QST

devoted entirely to

amateur radio

In this Issue——

How to Get Maximum Performance From Noise Stoppers
Above:
Dr. Frank E. Breene, W6 FOY, and His Record-breaking Collins 150C.

Equipment used was a COLLINS 150C with special 10 meter coils. W6FOY has also worked all sorts of dx on the other bands, but this record is of special importance because of the present activity on 28 mc.

There are hundreds of other amateurs who are really doing things with their COLLINS transmitters. COLLINS transmitters have established a reputation for outstanding performance that has never been equalled.

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45A
A NEW COLLINS DX-GETTER
COURTESY NBC

STRATOSPHERE BALLOON
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The gondola of the United States Army-National Geographic Society stratosphere balloon being made ready for its record making ascension. Burgess Batteries served portable power for operation of cosmic ray equipment, communication, and broadcasting, which was successfully re-broadcast by NBC.

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MARINE 140C

Nominal output rating 175 watts phone and C.W. (Actual measured output more than 200 watts.)

Incorporating the latest developments of modern engineering design, the Marine 140C is released from our laboratories, after many months of research, and we feel confident that its introduction meets with all the rigid requirements of present day practices —

Check these exclusive outstanding features of the Marine 140C

- Visual Oscilloscopic modulation control.
- Variable panel switch for line voltage control. Range 90 to 135 volts, A.C.
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March 1936
VOLUME XX
NUMBER 3
A PERSONAL WORD TO RADIO AMATEURS FROM LLOYD HAMMARLUND

THE "SUPER-PRO" Receiver, like most other worth-while developments, has been a long time coming. We aimed too high for speed. Speed in radio production too often demands shallow thinking and lack of precision.

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The Start

TRANSMITTER UNITS
FOR RADIO AMATEURS

STEP BY EASY STEP
From the Start to the Finish

ANNOUNCED MARCH, 1935
at the I.R.S.M. CONVENTION and in the
PROGRESSIVE TRANSMITTER GUIDE
published by the Amateur Press, Chicago

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or other appointments he can tell you about them, too.

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<table>
<thead>
<tr>
<th>State</th>
<th>S.C.M.</th>
<th>Address</th>
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<tbody>
<tr>
<td>Maryland- Delaware-District of Columbia</td>
<td>W3EZ</td>
<td>James M. Bruning</td>
</tr>
<tr>
<td>New Jersey</td>
<td>W3BAK</td>
<td>Edger L. Hudson</td>
</tr>
<tr>
<td>New York</td>
<td>W3XZ</td>
<td>Carroll L. Keen, Jr.</td>
</tr>
<tr>
<td>Pennsylvania</td>
<td>W3DDS</td>
<td>Charles Smith</td>
</tr>
<tr>
<td>W3CGU</td>
<td>C. H. Grossarth</td>
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**CENTRAL DIVISION**

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<tbody>
<tr>
<td>Illinois</td>
<td>W3RI</td>
<td>Fred H. Jinda</td>
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<tr>
<td>Indiana</td>
<td>W3RI</td>
<td>Arthur L. Brain</td>
</tr>
<tr>
<td>Kentucky</td>
<td>W3RI</td>
<td>C. W. Moominburg</td>
</tr>
<tr>
<td>Michigan</td>
<td>W3RI</td>
<td>Kenneth F. Conroy</td>
</tr>
<tr>
<td>Ohio</td>
<td>W3RO</td>
<td>Robert P. Irvine</td>
</tr>
<tr>
<td>Wisconsin</td>
<td>W3WI</td>
<td>E. A. Cary</td>
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**DAKOTA DIVISION**

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<tr>
<td>Hartwell</td>
<td>W3DL</td>
<td>T. B. Barush</td>
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<tr>
<td>South Dakota</td>
<td>W3DL</td>
<td>Charles J. Hammersome</td>
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**DELTA DIVISION**

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<tr>
<td>H. E. VeIta</td>
<td>W3DL</td>
<td>19 Kerr Rd.</td>
</tr>
<tr>
<td>W. J. Laudon, Jr.</td>
<td>W3DL</td>
<td>128 Crawford St.</td>
</tr>
<tr>
<td>J. H. Weirn, Jr.</td>
<td>W3DL</td>
<td>12 Humphrey St.</td>
</tr>
<tr>
<td>M. Elton</td>
<td>W3DL</td>
<td>206 California Ave.</td>
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**HUDSON DIVISION**

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<tbody>
<tr>
<td>Robert E. Hight</td>
<td>W3DL</td>
<td>526 South St.</td>
</tr>
<tr>
<td>B. L. Rauchung</td>
<td>W3DL</td>
<td>92 Claymont Ave.</td>
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**MIDWEST DIVISION**

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<tbody>
<tr>
<td>Phil D. Boardman</td>
<td>W3DL</td>
<td>325 Kirkwood Blvd.</td>
</tr>
<tr>
<td>O. J. Spetter</td>
<td>W3DL</td>
<td>385 Western Ave.</td>
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**NEW ENGLAND DIVISION**

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<th>State</th>
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<tbody>
<tr>
<td>Frederick E. Jr.</td>
<td>W3DL</td>
<td>19 Merril Rd.</td>
</tr>
<tr>
<td>John W. Johnston</td>
<td>W3DL</td>
<td>128 Crawford St.</td>
</tr>
<tr>
<td>Albert N. Giddis</td>
<td>W3DL</td>
<td>12 Humphrey St.</td>
</tr>
<tr>
<td>Frevor C. Noble</td>
<td>W3DL</td>
<td>206 California Ave.</td>
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**NORTHERN DIVISION**

