known figures in British amateur affairs in attendance. These included G6CL, G6UN, G6NF, G2TI, G2MI, G6OT, G6UT, G5QF, G6WN, G2UJ, G2WV, G2NH and G6WY. With everyone speaking English, participation in the discussion was more general than had been possible in our previous meetings where other languages prevailed, and the whole gamut of amateur topics, from serious to comical, made an interesting and happy evening fly quickly. We told them of the pleasant times we had had with our amateur friends in the countries we had visited previously and pointed out that the friendly amateur spirit which we found to prevail in England was exactly the same as we had found it with the hams in Germany, Roumania and France.

The following day, June 15th, was given up to visiting representative amateur stations, including G2MI, G6WY, G6NF, and G2IG. Although English-made equipment predominates, we were surprised to find a goodly percentage of American-made apparatus, including transmitting tubes and at least one American receiver. Even in England, as we had also found in the other countries, the supply of commercially available amateur parts is restricted in variety, as compared to what we have over here, principally because English manufacturers do not seem to be interested in meeting the demand which unquestionably exists. This was emphasized to me by Mr. Hugh Pocock, editor of Wireless World, with whom we had an interesting visit in his offices before we left London. He explained that the attitude of British manufacturers toward supplying parts especially designed for amateur and experimental use made the development of circuits a pretty difficult problem. Possibly because of the nominally experimenter status of British amateurs, as established by government regulations, the equipment is largely of the open-construction experimental type, although there is a tendency
Delco-Remy Model 961-N high-output generators, specially designed to furnish extra current for added electrical accessories on pleasure cars, also assure a fully charged battery for quick winter starting. As much as 26 to 28 amperes can be delivered by this low-cost generator whenever it is required—even at high driving speeds. This high output also meets the demand for the extra current requirements of amateur radio transmission.

The Model 961-N generator is complete with current and voltage regulator, wiring, and all necessary attaching parts. The Delco-Remy regulator controls the voltage at the battery, preventing battery overcharging and excessive voltage within the electrical system—and it does not cause radio interference.

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in present designs toward the rack-and-panel construction of more “commercial” appearance.

The evening after our round of visiting stations was spent at the home of Mr. Arthur Watts, G6UN, where we enjoyed a real English dinner with our host and Mrs. Watts, and later established contact with W1EH. This QSO gave Arthur’s new and practically unused transmitter a real workout with four or five different operators taking turns at shooting signals at “KB” in West Hartford. The next evening we had another QSO from Art Milne’s station, G2MJ, which, unfortunately, we had to cut short slightly before midnight in order to catch the last train back to London.

The remaining days of our visit, awaiting the sailing of our ship, were spent in studying the latest technical developments in British transmitting and receiving equipment, including television. There has been so much said recently both in the newspapers and the popular radio magazines reporting on the present status of British television that it should be hardly necessary to go into great detail here. The present system is based on the American technique of electronic camera pickup for transmission and cathode-ray tube reproduction in the receiver with a 405-line picture. Considerable progress has been made in the televising of different types of programs, including out-door events, largely because the service has been running daily on regular schedules and there has been, accordingly, greater opportunity for actual field testing to supplement laboratory investigation. Needless to say, we found the picture reproduction excellent and the programs really entertaining. We also became acquainted with the details of incidental technical developments which are now being put to good use in the evolution of the amateur television series which QST is inaugurating.

Despite these few days of diversion from amateur contact, we did not leave England without returning to amateur affairs. Before sailing we joined Arthur Watts and Jack Claricoats in a final “clean-up” session to discuss further plans for the immediate future with particular reference to Cairo; and the morning we left we found that we still were not forgotten. Arthur and Jack were at the boat train to see us off and as a parting memento we were presented with two real English roses which Mrs. Watts had picked from her garden for us that morning. As the President Roosevelt pulled out of the harbor at Southampton, we realized that here, too, we had found the truest evidence of real amateur spirit.

* * * * *

There is no doubt that these visits with European amateur groups, made possible by the trip to the C.C.I.R., have served to further international solidarity and to promote a better understanding than could be achieved by an infinite amount of correspondence and communication over the air. The International Amateur Radio Union plays a far greater part in our individual existence than might be indicated by the several pages devoted to it each month in QST. Amateur
An ad for Centralab volume controls.

Says Mr. Owen O. Tressler...

"I have used Centralab volume controls for the past three years, and FIND THEY CANNOT BE EQUALLED. Not only are they quiet in operation, but they FIT the sets they are built for."

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RESULT: Many more calls for our men than we are now able to supply!

As an amateur you have an invaluable advantage in favor of early employment. But we have found from experience that the average "ham" is inclined to be skeptical of such optimism. WE WELCOME THE STRICTEST INVESTIGATION. This "checking" has rewarded several "hams" and it can be to your advantage, too.

Some of the more active and widely known "ham" operators who have joined their radio experience with Midland training include:

W9LHQ
W9YCT
W9HON
W9IQI
W9DFY

These hams, together with many others, are already employed in fine, highly respected, responsible positions with leading U.S. airlines.

If you are between 18 and 30, have a high school education, are free of uncorrected physical defects, and really like radio operating, it will be to your advantage to get in touch with Norm G. Souther immediately. Write or wire

NORM G. SOUTHER
MIDLAND TELEVISION, INC.
(Midland Broadcasting Company Affiliate)
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KANSAS CITY, MISSOURI
Some years ago a brilliant scientist achieved success in producing a perfect synthetic imitation of a hen's egg. The texture, color and chemical components of the white, yolk and shell were perfect. But the egg wouldn't hatch. The chemist could never know the hidden secret—the way to make an egg fertile, to give it that magic spark of life. Eimac Tubes (like the egg) cannot be duplicated.

No less than six manufacturers have tried in vain to duplicate their performance. They have copied the physical appearance of Eimac Tubes. Some are using tantalum, too, but not one can duplicate the Eimac application of this superior metal. The hidden values—the invisible features of Eimac Tubes are what give them the power to stand up under intense heat, carry an unusually heavy extra load and allow you to "sock" the ether waves with terrific jolts.

The success of Eimac is notable in the industry. Introduced only three years ago, thousands of "Hams" in every part of the United States and abroad, are enthusiastic users of Eimac Tubes. If a nearby distributor cannot supply you, write us for information.

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EIMAC TUBES

EITEL & McCULLOUGH, INC. • San Bruno, California
THE STAGE SWITCH

The stage switch is a standard item having three gangs, each with six contacts (this seems to be the minimum number of contacts available on gang switches without going into special designs). Since only three contacts per gang were needed, the alternate contacts were removed, thus giving greater spacing and reducing capacity effects. The gang nearest the panel connects to the first 6N7G grid; that nearest the back of the set connects to the 807 grid. Although longer-than-normal leads are unavoidable in a switching circuit of this kind, this arrangement gives the highest frequencies the benefit of the shortest leads. It has worked out very well in practice.

TUNING AND ADJUSTMENT

Operation is quite straightforward. Coils for consecutively higher-frequency bands are plugged in at L1, L2 and L3; only five are necessary for operation with any crystals from 1.75 to 7 Mc. and for output from 1.75 to 28 Mc. For example, with 3.5-Mc. crystals, the 3.5-, 7- and 14-Mc. coils would be plugged in at L1, L2 and L3 respectively. For 1.75-Mc. crystals, the 1.75-, 3.5- and 7-Mc. coils would be used, and so on.

To tune up, first open the plate circuit of the 807 by inserting an open-circuited plug in the plate jack, J4, or taking out the plate coil, L4, and apply bias and plate voltage. With the switch in the lower position in Fig. 1 (all tubes in use) and the meter plug in J1, turn C1 until the familiar oscillation dip occurs. The plate current should drop from about 40 ma. to approximately 20 ma. Move the meter plug to J2 and adjust C2 to resonance (minimum plate current), then move the plug to J3 and repeat. In both cases the off-resonance plate current should be around 50 or 60 ma. and in-resonance about 20 to 25 ma. The last adjustment should be made quickly and the plate power then shut off, to avoid overheating the 807 screen. With the appropriate coil at L4, the meter plug may then be inserted in J4, plate voltage applied and C4 adjusted to resonance. Unloaded minimum plate current on the 807 will range between 10 and 15 milliamperes, depending upon the frequency and the coil in use. Remember that each coil covers two bands, so that if the 807 is excited on the frequency to which the plate circuit is resonant with near-maximum capacity, the condenser can simply be swung to the other end of the scale for doubling. Minimum plate currents when doubling of course run higher than when amplifying straight through, but should not exceed 25 or 30 ma. even on 28 Mc., where the tank losses are highest. In every case the tube can be loaded to about 100 milliamperes.

Fixed bias is used with the 807 for two reasons. First, the plate current is held down in case excitation is lost, and second, fixed bias stabilizes the tube. Despite shielding, the high power sensitivity of the tube causes it to go into oscillation very readily. Rather than go to elaborate shielding, it seemed to us simpler to use a little fixed bias. Bias of the order of 50 volts, which brings the plate current without excitation down to about 40 or 50 ma., is sufficient for stabilization; the 100 volts indicated on the diagram is almost,
TOUGH!

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They'll Stand the Overloads!

- Moisture Proof
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- Non-porous Ceramic Core

HERE are Heavy Duty wire wounds that are really built to take it! Tough as a rhino — dependable as the North Star — durable as only years of research by the world's leading resistance specialists can make them!

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Made in a complete line of fixed and adjustable types. Write for IRC Resistor Catalog 41.

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Makers of Resistance Units of More Types, in More Shapes, for More Applications Than Any Other Manufacturer in the World

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Cable Connectors

Don’t spend minutes of valuable time tracing wiring to find "which wire goes to what" when connecting your receiver to its power supply.

Don’t take chances on burning out valuable equipment by making incorrect connections between the chassis of your rack and panel transmitter or P. A. system. Save time and effort when hooking-up your portable equipment.

Use Yaxley Cable Connectors for the instant connecting or disconnecting of any apparatus. The receptacles and plugs are polarized to prevent incorrect insertion.