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<th>State</th>
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<tbody>
<tr>
<td>Richard J. Box</td>
<td>W3DL</td>
<td>Box 301</td>
</tr>
<tr>
<td>Nolla H. Hart</td>
<td>W3DL</td>
<td>Box 262</td>
</tr>
<tr>
<td>O. W. Viera</td>
<td>W3DL</td>
<td>1502 McPherson St.</td>
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**PACIFIC DIVISION**

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<tr>
<th>State</th>
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<tr>
<td>A. O. Adams</td>
<td>W3DL</td>
<td>214th Infantry Brigade</td>
</tr>
<tr>
<td>Edward W. Heim</td>
<td>W3DL</td>
<td>318 Hawthorne Ave.</td>
</tr>
<tr>
<td>Charles J. Camp</td>
<td>W3DL</td>
<td>70 Filler Ave.</td>
</tr>
<tr>
<td>Harold J. Burchett</td>
<td>W3DL</td>
<td>716 West Sixth St.</td>
</tr>
<tr>
<td>Alan D. Whittaker, Jr.</td>
<td>W3DL</td>
<td>731 Arlington Ave.</td>
</tr>
<tr>
<td>James E. Thompson</td>
<td>W3DL</td>
<td>714 East Bracht St.</td>
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**ROANOAKE DIVISION**

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<tr>
<td>H. S. Carter</td>
<td>W3DL</td>
<td>159 Camp St.</td>
</tr>
<tr>
<td>Charles M. Waff, Jr.</td>
<td>W3DL</td>
<td>P.O. Box 1212</td>
</tr>
<tr>
<td>Dr. Wm. R. Eilifsdatter</td>
<td>W3DL</td>
<td>Route 1, Box 398</td>
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**ROCKY MOUNTAIN DIVISION**

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<tr>
<th>State</th>
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<tbody>
<tr>
<td>Glen Glasscock</td>
<td>W3DL</td>
<td>2160 South Josephine St.</td>
</tr>
<tr>
<td>Arvy W. Clark</td>
<td>W3DL</td>
<td>260 So. 9th St.</td>
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**SOUTHEAST DIVISION**

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<tr>
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<tr>
<td>James E. Thompson</td>
<td>W3DL</td>
<td>714 East Bracht St.</td>
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<tr>
<td>Philip A. Mcmasters</td>
<td>W3DL</td>
<td>SC-PAC</td>
</tr>
<tr>
<td>Edward J. Collins</td>
<td>W3DL</td>
<td>C.C. Capp Lawrence</td>
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**SOUTHWEST DIVISION**

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<tr>
<th>State</th>
<th>S.C.M.</th>
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<tbody>
<tr>
<td>Howell L. Brown</td>
<td>W3DL</td>
<td>120 N. El Molino Ave.</td>
</tr>
<tr>
<td>C. C. Day</td>
<td>W3DL</td>
<td>&quot;La Posta Quebrada&quot;</td>
</tr>
<tr>
<td>Harry A. Ambler</td>
<td>W3DL</td>
<td>4101 Hamilton St.</td>
</tr>
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**WEST GULF DIVISION**

<table>
<thead>
<tr>
<th>State</th>
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<th>Address</th>
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<tbody>
<tr>
<td>Michael M. Cobb</td>
<td>W3DL</td>
<td>120 N. El Molino Ave.</td>
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<tr>
<td>Carter L. Simpson</td>
<td>W3DL</td>
<td>&quot;La Posta Quebrada&quot;</td>
</tr>
<tr>
<td>Ammon O. Young</td>
<td>W3DL</td>
<td>4101 Hamilton St.</td>
</tr>
<tr>
<td>Joseph M. Eldott</td>
<td>W3DL</td>
<td>SC-PAC</td>
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<tr>
<td>Richard M. Cobb</td>
<td>W3DL</td>
<td>Box 185</td>
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<tr>
<td>Carter L. Simpson</td>
<td>W3DL</td>
<td>3010 So. 4th St.</td>
</tr>
<tr>
<td>Ammon O. Young</td>
<td>W3DL</td>
<td>4801 Eli St.</td>
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**MARITIME DIVISION**

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<tr>
<th>State</th>
<th>S.C.M.</th>
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<tbody>
<tr>
<td>A. M. Crowell</td>
<td>W3DL</td>
<td>69 Dubuque St.</td>
</tr>
<tr>
<td>John Perdue</td>
<td>W3DL</td>
<td>229 Askin Boulevard</td>
</tr>
<tr>
<td>QUEBEC DIVISION</td>
<td>W3DL</td>
<td>Stan Comach</td>
</tr>
<tr>
<td>John Perdue</td>
<td>W3DL</td>
<td>780 Brault Ave.</td>
</tr>
<tr>
<td>John Perdue</td>
<td>W3DL</td>
<td>611 1st Ave., N. W.</td>
</tr>
<tr>
<td>Douglas G. Smith</td>
<td>W3DL</td>
<td>1214 Burnaby St.</td>
</tr>
<tr>
<td>A. J. R. Simpson</td>
<td>W3DL</td>
<td>71 Thelmo Mansions</td>
</tr>
<tr>
<td>Wilfred Skafe</td>
<td>W3DL</td>
<td>2040 McTavish St.</td>
</tr>
</tbody>
</table>

* Officials appointed to act until the membership of the Section choose permanent S.C.M.'s by nomination and election.
The American Radio Relay League

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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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1010 Shoreham Building, Washington, D. C.

Address all general correspondence to the executive headquarters at West Hartford, Connecticut.
ONE of the saddest objects in the radio world is an amateur who can’t make conversation. (Prize for the very saddest object goes to the bird caught up by a chap who can’t stop conversing! It was this situation which called forth the invention “Well, I won’t keep you any longer, OM!”) But we’re talking about those who have trouble making conversation, in a game the very foundation of which is personal contact.

One of the largest appeals of amateur radio is the diversified contacts it provides. The next station worked may be a school lad or a retired merchant or a housewife or an auditor, a tennis star or a truck driver, a yacht designer or a dentist. The naturally gregarious flourish in such a profusion of possibilities but the introspective have difficulty in breaking down the barriers of reserve. On this very page we have smiled, perhaps scornfully, at the “formula QSO” we hear so often: “GE tnx OM fr FB sigs RST 579x hr in Spittoon wx hr cold es cldy pwr hr 60 watts wl wtsa OM? ar,” and its companion reply: “RE tnx OM fr FB rpt ur FB sigs RST 589x hr in Peruna wx hr cldy es cold pwr hr 70 watts wl wtsa OM? ar.” But we must admit that this humble device arose spontaneously, to fill a very real need... It is “openers,” a thing to break ice, and from just so inauspicious a beginning many firm radio friendships have flowered.

The difficulty that the reticent seem to find is their inability to go past this point—the stereotype ends here except for the formula conclusions, equally well known. To get past this hurdle and really begin to know the other fellow, the amateur is on his own, he must commence to make his own conversation. Sometimes it is a hard job. We met a man on the air the other night who gave us a good lesson in breaking the ice. The QSO was on the 7-mc. band and so got off to the usual formula start. It didn’t look any too bright. Then our correspondent said, “Well, now, let’s know each other better. I’m 44 years old; I own a garage in this town of 500 people; I also do electric welding. Have two children. What do you do, and how old are you?” That was his particular ice-breaker and it worked splendidly. It led to an enjoyable 40-minute chat. We know something about that man now, we like him, and we’re looking forward to meeting him again.

Let the timid, then, devise a few ice-breakers for themselves. Jot down a few things to talk about. We don’t have to pry into each other’s souls but each new QSO offers warm human possibilities that far transcend mere shop-talk about gear and circuit conditions. First step in learning to visit over the air is to be prepared to do your part of the conversing, by arming yourself with a few openers.

Another suggestion: It is difficult to remember the things the other fellow talked about, the questions he asked. If the contact is to go on, its thread must not be lost. When interference conditions are good and a smooth fist spins out the words at the other end, one does not need to copy; one simply listens. It is then easy to jot down “topics,” thoughts generated by the other chap’s remarks, the things he asked about. When interference is bad it is better to copy, for a few letters in random words often show by examination what was said even though most of the words were lost. If one is copying, a useful device is to underscore the questions asked, the key words that represent ideas to be commented upon. By either of these methods one is prepared for a quick come-back and the execution of his part in sustaining the conversation.

One final cliche needs ripping into: “Hpe cu agn sn OM.” When you’ve met a fellow you like well enough to want to know better, why not make a schedule to see him again? Many a splendid possibility is passed by in overlooking this workable way to another contact. Without it, you’re likely never to “ce him agn.” When you meet again as the result of a schedule you’ll feel like old friends, both of you. In fact, you’re on the way, for you have something now in common—your previous QSO. It’s much more satisfying than the restless flitting from call to call, never progressing beyond the formula stage.

Radio is a tool, we its master—ours to use for human ends as well as technical ones.

THE recent remarkable performance of the 28-megacycle band naturally has attracted a considerable number of new-comers. That is splendid, for there is still plenty of room and a good time is being had by all. But amongst the new arrivals are quite a few whose signals do not meet the standard set for that band by regulations. Attracted by the possibilities of easy worldwide DX, a number of 50-mc. fellows have hurriedly made up larger coils for the 28-mc. band.
and endeavored to join the parade, with a resultant rather atrocious messing-up of things in general; and concerning this state of affairs we'd like to say a few words.

The 28-mc. band, it seems to us, is to be approached only as an extension of the technique of the lower frequencies. The practices of the 56-mc. band cannot be applied to it. It is not an easier 5-meter band; it is a harder 20-meter band.

The very fact that 28 mcs. is good for world DX at favorable times in the solar cycle, as at present, resulted in the decision a year or so ago to extend it to the regulations which govern all the lower-frequency bands. Thus there is required for it stability of carrier, pureness of supply, control of modulation and freedom from wobblulation precisely to the same extent as in the bands below 14.4 mc.

Five-meter technique is still developing; it is not yet crystallized. The band is wide open for all forms of experimental work and, so far as regulations themselves are concerned, anything goes. But it is improper to invade "ten" with these same practices. Modulated self-excited oscillators may be tolerated at local ranges on 56 mc., and indeed the superregen receivers of that band receive such signals very well. But when such equipment is put on 28 mc. the result is painful for all concerned. The signals are simply smears, the receivers customarily used in that band can't accept them, the superregen receivers themselves radiate all over the place, and nobody gets anywhere. We would like to point out to these OM's that this is all wrong, both technically and from the standpoint of regulations. "Ten" is not part of the u.h.f. family, and the requirements of F.C.C. regulations are to be met only by extending to it the methods of our lower-frequency bands. Please give ear, fellows: let us put in the 28-mc. band only signals that stand still when they're modulated by mike or key.