Available in both 7-wire and 12-wire types, complete with cable or separately as desired. The prices are reasonable. Ask your distributor to show you Yaxley Cable Connectors—or write for details.

P. R. MALLORY & CO., Inc.
INDIANAPOLIS INDIANA

Modernizing the Simple Receiver

(Continued from page 88)

The amplifier from radio frequency currents flowing in the detector circuit. A second r.f. choke, in series with the screen, strengthens oscillation by discouraging attempts of r.f. currents to flow from the screen back into the regeneration.

COIL TABLE

<table>
<thead>
<tr>
<th>Coil</th>
<th>Band (Mc.)</th>
<th>Winding Length (Inches)</th>
<th>No. Turns</th>
<th>Cathode Tap Turns</th>
<th>Wire</th>
<th>Tuning Range (Kc.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1</td>
<td>1.7</td>
<td>11/4</td>
<td>90</td>
<td>No. 23 d.c.</td>
<td>1100 to 2030</td>
<td></td>
</tr>
<tr>
<td>L2</td>
<td>3.5</td>
<td>15/3</td>
<td>35</td>
<td>No. 24 d.c.</td>
<td>2900 to 7050</td>
<td></td>
</tr>
<tr>
<td>L3</td>
<td>7</td>
<td>15/2</td>
<td>16</td>
<td>No. 21 d.c.</td>
<td>7000 to 12000</td>
<td></td>
</tr>
<tr>
<td>L4</td>
<td>14</td>
<td>7/2</td>
<td>7</td>
<td>No. 21 d.c.</td>
<td>10,000 to 15,400</td>
<td></td>
</tr>
</tbody>
</table>

All coils are close-wound on 1-inch diameter forms. Cathode tap turns are counted from the ground end of each coil.
Again, the RME-69 Receiver is proving its reliability in difficult situations... in remote places where human lives depend upon the maintenance of uninterrupted communications... where continuous, trouble-free performance is a vital factor.

Write for Bulletin 69
These all-porcelain rheostats provide close, accurate, primary voltage control that prolongs the life of transmitting tubes and keeps them operating at peak efficiency. They are built entirely of porcelain and metal, with no organic material to smoke or char. Model H, J and K are rated at 25, 50 and 100 watts respectively and can be furnished in a variety of resistance values. Bulletin 107 explains how to select the proper size.

RESISTORS

Brown Devils are wire wound, vitreous enamel covered units of the finest possible construction. The vitreous covering offers better protection against moisture and acid fumes than any other material. Insist on "Brown Devil" and avoid breakdowns.

DIVIDOHMS

These adjustable resistors can be quickly adjusted to any desired resistance value by means of a ball-pointed adjustable lug. A patented scale makes resistance reading possible at a glance. Excellent for experimental work.

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A suitable amount of output is delivered from the 6CS triode amplifier used, as explained before, to permit battery operation. If a.c. power supply operation is contemplated, output may be further boosted by replacing the triode with a pentode. This has been tried, the 6F6 being the particular tube used. Very few changes are required to make the conversion—voltage feed to the screen and a new cathode resistor doing the job, as shown in Fig. 2. However, for a dual purpose receiver—that is, battery and also a.c. operation—the 6CS triode is the better tube. Its current drain is well below that of any pentode and it does work satisfactorily when used in conjunction with a 250-volt power pack.

Filaments of both tubes are connected in parallel and heated with a 6.3-volt filament transformer, the center tap of which is grounded to reduce hum. For portable work the heaters will of course be supplied from a six-volt storage battery, the alternative connection of which is indicated in Fig. 1. Voltages ranging from 135 to 250 volts may be used on the plates, the best values being 180 volts for battery work and 250 volts when used with rectified a.c. power supply.

THE COIL ASSEMBLY

Three of the four coils are wound with No. 24 d.c.c. wire, while the fourth, the 1.7-Mc. coil, is wound with No. 28 d.c.c. The forms in each case are made from 1-inch bakelite tubing. The Coil Table specifies the length of the windings, the number of turns, and placement of the cathode tap. Two holes that will pass No. 14 tinned wire are drilled at each end of the form. When the tinned wire is threaded through these holes and bent over to form a clasp, we not only have points at which to start and end the windings but also means of mounting the coils on the switch. The cathode taps are most easily made by making a loop in the wire at the right place, scraping the insulation from the loop, and then twisting and soldering to add firmness, after which the winding is continued in the same direction. To the front circuit. $L_2$, $R_5$ and $C_5$ act as the audio coupling unit.

![Fig. 2-A Pentode Audio Amplifier May Be Substituted for Greater Output with A.C. Power-Pack Supply](image-url)

A choke-condenser output circuit protects the 'phones from the heavier plate current flow. The condenser should be of the paper type, rated at 400 volts and of 0.1 to 1 µf. capacitance. The choke may be a 30-henry 50-ma. type. Except for the 500-ohm 1-watt cathode resistor, other parts are the same as given in Fig. 1.
BUY that NEW RECEIVER from
GROSS RADIO RECEIVER HEADQUARTERS

ALL SETS IN STOCK FOR IMMEDIATE DELIVERY — LIBERAL TRADE IN ALLOWANCES

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Hallicrafter S-15 Challenger ..................................................... 60.50
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NEW! CB-55
MODERATELY PRICED
RADIOPHONE TRANSMITTER
FB. FOR 30 MC.

NEW! CW-55—uses 2-T20 tubes FB. for 30 MC.
Max-Output—70 watts
42 osc., 6L6 Buffer
2-T20's amp.

New: L60 Beam Power (60 Watt) Modulator

- 4 stages (1-6J7, 2-6CS, 2-70, 2-6L6, 1-45, 1-81)
- Push Pull second stage and driver for high fidelity
- Two channel, high and low gain high impedance inputs
- Built-in modulation transformer
- Fixed bias

This beam powered 60 watt modulator will 100% plate modulate transmitters with up to 120 watts input. The built-in modulation transformer will match R.F. loads of 5000, 8000, and 10,000 ohms. On special order we can supply this unit with output impedances of 4, 15, 500 ohms for general public address work.

A two channel input permits full output with mixing from a crystal, ribbon or carbon mike. The tone control provided is used to attenuate voice or music frequencies to suit the requirements of best modulation. Chassis size: 19" x 11" x 4½". Weight 50 lbs. Built-in extra heavy duty power supply.

Completely wired and tested in our lab., less tubes .................................................. $42.50
Matched set of Sylvania tubes .............................................................................. $6.50

NEW! "THE STANDBY" (2 TO 2000 METERS) 3-TUBE A.C. AND D.C. RECEIVER

This excellent 2 to 2000 meter receiver is offered with full realization of the present-day need of the amateur for a dependable "standby" receiver which will cover practically all of the radio bands in use today. Super regeneration, which is the most efficient form of detection at these frequencies, is used from 2 to 15 meters. The R.F. stage is effectively used over the entire tuning range. Throughout the entire tuning range, there are no skips or dead spots. Loud speaker volume is available from practically every station received.

- 1000 to 1 tuning ratio
- Super regeneration below 15 meters
- Automatic change over from straight to super regeneration
- Power supply incorporated
- Metal cabinet ........................................... $1.50

Complete kit of parts, less coils, tubes, cab .. $7.59
2-5 to 10 meter coils (set of 4) .................. 15-200 meter coils (set of 4) .................. 310-550 meter coil .................. 500-1000 meter coil .................. 1000-2000 meter coil .................. 60

Kit of three tubes 2.40
Wired and tested in our lab., add. 2.00

WRITE IN FOR FREE NEW CATALOG ON HAM AND P.A. EQUIPMENT

GROSS RADIO, INC., 51 VESEY STREET, NEW YORK CITY

Say You Saw It in QST — It Identifies You and Helps QST 79
section of the switch goes the common grid lead and to the other section goes the cathode lead. The coils are mounted with the cathode and grid leads going to their respective switch contacts. No. 14 wire is used to bring a lead from the grounded rotor plates of the condensers to the ground ends of the coils. Heavy wire should really be installed whenever advised and shown in the pictures; otherwise, a frail coil assembly will result. Unless the construction of this unit is as rigid as possible, operation and handling of the receiver will cause shimming or shifting of the coils, upsetting any hope of stability.

General coverage of the combined four coils is from 1160 to 15,400 kc. Band-spread is so arranged that the 1.7-Mc. band covers just exactly the entire scale of the dial. The c.w. portion of the 3.5-Mc. band is also spread over the entire scale with the ‘phone section of the same band requiring a small resetting of the band-set condenser. Both the 7- and 14-Mc. channels are allotted approximately fifty divisions of the dial.

All in all, this is not a bad little set to have around. Don’t let its size, quantity of tubes, or inexpensiveness lead you to think that it doesn’t deliver a sock, for signals have been copied from it while standing a good 25 feet from the ‘phones. And remember that suggestion about emergency utility. You know that when the need arises, a transmitter can be thrown together in a matter of minutes. But the receiver—well, that’s another story!

DX Contest Results

(Continued from page 86)

Mc. . . . Spanish ‘phone stations working in the 7-Mc. band engaged in War activities caused much grief for other Europeans. . . . Handicaps encountered by various contestants included a snowstorm and hurricane in Belfast during the last few days of the contest; G16TK’s skywire came down from the 70-foot tree where it was fastened, and he had to put it up again as best he could—about 7 feet; he had to scrape ice several inches thick off the antenna two or three times a
Rebuilding or Just Starting In

THE INFORMATION WILL BE FOUND IN

THE RADIO AMATEUR'S HANDBOOK

* FOURTEENTH EDITION *

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American Radio Relay League, West Hartford, Conn.

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TEMCO
350 TRANSMITTER
FULFILLS PRESENT
DAY OPERATING REQUIREMENTS
WITH AMPLE POWER AND
MULTIFREQUENCY FLEXIBILITY

- 5 Band Switching Exciter Unit
- Over-Abundance of Excitation
- High Efficiency on All Bands
- High Fidelity Transmission
- Remote Control
- Unsurpassed Workmanship

Standard tubes are used exclusively in the circuits of all Temco Transmitters.