K. R. W.

The Eighth International DX Competition

March 14th-22nd

All Hams, the world around, are invited to take part in A.R.R.L.'s Annual DX Contest. The four major features of contest operation are:

1. The exchange of a six figure serial number group, between W/VE and DX stations, counting both parties to the QSO three points if an exchange is completed in both directions. Numbers consist of the three-figure report on the station you are working plus three self-assigned numerals that stay the same throughout the contest.

2. A multiplier for the total of points made through such exchanges by either the number of countries (by I.A.R.U. prefix list) or the number of W and VE licensing areas with which successful exchanges have been made.

3. Operation in different frequency bands is credited by the fact that the number of countries or areas for multiplier shall consist of those worked in band one, plus those worked in band two, plus those worked in band three, etc.

4. A total time of operation period—90 hours at any time in the nine-day contest period with no penalty. (A contestant can work as many additional hours as he pleases in the nine days, but scores are reduced in proportion to the excess hours for all time over 90 hours.)

5. For W/VE's a "quota system" makes the maximum number of stations that can be worked in any one country three (for each band). There is no limit for others than W/VE.

See February QST for rules and announcement in full detail, with which various suggestions to assist in successful and pleasurable DX operation have been incorporated. Mark your calendar now and plan to take part with amateur operators everywhere in . . . The Eighth International DX Competition.
Operating Noise-Silencing Units
Practical Hints for the Best Silencing Results

By George Grammer*

While the ideal way of incorporating the noise-silencing circuit described in February QST1 in a receiver is to make it an integral part of the set, naturally enough most amateurs have shown great interest in the separate-unit idea because it can be applied to existing superhet receivers, many of which do not have the extra chassis room necessary for the installation of two additional tubes and a diode transformer. Experience of the past few weeks, both here and on the part of amateurs in the field, has shown that certain special problems are likely to be encountered in getting such units to work properly, these depending principally upon the particular receiver used and the method of making connections between receiver and noise-silencing unit.

Probably the most prevalent complaint is that of loss of receiver gain when one of the i.f. tubes in the receiver is replaced. This, of course, has nothing to do with the silencing circuit; it is simply a matter of successfully substituting the 6L7 for the existing i.f. tube. Since the 6L7 is capable of giving about the same gain in i.f. circuits as any of the tubes normally used for that purpose, the logical deduction is that there is something wrong with the method of connection if the receiver gain is greatly reduced.

One point which was immediately discovered by several workers is that ordinary rubber-covered shielded wire is entirely unsatisfactory for making the r.f. connections between the i.f. input and output circuits and the 6L7. Not only does such wire have quite high capacity, even in short lengths, but the losses in the rubber insulation employed also appear to be unduly high. The latter will cause a reduction in signal strength; the former may make retuning the i.f. circuits of the affected stage impossible. The material to use is the type of shielded cable measuring about a half-inch in diameter, having a small rubber insulated wire at the center, the intervening space being filled with cord. This has considerably lower losses and much less capacity than the ordinary shielded wire.

At that, it will pay to be very sparing in the use of even the large cable. The shorter the r.f. connecting leads the better. This is particularly important not only from the loss standpoint but also because the leeway in i.f. transformer adjustment varies considerably with some receivers. It must be possible to retune the i.f. circuits to resonance if the amplifier is to work. If it happens that in the particular receiver used the i.f. trimmers are normally working near minimum capacity, even a short length of shielded lead may add enough to the circuit to make exact retuning impossible. With air condensers having stops, this condition will be evident if the end of the condenser scale is reached before the resonance peak is passed through. With condensers which do not have stops, however, an apparent peak—which may be quite far from actual resonance—may be obtained at the minimum capacity setting. This will

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Noise About Noise

At last we know just how to crash the newspapers and news magazines of the country. All you need is to develop a successful noise silencer for radio receivers and write a quiet, conservative QST article about it. Of course it takes a few years of persistent laboratory work and original thinking to make the silencer a possibility, but from then on, no effort is necessary.

The publicity given us by the press as large is, of course, deeply appreciated. We are human enough to enjoy seeing a fellow like Jim Lamb get the credit that is due him. We get somewhat griped, though, at the way in which a certain fringe of the papers and magazines commonly violate all the ethics of the game—not to speak of the copyright law—in crude attempts to turn some of the credit in their own direction. Already the development presented by QST is being adopted by new and strange parents. Before long there will surely be a host of "Smith Noise Eliminators," "Brown Static Quenchers" and the like bursting into print. It is obviously futile to hope that this most recent QST development will fail to butter the bread of the same aspiring radio re-inventors who have done so well by us in the past.

A form QST will contain a further load of authentic dope on the new development with particular emphasis on the many variations necessary for completely effective silencer action under the different conditions found in different receivers.—EDITOR.

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result in reduced gain and decreased selectivity. It all boils down to the fact that the r.f. leads should be as short as the layout of the receiver will permit.

Since capacity to ground is of little consequence in the cathode lead, ordinary shielded wire may be used for this connection.

A second point to be watched is that of the tuning range of the diode transformer used. It is essential, of course, that its frequency be adjustable in close proximity to the socket of the i.f. tube to be replaced. The necessary r.f. and d.c. leads can then be run through appropriate holes drilled in the receiver cabinet, making short connections. An even more desirable method is to substitute a metal tube socket for the one in the set and install the 6L7 right in the receiver. The plug-in type unit shown in last month's QST generally will require a greater r.f. lead length and may result in some reduction in receiver gain, even though the silencing action is entirely satisfactory. This can be tolerated if the receiver has more than enough gain in the first place, but at best represents a makeshift method of doing the job.

A few notes on operation

A résumé of the tuning of the silencer unit should be of some benefit. With the unit wired in place, the first step is that of readjusting the i.f. circuits affected by the tube substitution; these are two only: the grid trimmer of the input transformer and the plate trimmer of the output transformer. The adjustment may be made on a steady incoming signal using the set's tuning meter, if there is one, as an indicator. In the absence of any measuring device the adjustment can be made on set noise or on a steady modulated signal, preferably with the beat oscillator off. This first lining up may be done with the grid cap disconnected from the noise amplifier, whose grid is in parallel with that of the 6L7. Familiarity with the receiver will show whether or not the gain is adversely affected by the substitution of the 6L7 for the regular i.f. tube. If there is a marked reduction in gain one of the reasons previously cited probably will be the cause and steps should be taken to overcome the defect.

Assuming that the gain is found to be satisfactory, the grid cap may be replaced on the noise amplifier tube and the grid circuit i.f. trimmer once more readjusted to compensate for the extra capacity added to the circuit when the noise amplifier is cut in. The threshold control, R24 in Fig. 1, should be in the "off" position (all resistance in circuit). When the grid trimmer is readjusted the gain should be the same as before. It will not be necessary to touch the plate trimmer.

The next step is to turn the noise control down slowly from maximum resistance until a point is reached where there is a sudden reduction in background. At this setting the bias on the noise amplifier and rectifier has been reduced to the point where these two tubes start to work, with the result that negative bias is being applied to the No. 3 grid of the 6L7, reducing its gain. With the control set just on the edge of this condition, tune in a weak signal and adjust the trimmer on the diode transformer to resonance, indicated by a reduction in signal strength. Signals of average strength should cut themselves off completely when the diode transformer is adjusted properly. Moving

(Continued on page 78)
A Low-Cost Crystal Transmitter
Complete Details of a Simple Outfit Using Receiving Tubes
By Vernon Chambers,* W1JEQ

This relatively simple transmitter certainly delivers the goods and is capable of operation on four bands. RST 449 sigs were banged over into England during the R.S.G.B. 80-meter tests. Receiving tubes are used in the interest of low cost but at that, a good ten watts of output are available. Although designed to operate with a separate crystal for each band, doubling can be accomplished with some reduction in power. A separate crystal for each band, down to 40 meters (then doubling for 20 meters) eliminates the usual expensive and complicated doublers.

This is the type of unit which will serve admirably as the basis for progress into the realm of high power.

The oscillator circuit
Fig. 1 shows us two familiar circuits, the pentode crystal oscillator and an amplifier with two tubes in parallel. Both circuits use 2A5’s. In the oscillator we find the crystal hooked between grid and cathode. Resistor R1 furnishes grid bias and RFC1 prevents the flow of r.f. current through the leak. The high-voltage is dropped to a value suitable for the screen grid through resistor R3. Condensers C3 and C4 are screen and plate by-pass condensers, respectively. High voltage is applied to the ground end of the tank circuit L1, C1. In all cases the negative high-voltage lead is considered as “ground.” The plate goes to the ungrounded end of circuit L1, C1, and the stator plates of C4.

The amplifier
The grids of the two amplifier tubes are capacity-coupled to the oscillator by condenser C4. All terminals on the two amplifier sockets are connected in parallel. Resistor R2 and RFC2 serve the same purpose as R1 and RFC1 in the oscillator. The tube plates are tied to one end of the tank circuit C5, L2. The other end of the circuit is connected to the grids through the neutralizing condenser C6. The rotary plates of C4 are grounded.

A plan view of the simple transmitter
The crystal oscillator group is at the extreme left. The tube, crystal, coil and tuning condenser can be identified readily. Along the rear edge of the base is the four-pin cable socket and the two terminals for the key. Remaining items of importance are the coupling condenser (fitted with a knob) very near the center of the base and the neutralizing condenser sitting alongside the amplifier tuning condenser.

The oscillator circuit
Positive high voltage is applied to the tank coil center tap through RFC3. Link coupling is used between L2 and the antenna tuning unit.

Constructional details
A front view of the transmitter shows the oscillator at the left side, the amplifier at the right. In the oscillator unit, a five-prong socket serves as a crystal mount. Centered about 3 3/4 inches to the right is a four-prong socket for the oscillator coil. Slightly to the rear of these two sockets is the six prong 2A5 socket. Condensers C1 and C2, together

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with the plate current meter, are mounted on the panel.

Eight inches in from the right end of the board and centered between the front and back, the two amplifier tube sockets are mounted. The amplifier tank coil is located behind condenser $C_3$. This coil is set up on two Johnson 20J stand-off insulators equipped with G.R. jacks. A small piece of brass is drilled to fit the stator terminals of one section of $C_3$, and to this the Cardwell Trim-Air neutralizing condenser is fastened.

Centered between these two circuits, and in the middle of the board, the coupling condenser $C_5$ is mounted in an upright position with the aid of a small angle bracket. Behind $C_5$, is a four-prong socket serving as a terminal for plate and filament leads. To the right of this socket is a small two-prong sockets (National).

The baseboard measures 9 by 21 inches. It was given a couple of coats of duco white enamel for appearance's sake only. The panel is a 7½ by 21-inch piece of crackle-finished pressed-wood (tempered Masonic).