Illustrated literature covering the Temco "100", "350", "600", and "1000" sent on request. Please indicate your power requirements.

The 'Phone Section

In the C.W. contest the leading accessory was "wrist oil." In the 'Phone fray it was "cough drops!" The first 'phone DX Contest to be incorporated in an A.R.R.L. International Competition was a decided success. There was plenty of activity, and even the skeptics who didn't think they would like a 'phone DX contest must now admit it was plenty of sport. The leading operator in number of QSO's, W4AH, made nearly as many contacts as the C.W. leader—W4AH made 267 QSO's; W2UK (C.W. leader) 268 QSO's. This will give some idea of the extreme concentration of signals in evidence in the DX 'phone bands during the contest!

Highest W/VE scorer was Robert Henry, W9ARA, who "did the honors" to the tune of 45,445—253 QSO's on 14 and 28 Mc. with 42 different countries, a multiplier of 61. OM Henry operated almost the full time, 89 hours, 47 minutes, using 808's in the final with 1-KW input. Nice work, OM. Gang, a toast to W9ARA!!

A reasonably close second was T. C. Wood, Jr., W4AH, who made 257 contacts with 35 different countries, a total of 45,064 in 69 hours. W4AH ran 1 KW, to a pair of 150T's in parallel, making contacts on three bands (3.9, 14 and 28). FB, TCW.

Madison Rehm, W2HNY, operating W2UK placed third with 39,753, based on 381 QSO's with 44 different countries. P.P. '52's were used in the final with 550 watts input. This, like the other high scores, represents plenty of jaw exercise. A striking thing is that, unlike many lower scorers, not one of the three high complained of a "sore throat"! They can take it.

Other high scorers include: W3EMM 34,574; W2JME 32,147; W1SZ 28,594; W4CBY (W4DHZ, opr.) 26,235; W6ITH 21,924, W3AIR 19,950 and W6DKU 19,551.

The highest scorers in each W district: W1SZ 28,594; W2UK (W2HNY, opr.) 39,753; W3EMM 34,574; W4AH 43,064; W5BEE 15,480; W4ITH 22,836; W7AO 6989; W8GLY 18,258 and W9ARA 45,445. Highest VE: VE2FK 5056.

High in number of QSO's are: W4AH 257; W9ARA 253; W2UK 211; W3EMM 198; W2JME 177; W6ITH 173; W1SZ 165; W4CBY (opr. W4DHZ) 165; W2MJ 160; W2IXY 158;

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More GRID-MODULATED POWER OUTPUT from the HK-154

Compare GAMMATRON before
YOU BUILD YOUR RIG — AND GET THE MOST FOR YOUR MONEY!

LOW COST UHF TUBES

<table>
<thead>
<tr>
<th>Type</th>
<th>Rated Plate Power</th>
<th>Grid Modulated Power</th>
<th>Price</th>
<th>Carrier Watt</th>
</tr>
</thead>
<tbody>
<tr>
<td>154 GAMMATRON</td>
<td>50/70*</td>
<td>$12.50</td>
<td>5.6</td>
<td></td>
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<tr>
<td>Tube A</td>
<td>100/54</td>
<td>$13.50</td>
<td>4.0</td>
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<tr>
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<tr>
<td>Tube C</td>
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<td>Tube D</td>
<td>50/22</td>
<td>$10.00</td>
<td>2.2</td>
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<tr>
<td>Tube E</td>
<td>35/19</td>
<td>$8.00</td>
<td>2.4</td>
<td></td>
</tr>
</tbody>
</table>

* The Type 154 GAMMATRON is ideally suited to grid modulation. Because of its high overload capacity, conservative plate rating and its low amplification factor, the HK 154 far outstrips its competitors in the same price class for this purpose. Because of its characteristics and because a release of plate supply power takes place during peaks, linear grid modulation is possible at efficiencies in the order of 50% with the HK 154; with other tubes of higher mu, efficiencies greater than 30 to 40% are unattainable. Complete information on just how this can be done is yours for the asking.
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IN THIS CASE
IT IS USED
TO CALL YOUR
ATTENTION,
TO THE FACT
THAT YOUR
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THE AMERICAN
RADIO RELAY
LEAGUE
ASSURES YOUR
RECEIVING
QST
EVERY MONTH,
REGULARLY.

THE BOARD OF DIRECTORS
A.R.R.L.

W4AGB 152; W6BAY 147; W5BEE 146;
W3CRG 134; W3AIR W9DKU 133 and W8GLY
130.

Highest multipliers are credited to W2UK 63;
W2JME W9ARA 61; W3EMM 59; W1SZ 58;
W4AH 56; W3CRG 54; W3PC, W4CBY
(W4DHZ, opr.) 53; W8GLY 51; W3AIR,
W4CYU 50; W9DKU 49; W4AGB 48; W1ADM,
W2CBO, W3BLQ 45; W4TO, W6ITH 44,
W9YGC 42 and W6GRX, W9BEZ 40.

HIGH FOREIGN SCORES

World high scorer in the ‘phone section was
XE2N—64,311 points, 566 QSO’s, multiplier of
39 made using 1.7-, 3.9-, 14- and 28-Mc. bands.
Operation was for 50 hours, 50 minutes.

With a score so close that it deserves a hand
almost equal to XE2N’s accomplishment comes
K6MVV in second place—63,180. He leads in
number of QSO’s—812—but slipped up on the
multiplier; he used but two bands (14 and 28)
and has a multiplier of only 26. Power at K6MV
was 58 watts, operating time 73 hours.

Third high is G6LK—36,176 . . . 355 QSO’s,
multiplier of 34. 3.9-, 14- and 28-Mc. bands were
used during 65 hours of operation. To XE2N,
K6MVV, G6LK—Congratulations!

Other scores worthy of note: VK2GU 24,096;
LU9BV 18,400, PA6WY 14,962, G5JO 13,650,
K6CGK 12,660, ON4ZA 12,408, CO2ON (CM2BJ,
opr.) 12,138, EI2J 11,406 and HK1GK 10,097.

The highest scorers on each continent: Africa—
ZU6P 8244; Asia—XU81W 82; Europe—G6LK
36,176; North America—XE2N 64,311; Oceania
—VK2GU 24,096; South America—LU9BV
18,400.

Leaders in number of QSO’s: K6MVV 812;
XE2N 566, VK2GU 368; G6LK 355; CO2ON
 opr. CM2BJ) 203; LU9BV 269; G5JO 223;
K6CGK 217; PA6WY 205; EI2J 205; HK1GK
194; ON4ZA 193; VK2ABG 185; K7PQ 162;
EI2J 160, VK3MR 157 and G2NH 155.

Highest multipliers were made by: XE2N 39;
G6LK 34; K6MVV 26; PA6WY, VK2GU 24;
LU9BV 23; ON4ZA 22; G5JO, PY2AC 21 and
EI2J, EI2L, G2NH, K6CGK, VK3MR 20.

GENERAL ITEMS

The following made contacts on 3 bands:
W1ADM, W1SZ, W2CBO, W3EMM, W4AH,
W6BAY, W6EX, W6GRX, W7AO, VE5MQ,
G6LK, K6CGK, K7PQ and PA6WY . . .

But two operators used 4 bands—W6ITH and
XE2N . . . “Yell and Listen Contest” is what
W4DCQ calls it . . . W6ITH worked a total of
66 VK ‘phones and made W.A.C. four times.

W6DKY worked 59 VK’s out of 114 he had
worked since March 25, 1936 . . . On the last
morning of the contest W4AH worked 30 VK’s
and ZL’s in 2 hours, 40 minutes . . . One of the
biggest laughs, according to W6ITH, was con­
testants trying Spanish on South Americans only
to be requested to use English! . . . On March
22d W6AM worked all continents in one night
on 14 Mc . . . W6CGQI’s serial number was
also his telephone number, so he invites any of
the DX boys he worked to give him a call when and if
PERSONALLY ENDORSED
by Chester H. Thordarson

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QST-2

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Excitation Required, 0.9 Watt
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The RK-20A is only one of a complete line of tubes designed especially for the Amateur. See your dealer or write the nearest Raytheon office for data on the RK-20A and on the new "Beam Power" RK-47 and RK-48 Raytheon Amateur Tubes.

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CONCLUSION

In a contest as successful as the Ninth International there is little left to be said after complete results have been put down on paper. And no one will question the great success of this 1937 DX Contest, both the C.W. Section and the 'phone Section. We could gripe about poor operating; there was enough of it observed during the contest. But, rather, let's each resolve to do our part to eliminate poor operating in the future.

Above all, let us zealously guard against a repetition of the flagrant off-frequency operation prevalent in this contest. If your call isn't listed in the final scores, look back in May QST and see if you were one of those operators disqualified for infringement of the regulations. In fact we refer every DX contest enthusiast to that May issue wherein By Goodman presented an interesting preliminary report on the contest (page 9) and where Comms. Mgr. Handy discussed "DX Competition Policy"; there are points given with which we should all be familiar.

How to make a winning score in future contests? Well, our suggestion is to give thought to a number of things—good antennas, good receiver, frequency flexibility, ability to change bands quickly and efficiently, break-in and push-talk, proper choice of operating hours and an all around general knowledge of good operating practice. If you get these things down pat, you'll be on the road to the top.

Scores

Ninth International DX Competition

(Operator of the station first-listed in each Section and Country is winner for that territory, unless otherwise indicated. ... Asterisks denote stations not entered in contest, reporting to assure credit for stations worked. ... The multiplier used by each station in determining score is given with the score—in the case of W/VE entrants this is the total of the different countries worked on each frequency band used; in the case of non-W/VE participants it is the total of the different W/VE Districts worked on each frequency band. ... The number of bands on which successful contacts were made is next listed. ... The letters A, B and C approximate the power input to the final stage at each station; A indicates power up to and including 100 watts; B indicates over 100 watts, up to and including 500 watts; C indicates over 500 watts. ... In cases where power was varied, this is shown by the use of more than one letter. ... The total operating time to the nearest hour is given for each station and is the last figure following the score. ... Example of listings: W3ENX 45908-92-4—C-70, or, Final Score 45908, multiplier 92, 4 frequency bands used, power over 500 watts, total operating time 70 hours.)