**WIRING**

Although most of the wiring can be seen in the picture, perhaps a few suggestions will be helpful. When wiring the tank circuits try to make all connections short and direct. The only wires beneath the base are those hooking the tube filaments in parallel and transferring positive high voltage from the oscillator tank circuit to the amplifier tank coil center-tap. Power leads are brought to the socket mounted for that purpose through an eight-wire cable. The filament voltage drop was excessive in the ordinary four-wire cable, hence the suggestion of an eight-wire cable. Two wires can be used for high-voltage leads, the remaining six being divided into two groups of three each, thus giving three parallel wires for each filament lead. One side of the key terminal strip is connected to negative plate voltage and the other to the amplifier cathode. The two amplifier tube sockets are tied in parallel, the corresponding connections of each socket connected together. When making grid, plate and cathode connections, try to do so at points midway between the sockets. The ground connection to the rotary plates of $C_3$ should be as short as possible.

**COILS**

The most efficient way of operating the transmitter is with a separate oscillator and amplifier coil and a separate crystal for each band. In this way, maximum output can be had. If amplifier doubling is desired, the crystal circuit is adjusted and equipped to operate on one band and a coil for the next lower band is placed in the amplifier. The rig then is put through the usual tuning procedure and the output will be on the second harmonic of the oscillator and, of course, one band higher in frequency. Doubling can also be had with the crystal and both coils designed for one band, by decreasing the amplifier tank capacity until the second harmonic is reached. In any case, doubling will show quite a decrease in output, and with crystals as inexpensive as they are, the business of doubling in a transmitter of this type is hardly justified.

The oscillator coils for 160, 80 and 40 meters are wound on Hammarlund four-prong coil forms. These forms have a diameter of 1¾ inches and a winding length of 2½ inches. All coils are of 18 d.c.c. wire. The number of turns for the three oscillator coils are as follows: 160 meters, 43 turns close wound; 80 meters, 22 turns; and 40 meters, 14 turns. The windings of the 80- and 40-meter coils are spaced the diameter of the wire. There is no 20-meter coil for the oscillator, as 20 meters is reached by doubling in the amplifier.

All amplifier coils are wound on 4½-inch pieces of 2-inch diameter bakelite tubing. These coils are mounted on stand-off insulators as previously explained. A soldering lug under each jack serves as a wire connecting point. A third plug in the exact
center of the coil provides the center tap at which high voltage is connected.

A handy way to wind the amplifier coils is to start at the center tap and wind out. All coils require the same winding space. The windings are spaced \( \frac{1}{4} \)-inch apart at the center to clear the G.R. plug located there.

These coils have the following turns: 160 meters, 36; 80 meters, 20; 40 meters, 10; 20 meters, 6. These windings are, of course, all center-tapped. The 160-meter coil turns are wound without spacing. Turns on the other coils are spaced to occupy the same length as that of the 160-meter coil.

**TUNING AND ADJUSTMENT**

Crystal oscillation is the first thing to obtain. With \( C_4 \) at a low capacity setting and high voltage off the final, the oscillator is tuned to resonance (plate current dip or glow in neon bulb held against the plate lead). If the neon bulb is used, its brightest glow indicates when the crystal is functioning the most efficiently. Five mils or so above minimum is probably the best setting for plate current, if the meter only is used for adjustment.

Neutralizing comes next. This is accomplished by holding the neon bulb against the oscillator plate lead and tuning the amplifier to resonance. If during this procedure the neon bulb should flicker, the final is not neutralized. \( C_4 \) is then tuned in slow stages until the amplifier can be tuned through resonance without the flicker. High voltage is disconnected from the tank during these adjustments.

Now that we are ready to apply the oscillator excitation to the amplifier grids, it is a good idea to fix up a gadget to help us estimate the amount of output that can be obtained from the rig. A ten-watt light bulb connected to five or six turns of insulated No. 18 wire is connected from the Fahnestock clip to one G.R. jack and then to the condensers stator terminal.

With no load on the final (and the key closed) it is tuned to resonance. If a load is now coupled on (light bulb, neon bulb or antenna) the plate current will increase appreciably. If either of the two bulbs constitute the load, maximum glow indicates maximum output. The brightest glow with the least plate current is the proper adjustment. Increasing the capacity of \( C_3 \) at this time, may result in an increase of output. This increased capacity may stop crystal oscillation, however. Should this happen, the amplifier need not be touched again; it is only necessary to reset \( C_3 \) and possibly retune the crystal slightly.

If at 160 meters trouble is encountered in making the oscillator work, this is because in pentode circuits the only method of feedback is through the rather small grid-plate capacity of the tube. This feedback occasionally is not great enough to permit crystal oscillation. This trouble, if run across, can be eliminated by soldering a piece of insulated wire to the tube plate and bending it around to a position near the grid. Usually clipping it under one of the grid wires does the trick. A little experimenting with its nearness to the grid will decide a correct point.

**ANTENNA TUNER**

Fig. 2 shows the antenna tuning unit. This tuner has been used with a voltage-fed antenna, cut to a half wave for 3.5 mc. The antenna in this case is 132 feet long. Other types of antennas and tuners can be used, of course. Reference to the Antenna Chapter of the A.R.R.L. Handbook will show any number of schemes adaptable to the rig.

The mount board for the tuner is 4 1/2 by 8 inches. Holes are drilled for two G.R. jacks spaced 3 inches between centers. The condenser is mounted on two small angle brackets. A Fahnestock clip at the coil end serves as an antenna terminal.

The coil is in parallel with the condenser. A wire is connected from the Fahnestock clip to one G.R. jack and then to the condensers stator plates. The rotary plates go to the other G.R. jack.

Tuner coils are wound on 3/16-inch long by 2-inch diameter pieces of bakelite tube. No. 18 d.c.c. wire is used for all coils. G.R. plugs, 3 inches between centers, serve as winding terminals and in turn plug in the jacks on the baseboard. The number of turns are as follows: 160 meters, 58 (close-wound); 80 meters, 21 (spaced diameter of wire); 40 meters, 12 (s.d.w.); 20 meters, 5 (s.d.w.).

Five or six turns of insulated wire (ordinary "push-back" wire is suitable) wound around this tuner coil and likewise around the amplifier coil, (Continued on page B7)
THE 3500-kc. transoceanic tests held by the R.S.G.B. during December, with the cooperation of European societies and A.R.R.L., were reasonably successful with a good number of contacts being established, and scores of calls heard. The one regrettable feature was the seeming disregard of, or carelessness in not observing, the “Silent Periods” by many amateurs on this side of the “pond.” By sending “Test RSGB,” “CQ DX,” etc., during periods specifically set aside for listening, these amateurs through their thoughtless transmissions not only spoiled many an operator’s chances of pulling through a DX signal, but also wasted their own.

Mr. H. J. Powditch, G5VL, under whose guidance the tests were arranged, writes as follows:

“Outstanding was the work of G2ZQ (C.W.). With 120 watts he averaged a contact every five or six minutes while on the air. Among the low-power fellows, G2DQ got across to VE1EI on ‘phone with an input of just 7½ watts! G5KG with 10 watts had some 18 contacts, 9 on ‘phone. I think the tests have demonstrated:

“(1) That 80 meters is exceedingly good for trans-Atlantic working, powers of 50 watts being quite reliable. Several stations here comment that reports received are higher QRK than on higher frequencies.

“(2) That, even on low powers, contacts are quite possible.

“(3) That, given schedule working and known frequencies, regular working is quite possible.

“(4) That American and Canadian stations, on their present powers, are receivable almost any night here. The general opinion is that your stations do not expect calls from Europe and do not appreciate their strength and consistency here.

“(5) That more schedule working is called for.”

G6PF, one of most consistent Europeans, used less than 20 watts.

In spite of the lack of cooperation of so many careless fellows, however, some good DX was pulled through and we are able to present a good-sized list of “calls logged.” The lists of stations logged and worked will speak for themselves. Outstanding among the United States C.W. operators was WISZ, who made 9 contacts with 8 different stations during the First Period (Dec. 15th-18th, 2345-0020 GMT each night), and 28 contacts with 15 different stations during the Second Period (Dec. 19-22, 0500-0800 GMT each night). W1SZ worked stations in Great Britain, Germany, France, Switzerland, Norway and Netherlands. W8FIP worked 11 different stations. W1BKL, W1ME and W1TS each worked 9 different stations.

The outstandingly successful ‘phone operator among the W/VE group was VE1EI, who made 14 contacts with 5 different British stations: G2DQ, G2IN, G6KG, G5VL and G6LL. A good number of ‘phone stations were logged in Great Britain, the number being especially high since numerous British Receiving Stations were active in the tests.

G6PF, one of most consistent Europeans, used less than 20 watts.

In the lists of stations logged asterisks are used to indicate the number of different stations reporting reception, as follows:

- No asterisk: . . . . . . . . . . Reported by 1 station only.
- * . . . . . . . . . . . . . . . . Reported by 2 or 3 stations.
- ** . . . . . . . . . . . . . . Reported by 4 or 5 stations.
- *** . . . . . . . . . . . . . Reported by 6, 7, 8, 9 or 10.
- **** . . . . . . . . . . . Reported by 11, 12, 13, 14 or 15.

‘Phone stations are indicated by an (f) after their calls. In the “Stations Worked” lists a figure in parenthesis after a call indicates the number of contacts made with that station during the period in question. The various lists follow. We hope your call is among them!

E. L. B.
Transmitter Band-Switching Systems
A Survey of Practical Circuit Arrangements
By George Grammer, Assistant Technical Editor

Fundamental to a discussion of transmitter band-switching is an appreciation of the end to be achieved by its use. Just what sort of picture is conjured up in the mind of the amateur who thinks about band-switching? A single knob affair, so rapid in operation that if one should hear a CQ on some band other than that to which the transmitter is tuned a flip of the wrist would put the set there in time to pound out an answer? Or is it something which merely changes the inductances in the various stages so that the circuits are capable of being tuned for output on the band desired? There's a vast difference between the two, and the solution of the first is much the simpler—all it requires is separate transmitters and separate antennas for each band. Naturally it's expensive, especially when any power is involved.

However, we rather believe that most amateurs think of band-switching as something applied to one transmitter. In that case the one-knob business, while not beyond attainment, is certainly not simple of solution nor is it likely to be inexpensive. The transmitter switching problem is not readily comparable to that in receivers. Not only is there an infinite variety of transmitting circuits, as compared to the quite standardized receiver input arrangement, but the greater physical size of the transmitter, the necessity for more accurate tuning because of the power handled, the required provision for antenna coupling, and the large number of antenna systems in use, each with its different tuning requirements, all introduce complications which simply are not considered in receiver switching design.

If in an attempt to duplicate the easy switching which characterizes commercial receivers the same technique is adopted, it would be found that except for tube cost, the total cost would be almost the same as for individual transmitters for each band. Receiver switching as commonly practiced involves the use of separate coil sets for each band, individually adjusted by trimmer condensers. The corresponding transmitter set-up would require not only separate coils, but the separate trimmers would have to be regular transmitting condensers, since there are no cheap transmitting “trimmers.” Nevertheless this principle can be applied with some benefit, although its application is necessarily limited if the cost is to be kept down. With pre-tuned separate circuits, however, the ideal of one-flip band-change can very nearly be realized.