C.W. Scores

ATLANTIC DIVISION

B. Pennsylvania

W3ENX 45908—92-4—C-70
W3MAR 51405—79-4—A-57
W3CHH 21995—69—BC-51
W3EYW 20854—92-4—B-83
W3FUO 15903—56—AB-50
W3OKO 13991—63—3—B-58
W3KX 11500—46-2—B-51
W3DPU 7536—59—BC-48
W3DOP 7488—39—2—B-26
W3ATR 4950—34-3—B-44

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W9BOS 36- 3- A - 5
W9BRT 12- 2- A - 1

Kentucky
W9PLM 14787- 53- 4- AC- 40
W9IVL 14616- 65- 1- C- 10

Michigan
W9PLS 14615- 65- 1- C- 11

Wisconsin
W9WTO 27560- 74- 3- C- 60
W9WRL 27516- 73- 3- C- 73

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ADVANTAGES
Unlike other recording devices, the American Code Reader uses no ink. Therefore, there is no smudging, no blotting, no punching. Recordings may be made permanent or temporary by means of a variable potentiometer. Its low list price of $20 (including one 100 ft. roll of special tape) is among its most attractive features. Additional tape replacement rolls of 250 feet may be purchased for 25c each.

AMERICAN COMMUNICATIONS Corp. 1650 Broadway Code Reader Division New York, N. Y.
Every DX'er Needs This Clock—
WORLD TIME at a glance!

You're there ON TIME with a World-Wide clock! One quick glance gives you Standard or GMT time, accurately—for any one of the twenty-four-hour time zones around the world.

This 24 hour time-piece, has a genuine Waltham movement. Attractively colored dial plates marked for direct reading. Self starting. Operates on 110 Volt; 60-cycle, AC.

Here is a beautiful, practical instrument you’ll be mighty proud to own. Black painted metal case, measurable for flush mounting in your panel. Stainless Steel-3-1/2". Only $9 net to licensed hams. Get yours today! See your jobber. Inquiries invited.
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AMATEUR HOUR WINNERS

They Never Get the Gong!

Ask your local Jobber to show you the new Ham line. 180 Different Items: From pre-amplifier to 1 K. W. audio components.

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RADIO ENGINEERING

RCA Institutes offer an intensive course of high standard embracing all phases of Radio. Practical training with modern equipment at New York and Chicago schools. Also specialized courses and Home Study Courses under “No obligation” plan.

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RCA INSTITUTES, INC. Dept. ST-37
A Radio Corporation of America Service
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110 VOLTS AC

Anytime! Anywhere! With
KATOLIGHT PLANTS
850 Watts 60 and 2 Volts DC $ 39.90
850 Watts 60 and 2 Volts DC $ 42.90
1000 Watts 60 and 2 Volts 6024.00
Portable—Half-Loading
Ask for Special Discount to Amateurs
200 watt 150 v. A.C. Generator only $ 3.40
Also AC and DC Batteries, Converters,
AU75 and AU Generators, etc., etc.
Write for Details
KATO ENGINEERING COMPANY
Manhasset, Minnesota, U.S.A.

THE COMPLETE LINE OF TELEGRAPH KEYS

A new and outstanding development — A general purpose type — Moulded Bakelite Base. Pigtail connections eliminate insulation problems — No current on bearings — Coin silver contacts. All Metal parts nickel plated.

No. 391, Bakelite Key, List Price $2.15
No. 391S, With Switch, List Price $2.50
No. 392, ¼ inch contacts, List Price $2.40

Type 301 Key

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Other models of Hand Keys from $1.50 to $3.50 list — Available at leading Jobbers everywhere — Write for new literature and Amateur Discounts.

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

DESIGNED FOR THE

AMATEUR

Hoyt Meters are designed and built expressly for the radio amateur. The 582 D.C. shown above is a jewel-bearing, moving-coil instrument of 2% accuracy. The flush bakelite case is 3¼" across the flange and fits a standard 2¾" panel hole. The companion A.C. meter No. 584 is the same size. Prices are most reasonable.

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THE BURTON-ROGERS CO.
Sales Division of the Hoyt Electrical Instrument Works
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BOSTON, MASS.

Gentlemen: Kindly send information about Hoyt Radio Meters.
Name

Street

City

State
SASKATCHEWAN—SCM, Wilfred Skaife, VE4EL—The S.A.R.C, station, AA, has been working some DX on 14 Mc. BF got a batch of new quartz slabs and MB is handling the grinding job. JB has been transferred by his firm to Vancouver, B.C. BF is working on a new outfit, planning T55's in the final. MB reports new doublet brings in DX and cuts down noise level. PQ is increasing power, QZ visited RO, Winnipeg, and brought back a roll of DX cards for the local boys. RJ is working out well on 14 Mc, with sea-power. TW erected new 14-Mc. bobbin. UC procured a 212D which will be used as a form of applause for the safe arrival of a junior op. at Camp Roosevelt and maintained traffic with EHW, Indiantown Gap. 3CXE boasts a completely renovated station, thanks for the vote of confidence, OM's. Please help me as S.C.M. to make this Section the "tops." Let me know whenever I can help in any way. 3POL reports that Hasielton N.C.R. gang had a blowout on Aug. 16th. 3KGF lost his mask and Q antenna in storm. 3GKX is bearing down on the DX. Traffic: W9EDC 2 EZ 4 DXO 1 QP 194 AQN 4 ETM 31 BGD 6 FAJ 2 EML 4 GLQ 99 BKZ (WLQC 81). WSFLA 98 EU 1 IQ 6.

HUDSON DIVISION

EASTERN NEW YORK—SCM Robert E. Haight, W2LU—CC reports 1303 QSO's with VK5HKG up to Aug. 16th. A fine record and CC is to be congratulated. JCL is back again, and QZ is interested in old C.W. ZW, N.Y.C, W7ADU at Buffalo, and 3GQ are fighting for first place in Main Line Radio Club's Hidden Transmitter Hunts. 3AQN and 3FLA have been working in Main Line, but haven't been located yet. TheOLOR gang had a blowout on Aug. 16th. They are under the impression that they are doing very well, but do not think their DX is better than that received in New York. JTT spent his vacation touring eastern U.S. QHX will soon be handling traffic on 3.5 Mc. KXA spent a lot of time on 56 Mc. trying to bear the Mt. Washington Expedition. JWE is on 56 Mc. for his W.A.C. CGU spent a fine total by delivering traffic for a local National Guard unit while in camp at Indiantown Gap. 3CXE boasts a completely renovated station, thanks for the vote of confidence, OM's. Please help me as S.C.M. to make this Section the "tops." Let me know whenever I can help in any way, 3POL reports that Hasielton N.C.R. gang had a blowout on Aug. 16th. 3KGF lost his mask and Q antenna in storm. 3GKX is bearing down on the DX. Traffic: W9EDC 2 EZ 4 DXO 1 QP 194 AQN 4 ETM 31 BGD 6 FAJ 2 EML 4 GLQ 99 BKZ (WLQC 81). WSFLA 98 EU 1 IQ 6.

MARYLAND-DELAWARE-DISTRICT OF COLUMBIA—SCM, Edward S. Smith, W2MB—OM's: KZQ, 3EU, 3QXL, Chief R.M.: 3BWT, CXL. Capt, Collins, A.A.R.S. call WLNC. HNH reports his pupil is now on the air under call of KPF on 1.75 Mc. Newly installed officers in the Trenton Radio Society: Pres. AWH, Vice-Pres. BFT, Secy. A.XU, Treas. GHK. BWR reports activity on 56 Mc. only. JTT spent his vacation touring eastern U.S. QHX will soon be handling traffic on 3.5 Mc. KXA spent a lot of time on 56 Mc. trying to bear the Mt. Washington Expedition. JWE is on 56 Mc. for his W.A.C. CGU spent a fine total by delivering traffic for a local National Guard unit while in camp at Indiantown Gap. 3CXE boasts a completely renovated station, thanks for the vote of confidence, OM's. Please help me as S.C.M. to make this Section the "tops." Let me know whenever I can help in any way, 3POL reports that Hasielton N.C.R. gang had a blowout on Aug. 16th. 3KGF lost his mask and Q antenna in storm. 3GKX is bearing down on the DX. Traffic: W9EDC 2 EZ 4 DXO 1 QP 194 AQN 4 ETM 31 BGD 6 FAJ 2 EML 4 GLQ 99 BKZ (WLQC 81). WSFLA 98 EU 1 IQ 6.

SOUTHERN NEW JERSEY—SCM, W. W. Filson, W9FRI—The S.C.M. prepares the laws of three good traffic handling O.R.S. in the persons of DFO, FBMs and FTK due to the need of finding employment away from home. I am looking for some new applicants for O.R.S. BB is busy working in the New Jersey State Department of Agriculture. OM's activities are confined to 56 Mc. Newly installed officers in the Trenton Radio Society: Pres. AWH. Vice-Pres. BFT, Secy. AXU, Treas. GHK. BWR reports activity on 56 Mc. only. JTT spent his vacation touring eastern U.S. QHX will soon be handling traffic. JWE is on 56 Mc. for his W.A.C. CGU spent a fine total by delivering traffic for a local National Guard unit while in camp at Indiantown Gap. 3CXE boasts a completely renovated station, thanks for the vote of confidence, OM's. Please help me as S.C.M. to make this Section the "tops." Let me know whenever I can help in any way, 3POL reports that Hasielton N.C.R. gang had a blowout on Aug. 16th. 3KGF lost his mask and Q antenna in storm. 3GKX is bearing down on the DX. Traffic: W9EDC 2 EZ 4 DXO 1 QP 194 AQN 4 ETM 31 BGD 6 FAJ 2 EML 4 GLQ 99 BKZ (WLQC 81). WSFLA 98 EU 1 IQ 6.

NEW YORK CITY AND LONG ISLAND—SCM, Ed. L. Baunach, W3AVY—JUH is now O.O. KGB is O.R.S., and VG is O.R.S. JDG is O.P. UK joined the ranks of the Benedicts. Aug. 9th. CHK is now at BC station WOV. IOP vacationed in Maine. HMJ made W.A.C. HGQ received a Public Service Award for work done in the Ohio River flood. KAM is pulling bugs from his 100 watt rig. APV, located at Haiti, is now HI5PA. PF is handling traffic for VE1IN, relaying it through A.A.R.S. GXQ is at new QTH, and is now QSL'ing N.Y.C. JUH's location was changed to a more favorable station, probably at Far Rockaway on 56 Mc. FLD is now located at 53 Hale Ave., Brooklyn. JUH has been theBrunswick Hospital at Amityville. L.I. RTT is using a Johnson Q for 14 Mc. KU is using an RCA microphone, KD has three receivers and transmitters. HNR has been having B.C.L, trouble on 1.75 Mc. 'phone. AZY has been getting out with low power, just as good as high power. JWE is operating on 56 Mc. JWE has purchased his first new crystal which he has been receiving plenty of foreign DX cards. KGN is working ZL's with his 46 foot on 7 Mc. The L.I. net will resume activity on 810 hrs, this full every night at 8:00 P.M. All those interested should work DX, the Key station, on that frequency. Traffic: W9FRI 49 AZ 48 FY 29 JUH 13 JUH 13 HHT-CHK 7 HGO-CIT 4 HYL 3 JEG-BYL-EFL 2 DBQ-AA BGO 1.

SOUTHERN NEW JERSEY—SCM, Fred C. Read, W2CMN—CC has been remodeling for higher power. HAE has been experimenting with 14 Mc, c.w. IOZ is now R.C.C. member. GGW had a two weeks' trip to Nova Scotia with the U.S.N.R. C.JX has new reason for burning the midnight oil—another addition to the family. It's a baby girl, in favor of 7 lbs. for the summer. GSI has been working 3.9-Mc. 'phone from Lake Hopatcong. KNQ is having good success with his new rig on 1.7-Mc. phone. ISZ is on 14 Mc. c.w. GVZ has worked ninety countries to date; he has now rotary

100

QST for
WESTERN PENNSYLVANIA SECTION
QSO CONTEST

DATED: Starts 6:00 p.m. EST Oct 29th. Ends midnight.

EST October 31st. Operating hours 6:00 p.m. EST to midnight on Friday and Saturday the 29th and 30th and 2:00 p.m. EST to midnight on Sunday the 31st.

Qualifications: Only operators of stations located in the Western Pennsylvania Section of the Atlantic Division (this shall include the boundary counties Potter, Clinton, Centre, Mifflin, Huntingdon and Franklin) who send in copies of their logs with final scores shall be eligible for prizes.

Object: To contact and get acquainted with as many other Western Pennsylvania stations as possible during the contest. Contacts outside the Section do not count in the score.

Calling procedure: The following calling procedure shall be used by all stations taking part in the contest: CQ WPA de W.

Completion of contact: A contact shall be considered complete when the two operators have "chewed the rag" for at least ten minutes.

Scoring: One point shall be allowed for each contact with a different Western Pennsylvania station. Each station can only be worked once.

Note.—It is not necessary that the station you work turn in a score. All that is required is that the station be in the Western Pennsylvania Section.

Power: Power used will have no effect on the scoring.

Frequency: Any or all frequencies may be used. Either or both cw and phone can be used.

Logs: Copies of the log sheets, listing the station worked, the date, the time contacted, time of contact completed (at least ten minutes) and the location of the station worked, shall reach the S.C.M. (K5AG, c/o H. C. F., Lower, Pa.) not later than midnight, November 30th.

Prizes: There will be plenty of prizes to make things interesting. Besides prizes for high scoring, there will be three or four prizes drawn from a hat if you only contact one station you have a chance of winning a prize. Last year over sixty dollars worth of prizes were awarded. DON'T FAIL TO TAKE PART AND SUBMIT A LOG.

WESTERN PENNSYLVANIA—SCM, Kendall Speer, Jr., WSOFO-R.M.'s: 8KUN, 8KWA, SMOT, P.A.M.: 8QNQ, New appointments—A.A.R.S. Lislon R.M.: 8UK, N. D.; C.R.X.S. O.R.S.: 8trs, O.P.S.: QQV, Prospective—O.R.S.: GSH, PLM, JSU, JTT, 4BOU, O.P.S.: GQE, BID, OVQ. It looks like we are off to a flying start this season with over fifteen O.R.S. The Salisbury Amateur Radio Club will have the November meeting of the Floating Club. EAM has a new Breeding-14, DGO is active on 14 Mc. EAA is on 7 Mc. about half of the time. CEI spent his vacation at the Beach. DOZ has a new "bottle" in the final. DQJ has his new home-built receiver going FB. The Gang had a steak supper at DOV's cabin for 2CBO, who is visiting in the city. BMV is changing his rig from bread board to rack and panel style. EIT has a 6L6 Oscillator, and a 2-tube home built receiver. DZS has been rebuilding. DGO burnt out power supply. H12 is working on the new 100-0 with 10th's final. DCC is getting out well with TS5 final. DSO entered the low power contest using 7-Mc. band. ESZ is rebuilding for 1.75-Mc. 'phone. CeL is sticking to 3.9 Mc. ES7 visited DRU. FT is plugging away on 28 Mc. NY is getting a rig on 14 Mc. before he gets 10 Mc. He recently underwent an operation, but he has been removed to his home now. Hurry up and get well, Sweeney. CYB had as visitors this month 8NLJ and SQDP from Oneida, N.Y., SNGD and sister Edith and 4BV. DSO is planning a new exicitl unit and more power for a 28-Mc. phone rig. A3U is in Texas hunting Broncos, and digging oil wells. DWB is working portable in Virginia. DGO is now O.P.S. BVYA is using a P.A.M. T. Give him your support, fellows. CFR, BWH and ABT and their families and friends spent a week at Farmers Fishing Camp near Sparta. They had as visitors RA, BFV, 1KRR and ODG over the week-end. DVO has a swell kw. power supply. TS.

Traffic: WANG 16 DZS 3 DQG-ABT 3.

WIRGINIA—SCM, Charles W. Waff, Jr., W3UVA—(JPC wants traffic schedules. FBL has been having plenty of fun on 56 Mc. with a mobile unit. JGF is putting in a pair of T-20's. AJJ visited FGJ and CHB. AJH has moved to Staunton. FMY and AJH have new 80's. GBC visited a bunch of hams when he returned for a visit to his old home at York, Penna. BSY is traveling in Europe. EZL has moved back to his old home in Charlottesville. UVJ is still rebuilding.

Traffic: W 3GFC 3.

WEST VIRGINIA—SCM, Dr. Wm. H. Riedlefather, W8RKG—The Logan amateurs have a club going, The Black Diamond Radio Club. QSO applied for ORS. KYJ has a new transmitter going, OLY has been putting down 7228 kc. all summer. QBS joined C.C.C. OIF burnt out power transformer, M1S and NTV attended South Hills hamfest. MIT moved to Parkersburg. 3FUM moved into the affaretion. LCN scores with KGJ 491V. DGO 350 and 9CRE are operating in the sector. The Charleston Gang piled up 1500 points in the Field Day activities. The Charleston Club has elected C. Z press. RDE (XYL) vio-press. FUA secty.-treas. (RDE is Mrs. FUA). BEL. Cls, L11, DZS, and QSA are working 56 Mc. RDE is putting up a beam for 14 Mc. JRL has 106 countries and called up KKG to spot him HZ6NI, whom they both worked bang, just like that. Director Caveness visited the A.R.R.L. affiliated clubs over the state and gave many of the members a chance to meet him for the first time. Mrs. Caveness accompanied him on his trip that included stops at Bluefield, Charleston, Huntington, Clarksburg, and Wheeling.

Traffic: W8HD 3 MOP 1 KGK 87.

NEW ENGLAND DIVISION

CONNEC'TUT—SCM, Frederick Ellis, Jr., W1CTI—KPN has new rig with pair of HF100's final. JMY is looking forward to opening of the Nutmeg Net. ES has a time schedule with W1K. UE7V moved to Granby, CTF is warming up for traffic season. INP built and installed (Continued on page 104)
102 Say You Saw It in QST — It Identifies You and Helps QST

Q-BAR INSULATOR

National offers a new isolantite insulator for a fixed-ratio Q-bar transformer to match a center-fed half-wave antenna to a feeder using No. 12 B & S wire and six-inch spreaders (72 ohms to 600 ohms). They are designed with rigid duralumin tubing with an outside diameter of 3/4 inches, and are simply slipped over the tubes. The complete assembly is rigid, efficient and tidy as well as convenient to handle.

Q-Bar Insulator, Type QB, Net Price $12.50

NATIONAL COMPANY, INC.
Malden, Mass.

At Last!
A Perfected AUTOMATIC SENDER

Save your feet. Let our Automatic Sender raise your stations for you. Repeats calls or messages indefinitely. Length of messages unlimited. Sends from 2 to 70 words a minute. Motor driven. Entirely automatic. Built-in tape perforator. Absolute uniformity in spacing of characters. Used with buzzer or oscillator, makes excellent code teacher for novice and speed-bolider for the advanced amateur. Complete with 4 units of tape and full instructions. No extra equipment needed. If your dealer can't supply you, write us.

MONEY-BACK GUARANTEE
Gardiner-Levering Co. New Jersey, L. S. A.

LEARN RADIO — TELEVISION

New Beginners' Class Sept. 13th. Send for 48-page catalogue, explains fully. 500 licensed graduates placed in last six years in broadcasting, shipping, police radio, aviation, etc. Oldest, largest and best equipped school in N. E. We each all branches of radio. Tel. HAN. 8184.

Fan operators placed with Pan-American Airways in one week.

Radio Service Instructions Given

Open All Summer

MASS. RADIO SCHOOL
18 Boylston Street, Boston

(Continued from page 98)

W. Florida
W4CDE 19408- 62- 3- B- 83
W4CR 1566- 19- 3- C-

Georgia
W4CBL 89638- 138- 4- C- 84
W4CVA 26060- 59- 2- C- 85
W4X 890- 15- 2- A-

SOUTHWESTERN DIVISION

Los Angeles
W5CNX 11664- 123- 4- C- 88
W5CHL 19507- 125- 4- C- 90
W5EZI 7219- 117- 4- B- 88
W5IBD 76000- 118- 2- C- 90
W5CRX 8476- 109- 5- B- 92
W5KIP 42501- 82- 3- C- 84
W5AM 815- 51- 2- C- 70
W5GHU 11550- 50- 3- C- 87
W5KRD 10138- 44- 1- B- 85
W5KU 380- 14- 3- C- 82
W5KN 7423- 83- 2- B- 85
W5LW 5810- 24- 2- B- 89
W5LQ 620- 20- 3- B- 81
W5MV 2046- 19- 2- B- 88
W5NAD 1190- 17- 3- A- 20
W5CM 606- 14- 1- B- 20
W5DV 2910- 21- 1- B- 85
W5IDW 720- 12- 3- A-
W5KLF 251- 11- 3- A- 20
W5ID 643- 11- 5- B-
W5KU 430- 10- 3- A- 19
W5ACG* 180- 8- 1- A- 9
W5AEAF* 190- 5- 5- 1- A- 11
W5LFC 75- 5- 5- 4- A- 4
W5CP 48- 4- 1- B- 18

Arizona
W5FCQ 12100- 50- 4- B- 45
W5KFC 1800- 20- 4- A- 26
W5AUI 6- 1- 1- - -
San Diego
W6QG 39299- 82- 5- B- 90
W6GAM 28335- 72- 3- B- 93
W6GBD 14650- 55- 5- B- 83
W6GCT 2510- 21- 1- B- 85
W6BBR 2688- 28- 2- B- 55
W6BYX 2346- 23- 3- B-
W6LQ 149- 11- 5- A-
W6OLI 415- 11- 2- B-
W6GCM 378- 9- 2- A- 20
W6SIC 96- 4- 1- B- 16
W6LUI 48- 4- 1- -

West Gulf Division

N. Texas
W5DM 21058- 64- 3- B- 48
W5AMO 948- 44- 3- B- 81
W5YF 3106- 10- 4- A- 14
W5KKEF* 5532- 36- 2- B- 50
W5DXA 3950- 39- 2- B- 22
W5FKG 2306- 26- 2- A- 15
W5BQN 960- 16- 1- B- 22
W5TX 395- 26- 2- C- 85
W5KU 284- 5- 2- A- 77
W5BST 243- 9- 3- A-
W5HMA* 84- 3- 1- 2- C-
W5RE 18- 2- 1- B- 4
W5OWI* 18- 1- 1- A- 3
W5FRQ* 18- 1- 1- A- 3
W5FM 5- 1- 1- A- 3

Oklahoma
W5VY 10793- 44- 1- C-5548
W5FLD 23508- 21- 3- B- 76
W5ACD 1873- 18- 1- B- 84
W5FEW 370- 9- 2- A- 19

So. Texas
W5VY 29092- 70- 3- B- 81
W5CQ 97096- 70- 3- B- 85
W5E 14750- 50- 3- - 47
W5KMR 1200- 20- 1- B- 23
W5EKD 1318- 13- 3- A- 28
W5EIS 645- 12- 1- A- 33
W5FNA 380- 9- 2- B- 19
W5DBW 110- 1- B- 27
W5ARD 284- 8- 2- A- 22
W5PTU 253- 7- 1- A-
W5DHF 114- 6- 1- A- 12

CANADA
Maritime
W5EIA 28543- 72- 3- AB- 77
W5EIO 12- 5- 1- -
Ontario
W5EIA 30605- 89- 3- BC- 90
W5EKF 26854- 71- 4- B- 73
W5EIA 8803- 43- 2- A- 84
W5ESR 8894- 45- 3- B- 51
W5EIO 4696- 30- 2- A- 49

Quebec
W5EIA 12400- 21- 5- B- 80
W5EKF 111- 1- A- 22
W5EIA 3962- 5- 1- B- 10
W5EIA 10- 2- -
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Gardiner-Levering Jf Co.
O-Bar Insulator, Type OB, Net Price $12.50

We each all branches of radio. Tel. HAN. 8184.

Fan operators placed with Pan-American Airways in one week.

Radio Service Instructions Given

Open All Summer

MASS. RADIO SCHOOL
18 Boylston Street, Boston

(Continued on page 100)
The new Bliley HF2 10-meter crystal unit now makes possible high stability 5-meter transmitters of greatly simplified construction. Possessing a high activity, these crystal units can be used in conventional circuits with certain standard low-priced tubes for single tube low power or multi-tube high power 5-meter transmitters.

It is now an established fact that better 5-meter contacts are possible with the stability and concentration of carrier power brought about by the use of crystal control. For improved results, use a Bliley HF2 10-meter crystal unit—priced at $5.75. Technical data and constructional information is given in Engineering Bulletin E-5, available from your distributor. Bliley Electric Company, Erie, Pa.

BLILEY HF-2 CRYSTAL UNIT
3FXZ/1 schedules K6NXD daily and reports "ignals very you have had your ticket twenty years or twenty minutes.

CUSE section matters just name your frequency and time. Good here in N.E. ONT takeo a shot at 14 Mc. and works a few furriners. IOR has new exciter perking. Chet reports or even for suggetions for such nets have gone totally un­heared, or at least unheeded. Our record shows us up as the don't give a boot. Any disaster that is likely to affect New England is almost certain to center in the Conn. Valley, as thoup;h we just haven't got what it takes, or else we iust right in our.

LZV is working some DX on 56 Mc. EAO recom­mends DQ for O.P.S. GTN is warming up the A.A.R.S. net for fall.

Traffic: W1EDT 2.

Traffic: W1IHJ 129 AKS (WLG 140) INA 109 KII 102 EMG 62 AGX 61 AMT 38 HWE 24 IHN 16 J6K 12 JFN 12 (WLY 58) JTM 9 HXK 8 KMS 4 RE 2.

Traffic: W1GW 112 INW 40 GOJ 20 EUL 10 TE 7 (June-

Traffic: W1ERQ 7.

Traffic: W1KIN 129 AKS (WLG 140) INA 109 KII 102 EMG 62 AGX 61 AMT 38 HWE 24 IHN 16 J6K 12 JFN 12 (WLY 58) JTM 9 HXK 8 KMS 4 RE 2.

Traffic: W1GW 112 INW 40 GOJ 20 EUL 10 TE 7 (June-

Traffic: W1EDT 2.

Traffic: W1IHJ 129 AKS (WLG 140) INA 109 KII 102 EMG 62 AGX 61 AMT 38 HWE 24 IHN 16 J6K 12 JFN 12 (WLY 58) JTM 9 HXK 8 KMS 4 RE 2.

Traffic: W1GW 112 INW 40 GOJ 20 EUL 10 TE 7 (June-

Traffic: W1EDT 2.

Traffic: W1IHJ 129 AKS (WLG 140) INA 109 KII 102 EMG 62 AGX 61 AMT 38 HWE 24 IHN 16 J6K 12 JFN 12 (WLY 58) JTM 9 HXK 8 KMS 4 RE 2.
Omission from Circuit Equalizing Article

A most unfortunate error occurred in the publication last month of Mr. Gluck's article, "Circuit Equalizing to Improve Receiver Performance." A portion of the text and two illustrations were omitted. We greatly regret the omission. Here's what was left out—it should have followed page 31, Sept. QST.—Editor.

If we now adjust or calculate the value of $CT$ for the 1st r.f. and mixer so that all circuits will be resonant to 2252 kc., these values will then be:

<table>
<thead>
<tr>
<th>Circuit</th>
<th>$L$</th>
<th>$C_T$</th>
<th>$C$</th>
<th>$f$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st r.f.</td>
<td>110</td>
<td>15.5</td>
<td>30.0</td>
<td>2252</td>
</tr>
<tr>
<td>2nd r.f.</td>
<td>100</td>
<td>20.0</td>
<td>30.0</td>
<td>2252</td>
</tr>
<tr>
<td>Mixer</td>
<td>90</td>
<td>25.5</td>
<td>30.0</td>
<td>2252</td>
</tr>
</tbody>
</table>

FIG. 2—A SIMPLE VACUUM-TUBE VOLTMETER IS USED IN CONJUNCTION WITH THE OSCILLATOR FOR CHECKING INDUCTANCES

The bypasses are not critical—0.01-µfd. condensers will do.

So far so good. The three circuits are each resonant to 2252 kc. Let us now vary $C$ until it is equal, first to 100 µfd., then to 170 µfd. and see if the three circuits will still be on "talking terms."

C. In (B) all circuits were resonant, but in (C) and (D) conditions have changed. Such variations in frequency cannot be tolerated in a good receiver.

For perfect tracking of the three circuits, the following conditions must be religiously observed:

1. $L_1 = L_2 = L_3$.
2. $C_{T1} = C_{T2} = C_{T3}$.
3. The capacity of each section of the ganged condenser at any setting must be equal to that of each of the remaining sections at the same setting.

CHECKING CONDENSER SECTIONS

We shall now proceed to check our ganged condenser. For this work an oscillator or a regenerative receiver will be needed. It need not be calibrated. The circuit arrangement is shown in Fig. 1.

Apply all voltages to the oscillator and set the receiver and its b.f.o. into operation.

1. Set the gang condenser at about 5° (minimum capacity).
2. Turn condenser $C$ on the oscillator and adjust it for zero beat as indicated by the receiver. Do not disturb the receiver setting.
3. Connect test leads to section No. 2 and turn condenser $C$ until zero beat is again indicated.
4. Repeat the above for sections Nos. 3 and 4 and note what the reading of $C$ was for each of the sections when zero beat was indicated.

If the four readings of $C$ are identical, then we may feel certain that the four sections of the ganged condenser have identical values of capacity at 5°. Slight variations from this desired condition may be overcome or corrected by bending the radially slotted end plate on each section.

The procedure is repeated with settings of the ganged condenser at 20°, 35°, 50°, 65°, 80°, and 95°. With the corrections completed, the condenser problem is solved and we may now confine our attention to the inductances.

EQUALIZING INDUCTANCES

So that the work may be done correctly, it is important to remember that the coils should be mounted in their shields with covers in place. If possible do not place padding condensers inside of coils. These have an effect on inductance as well as on the resistance of the coil. Since pruning of the coils is to correct for the effects of the shield, etc., this precaution must not be taken too lightly.
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So. New Jersey

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Central Division

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W9DLK 919-23-1- A-16
W9DRL 919-23-1- A-16

South Dakota

W9DRL 919-23-1- A-16
W9DLK 919-23-1- A-16
W9DRU 919-23-1- A-16

So. Minnesota

W9DRL 919-23-1- A-16
W9DLK 919-23-1- A-16
W9DRU 919-23-1- A-16
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New Johnson porcelain parts include five tapped cone insulators (right) in the same sizes as the Alsimag 196 cones. Furnished complete with cushion washers, machine screws both top and bottom, and in four jack types. Above, are five sizes of porcelain lead-in bushings. Johnson porcelain insulators may be used with confidence wherever the unusual characteristics of Alsimag 196 are unnecessary.

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<td>$30.24 $10.51</td>
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- D200, 750-1000 V, each side at 300 mls: Net $5.25
- D201, 1000-1500 V, each side at 300 mls: 6.20
- D202, 1500-2000 V, each side at 300 mls: 11.00
- D203, 1000-1500 V, each side at 300 mls: 11.00

**SMOOTHING CHOKEs**

- D100, 20 Henries — 200 mls, 2500 V, Insulation: Net $1.50
- D102, 20 Henries — 500 mls, 2500 V, Insulation: 2.90
- D104, 20 Henries — 1000 mls, 2500 V, Insulation: 3.50
- D106, 20 Henries — 500 mls, 6000 V, Insulation: 8.00

**SWinging CHOKEs**

- D101, 5-25 Henries — 200 mls, 2500 V, Insulation: Net $1.50
- D103, 5-25 Henries — 500 mls, 2500 V, Insulation: 2.90
- D105, 5-25 Henries — 1000 mls, 2500 V, Insulation: 3.50
- D107, 5-25 Henries — 500 mls, 6000 V, Insulation: 5.00

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**THE FINISHING TOUCH!**

- **Gordon World-Wide GMT and Standard Time Clock**
  - 60-Cycle Self-Starting Genuine Waltham 24-Hour Movement.
  - Base removable for panel mounting (hole size 34") Satin Black Finished Base holds clock in reclining position for easy reading. Tells at a glance GMT and Local Standard Time in 24 principal countries around the globe. Tells the time in each of the 24 time zones around the world. And your net cost is only $9.00.

- **"X" Cut Unmounted 40 Meter Crystals**
  - Made by nationally known manufacturer. Your choice from our stock, only $1.95. These are 1" square and have high output. Calibration is accurate to 1%. Special Billey 40 meter crystal holders: $0.95.

- **TAYLOR T20 AND T230**
  - $2.45
- **TAYLOR T125**
  - $13.50
- **TAYLOR 283Z**
  - $6.50
- **EIMAC 100TH**
  - $24.50
- **EIMAC 250TH**
  - $24.50
- **RATHEON RK39**
  - $2.50
- **AMPERE HF100**
  - $12.50

We usually have some receivers on hand that have been taken in trade on new sets. If you are looking for a used job it might pay you to see us.

---

### Terminal Radio Corporation

**80 CORTLANDT STREET, NEW YORK CITY**

**Bill Filler**

**Adolph Gross**

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COIN, OR STAMPS

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In it are complete illustrations of our new L and V series mountings, also our new type CBC commercial unit.

We have made several improvements on our popular amateur unit, type VM2 mounted crystal for the 160, 80 and 40 meter bands. No increase in price — $3.00.

Our new low drift type LMA mounted crystal 160, 80 and 40 meters, a unit of commercial design for amateur use. ONLY $4.50.

Obtain a copy from your local dealer or write direct

THE VALPEY CRYSTALS
P.O. Box 321, Highland St., Holliston, Mass.

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

met by the values specified when the speech amplifier tubes are triodes, as shown in the circuit diagram.—Editor.

I. A. R. U. News
(Continued from page 44)

Roumania: Victor Cantuniari, Str. Matei Basarab, 3 bis Bucharest IV.

Salvador: J. Frederico Mejia, 7a Calle Poniente 78, San Salvador City.

South Africa: S.A.R.R.L., P. O. Box 7028, Johannesburgh.

Southern Rhodesia: see South Africa.


Sudan: c/o Frank H. Pettitt, Catholic Club, Mustapha Barracks, Alexandria.


Tanganyika: see Kenya.

Trinidad: see Antigua.

Uganda: see Kenya.

Uruguay: U.S.W.C.G., Box 37, Montevideo.


Venezuela: R.C.V., Torre a Madries No. 8, Caracas

Strays

Somebody must have been reading a book. W9PLF discovered in a local paper an ad for a ceiling fan which runs on up-and-down current!

And another paper, in a biographical sketch of Marconi, goes on to relate how many lives were “saved by prompt response to the old distress signal PDQ”! Spotted by W3BCI.

New "PRECISION" Series 840L
A.C.—D.C. VOLT — OHM — DECIBEL — MILLIAMMETER

including a 2500 volt A.C. — D.C. range

* 5 A.C.—D.C. Voltage

* 5 Resistance Ranges from 0 to 2500

* 5 Decibel Ranges from 0 to 10 mgs. (provision for self-contained batteries).

* 4 D.C. Current Ranges

* 5 Output Ranges.

Net Price to Amateurs $19.95

Less Batteries and Test Leads

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631 EAST NEW YORK AVE., BROOKLYN, NEW YORK
UNTIL this remarkable series of meters was announced, panel instruments were a real "headache" to most amateurs. There was either the headache of paying a premium price for an accurate, durable instrument, or the even worse headache of trying to "get by" with short-lived instruments of questionable accuracy.

Then suddenly the big news went out: "You can buy panel instruments with the costly bridge-type construction and soft iron pole pieces at the price you have been paying for the ordinary run of instruments!"

Good news travels fast — and that's why more and more ham stations are being equipped with these Simpson instruments. An unsurpassed experience in instrument building aided by modern production methods have made this the most incredible value possible. A typical example of the remarkable value found throughout the line is illustrated opposite. See this and other Simpson meters and testing equipment at your jobber's. Why accept less than Simpson quality, beauty and accuracy, when it costs no more to have it! Coupon brings facts.

R. R. Jobs for CW MEN
65 TO 80c PER HOUR, YEAR AROUND


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Radio Operator's Course
Telegraphy—Telephony—Aviation

PORT ARTHUR COLLEGE has been teaching Radio for twenty-eight years, and during this time it has never been our policy to guarantee positions to prospective students, directly or indirectly. We believe it wisdom at this time, however, to go on record in our QST advertising to say that it is impossible for us to even come near to supplying the demand for Radio Operators received by our Employment Department. We do not mean by this that all students who enroll will automatically acquire positions. The demand for good men who deserve and are qualified to hold positions. The graduates of our Radio School, so far as we know or can learn, are employed 100%.

It is possible for every student who enters the P. A. C. Radio School and completes the course in keeping with our standards to receive employment as a Radio Operator for our station K P A C at the transmitter, in the control room, as trans-radio press operator, or announcer, and not only earn more money than he pays for the training but also continue his training as a post-graduate student in advanced work and prepare himself to secure and hold operating positions in the upper bracket of broadcasting, marine work, announcing, or airways.

Port Arthur College advertises primarily to Radio Amateurs, and the training is too technical for the average student who has not selected Radio as his life's work. We know the opportunities for positions and advancement are unlimited for men who are interested in Radio and who plan to make this their career and are willing to make the sacrifice and effort necessary to master our training. P. A. C. maintains strict college rank — only high school or college graduates are eligible for enrollment.

If interested in details about Radio Course, write for bulletin R.
Where to buy it

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

Baltimore, Md. 3 North Howard St. Radio Electric Service Company

Boston, Mass. 46 Brattle Street

Boston, Mass. H. Japan Company

Burlington, Vermont Vermont Hardware Co., Inc.

Greenwich, Conn. 252 Greenwich Ave. Mead Stationery Company

Montreal, Canada 285 Craig Street, West Canadian Electrical Supply Co., Ltd.

Newark, N. J. 219 Central Avenue Wholesale Radio Service Co.

New York, N. Y. 12 West Broadway

New York, N. Y. 51 Vesey St. Gross Radio, Inc.

New York, N. Y. 100 Sixth Ave. Wholesale Radio Service Co., Inc.

New York, N. Y. 80 Cortlandt Street Terminal Radio Corp.


New York, N. Y. 136 Liberty St. Sanford Samuel Corp.

New York, N. Y. 100 Sixth Avenue Wholesale Radio Service Co.

New York, N. Y. 12 West Broadway Harrison Radio Company

New York, N. Y. 124 E. 44th Street Grand Central Radio, Inc.

Philadelphia, Penn. Eugene G. Wile 10 S. 10th Street


Reading, Penn. Bright & Company 8th & Elm Streets

Reading, Penn. 104 North Ninth Street Sylvester Radio & Supply Co., Inc.


RCA Amateur Products

Albany, N. Y. Uncle Dave's Radio Shack 356 Broadway

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

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<tr>
<td>Washington, D.C.</td>
<td>938 F Street, N. W. Sun Radio &amp; Service Supply Co.</td>
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<td>Buffalo, New York</td>
<td>216 E. Genesee Street Radio Equipment Corp.</td>
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<td>Concord, New Hampshire</td>
<td>80 N. State Street Sun Radio &amp; Service Supply Co.</td>
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<td>Newark, New Jersey</td>
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<tr>
<td>New York, N.Y.</td>
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<td>Washington, D.C.</td>
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<tr>
<td>Albany, New York</td>
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<td>Binghamton, New York</td>
<td>210 Chapel Street Stern Wholesale Parts Company</td>
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<tr>
<td>Buffalo, New York</td>
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<td>Hartford, Connecticut</td>
<td>210 Chapel Street Stern Wholesale Parts Company</td>
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<td>New York, N.Y.</td>
<td>356 Broadway Uncle Dave’s Radio Shack</td>
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<tr>
<td>Rochester, New York</td>
<td>244 Clinton Ave., N. Radio Parts &amp; Equipment Co.</td>
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<td>Bostons, Mass.</td>
<td>46 Brattle Street Radio Shack</td>
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<td>Newark, New Jersey</td>
<td>28 Brattle St. Selden Radio Company</td>
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<td>Montreal, Canada</td>
<td>285 Craig Street, West Canadian Electrical Supply Co., Ltd</td>
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<tr>
<td>Newark, N.J.</td>
<td>219 Central Ave. Wholesale Radio Service Company</td>
</tr>
<tr>
<td>New York, N.Y.</td>
<td>100 Sixth Avenue Wholesale Radio Service Company</td>
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<tr>
<td>Pottsville, Penn.</td>
<td>404 Walnut Street E. Norwegian &amp; George Sts.</td>
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<tr>
<td>Reading, Penn.</td>
<td>404 North Ninth St. Sylvestor Radio &amp; Supply Co., Inc.</td>
</tr>
<tr>
<td>Washington, D.C.</td>
<td>938 F Street, N. W. Sun Radio &amp; Service Supply Co.</td>
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Tower Legs—1'/2' x 1'/2' x 1'/2' x 20 ft. Low carbon steel angle. Galvanized after fabrication. Cross Bars—1'/2' x 1'/2' x 1'/2' mild steel, spot welded to form X brace. Painted black enamel.

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"Put Your Signal Where You Want It When You Want It There"

Write for Bulletin 382

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CRYSTALS, ground to order, 160-50, X cut, 4-6, 4-6, 4-6, 4-6. Hotcrystal, 3020 S. 7th St., St. Louis, Mo.

CRYSTALS: 1st "square x cut 80-160 meters, $1.40; 2nd, 2.5-4.5; 3rd, 5.0-7.5; 4th, 7.5-11. W8DQ, 405 Delaware Ave., Wilmington, Del.

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<td>100 Sixth Avenue</td>
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<td>&quot;Investigate Our Easy Payment Plan&quot;</td>
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<td>12 West Broadway</td>
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<tr>
<td>Everything for the amateur</td>
<td>&quot;The Friendly Ham Supply House&quot;</td>
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<td>542 East Fordham Road</td>
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<td>Radio Equipment Corp.</td>
<td>Eugene G. Wile</td>
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<td>326 Elm Street</td>
<td>10 S. Tenth Street</td>
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<tr>
<td>W808K — Ham, service and sound equipment — W808L8</td>
<td>Complete Stock of Quality Merchandise</td>
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<tr>
<td>&quot;Investigate Our Easy Payment Plan&quot;</td>
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Quoted from QST's advertising rate card.

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

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Say You Saw It in QST — It Identifies You and Helps QST
IN THE laboratory or home workshop — wherever precision receivers, transmitters, and miscellaneous devices are being developed or built for ultra-short waves, short waves, or the broadcast band — HAMMARLUND coil forms are always the choice! Such is the unanimous approval because in HAMMARLUND coil forms will be found the advanced design, craftsmanship and finest materials that afford the required outstanding efficiency! For instance, the popular priced "SWF" moulded forms are of "XP-53" dielectric — the remarkable new low loss insulating material that is so rugged, durable and has such an unusually low power factor. The forms are natural in color with no artificial coloring to cause losses. They are also groove ribbed for air spaced windings and have flange grips for easy handling. Meter indexes are also supplied for wave length inscriptions. A special threaded shelf, moulded inside, permits the mounting of an "APC" air condenser for fixed tuning or band spread. Made with four, five, or six prongs.

For transmitting, a jumbo "XP-53" coil form is available. Completely wound "XP-53" coils are made, too, to cover from 10 to 560 meters. Ceramic "CF" forms of extruded Isolantite for efficient high frequency reception under all conditions are also made by HAMMARLUND. These have a recessed black enameled wooden handle with removable paper disc, a nonskid surface, and numerous holes for winding. Available in four, five and six prong types. For ultra-high frequencies, HAMMARLUND has developed special "CF-M" Isolantite coil forms 1½ in diameter, with non-skid surface and plenty of mounting holes.

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Say You Saw It in QST — It Identifies You and Helps QST
UTC VARIMATCH TRANSFORMERS

The UTC VARIMATCH transformers consist of a series of driver and output units for every transmitting and P.A. application. Through a unique coil arrangement a very wide range of impedances is obtainable. Obsolescence is practically eliminated with these units, inasmuch as any one unit will match any tubes within its power range.

LINEAR STANDARD COMPONENTS

UTC Linear Standard components are ideal high fidelity units for broadcast, recording, and other applications where highest fidelity is desired. The frequency response is guaranteed uniform from 30 to 20,000 cycles, and the shielding and insertion loss is maintained at extremely low values. These units are unequalled for studio and speech input equipment, home radio, and high fidelity phone transmitters.

ULTRA COMPACT HIGH FIDELITY AUDIO UNITS

The UTC ultra compact audio units are extremely small and weigh only 5 1/2 ounces. The fidelity, however, is excellent, the frequency response being uniform ±2 DB from 30 to 20,000 cycles. These units are ideal for mobile equipment and similar applications where both weight and size are paramount factors.

PUBLIC ADDRESS UNITS

The Public Address series of units is a popular priced line having medium fidelity. A complete line of input, output and power components is provided, suitable for every public address and amateur transmitting function. Units of this class are used extensively by commercial communications companies for service where broadcast fidelity is not essential.

HIPERM ALLOY COMPONENTS

UTC Hiperm Alloy Components are similar to the Linear Standard units but of a more compact design and employ a light-weight high conductivity case so that these units can be employed for portable and compact service. They are used extensively in recording and remote pickup equipment.

Description of the full line of UTC Transformers is given in the new PS-402 bulletin now available at your jobber

UTC Transformers are used by R.C.A., G.E., Western Electric, Westinghouse, Bendix, C.B.S., N.B.C., M.B.S., U. S. Army, Navy, Signal Corps, Coast Guard, Dept. of Commerce, Bureau of Standards, etc.

UNITED TRANSFORMER CORP.
72 SPRING STREET • NEW YORK, N.Y.

128 QST for October, 1937, EASTERN Edition
The new National NC-80 Receiver employs the same type of movable coil tuning unit used so successfully in the NC-100, and which combines high electrical efficiency with plug-in coil convenience. Every detail of the simplified NC-80 chassis is designed for consistently high performance.

**IMAGE REJECTION**

Due to the use of a high IF frequency (1560 KC) image frequencies are so far apart that they can be effectively rejected without a preselector. The greatly improved crystal filter has a selectivity continuously variable from 300 cycles to 7 kilocycles, and is always left in circuit.

**LOGGING MARKERS**

The linear scale of the NC-80 Receiver is calibrated directly in megacycles for all coil ranges. A knife-edge pointer and mirror scale enable accurate readings to be made, free from parallax. Convenient, sliding markers make it easy to log stations or band limits directly on the dial itself.

**AMATEUR-BAND-Spread**

The tuning system on the NC-80 has an automatic dual-range control. When running rapidly through the tuning range, the ratio is sixteen-to-one; when tuning in a particular station the ratio automatically shifts to eighty to one. On the special NC-81X amateur model, five coil ranges are provided, each covering one amateur band.

**NET $88.00**

Complete with Tubes and Speaker

**NEW RECEIVER THAT HAS EVERY FEATURE**

**AIR-TUNED RF & IF**

**MOVABLE COILS**

**CRYSTAL FILTER**

**IMPROVED DIAL**

**DUAL-RATIO TUNING**

**AC-DC OPERATION**

**NATIONAL COMPANY, INC.**
IN MARCH we announced that our engineering, manufacturing, and sales efforts on amateur tubes would be concentrated on a few outstanding types. Increased volume on these types now permits us to make substantial money-saving reductions. Never before have quality tubes cost so little—and at a time when prices generally are being increased.

**RCA-802**
The favorite for crystal and buffer stages. Easy to drive. No neutralization. This popular type now sells for $3.50.

**RCA-805**
This husky favorite—125 watts max. plate dissipation, 1500 max. plate volts, 210 max. plate ma.—It's in the price class of tubes having considerably less capabilities, now sells for $13.50.

**RCA-806**
This heavy-duty, tantalum-plate triode, a popular tube, at a new low price. Now only $22.

**RCA-807**
With new improvements the RCA-807 is an even greater value today. Tremendous acceptance makes possible the new price $3.50.

**RCA-808**
Here's a real buy! High-mu, low interelectrode capacities, 1500 max. plate volts, 150 max. plate ma., rugged construction, heavy-duty filament—all combine to make this tube a sensation at $7.75.

**RCA-809**
For your power supply, this RCA tube, with its outstanding quality and reliability is now yours for only $1.50.

**RCA-906**
The first popular 3" cathode-ray tube was originally $18.00, but because of steadily increasing demand, now sells for only $13.50.

**RCA-913**
Sensational when introduced at $5.60 less than a year ago, this tube because of tremendous acceptance, can now be sold at $4.00.

With all the advantages of RCA quality, design features, reliability and performance capabilities costing so little today—why not do as the winners in the DX Contest did—go RCA Tubes All the Way in your transmitter and receiver?