Because so few amateur transmitters are exactly alike it is difficult to discuss band-switching except in terms of a single stage. We propose here to look over the various methods of stage switching which have been described from time to time, necessarily leaving complete transmitter design to the individual concerned.

Switching Tanks
One of the first systems that comes to mind is that of switching complete tank circuits, already mentioned. A representative arrangement is shown in Fig. 1, coupling between two stages being indicated. Parallel feed is shown for both plate of driver and grid of amplifier, although series feed readily could be used on either one simply by joining the lower ends of the various tank circuits together and inserting a by-pass condenser between the junction and ground.

This system offers about the maximum of speed and convenience, but is relatively expensive since separate tank circuits are required for each band to be covered.

FIG. 1—ONE METHOD OF BAND-CHANGING—TANK SWITCHING
This system offers about the maximum of speed and convenience, but is relatively expensive since separate tank circuits are required for each band to be covered.

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Switching Tanks
One of the first systems that comes to mind is that of switching complete tank circuits, already mentioned. A representative arrangement is shown in Fig. 1, coupling between two stages being indicated. Parallel feed is shown for both plate of driver and grid of amplifier, although series feed readily could be used on either one simply by joining the lower ends of the various tank circuits together and inserting a by-pass condenser between the junction and ground.

This system is not wholly impractical from the expense standpoint when applied to a low-power stage, since midget condensers are relatively inexpensive and coils are easy to make. The switch should have good insulation and fairly low capacity between contacts to avoid stray excitation of unused tanks and possible resultant power loss. The coils should be arranged for minimum coupling; shielding is not necessary, although desirable. Shielded tanks of the type built up by W9DRD 1 are excellent for low-power stages handling up to 20 watts or so; special units for the purpose are now commercially available.

If the switching is to be kept simple, it is necessary that the amplifier tube be of a type

which can be driven directly from the plate end of the tank circuit and not require tapping down on the coil for maximum power transfer. If tapping is required, it will be necessary to gang two switches so that the proper tap is selected along with the desired tank circuit. Alternatively, if the tube combination is not suitable for straight-through coupling the load on the driver stage can be adjusted through the use of a suitably small grid coupling condenser. This generally entails some sacrifice of excitation power, however.

![Diagram of tank circuits]

**FIG. 2—SERIES TANK CIRCUITS FOR BAND-SWITCHING**

In some cases this simplifies the switching problem introduced when separate tanks are used, as discussed in the text.

It is hardly necessary to provide for shorting out the unused tanks, since the operating conditions are not comparable to those in receivers, where extra coils often must be shorted to avoid dead spots. Such shorting would require a special switch and introduce the very complications which we want to avoid. The simpler the r.f. circuit, the better.

**TANKS IN SERIES**

Another method of switching separate tanks, proposed by W6ZH,\(^2\) is shown in Fig. 2. In this case four separate tanks, one for each band, are in series, excitation being picked off at the desired frequency by the four-point switch. Providing suitable \(L/C\) ratios are used, the tanks resonating on bands other than that in use will offer negligible impedance at the operating frequency. In effect, then, only the desired tank is in circuit. The one precaution to be observed is that the \(L/C\) ratio should not be too high; if each tank consists of mostly coil and little condenser the impedance on other bands may be great enough to affect the operation of the circuit. The optimum \(L/C\) ratios as given by Robinson\(^8\) should be satisfactory.

When the driver tube is used as a doubler, the fact that a tank circuit tuned to the fundamental frequency is present should improve the efficiency without lowering the output on the second harmonic. Obviously the tube must either be neutralized or of the screen-grid type to prevent self-oscillation.

This type of switching offers an advantage over the arrangement of Fig. 1 in that a second switch is not necessary should it be desirable to take the excitation from taps on the coils instead of across each circuit as a whole. It should be readily apparent that all four of the taps could be on the coils just as well as between the tank circuits, as shown in the diagram.

**TAPPED COILS**

The separate tank method is, as we have already pointed out, relatively expensive and bulky except for low-power stages. For stages handling more than a few watts, it would seem to be more practical to use a tapped inductance, keeping the same tuning condenser for all bands.

A question which arises immediately in consideration of tapped coils is that of efficiency—or rather the extent of such losses as may be introduced by using only part of a large inductance, since the unused section is usually intimately coupled to the active section. Long ago it was found that "dead-end" effects were greatly lessened when the unused section of the coil was short-circuited instead of simply being allowed to float. Shorting, rather than tapping, is therefore the method of switching commonly employed. Typical circuits are given in Fig. 3.

Splitting the inductance in two parts with coupling between the two sections minimized, as indicated in the lower diagram, will be of some help in reducing losses, especially when four or more bands are to be covered. If the range to be covered is from 3.5 to 28 mc., for instance, one coil would take care of the 14 and 28 mc. bands and the other the 7- and 3.5-mc. bands, allowance being made for the fact that the smaller of the two coils is always in the circuit on these two lower-frequency bands.

There are two points to observe in shorting coils. The switch contact resistance and resistance of tap connections must be as low as possible. Considerable power loss will result if these resistances are not low, since the r.f. current flowing in the shorted section may be quite large. In stages handling several hundred watts, the current-carrying capacity of the switch becomes an important factor, not only because of this "idle" current but also because the regular tank current flows through the switch as well. Since the magnitude of both currents depends greatly on the loading of the circuit, being much less when power is being delivered to an external load, it is highly advisable to make all adjustments with the amplifier loaded, if possible. If it is necessary to operate the amplifier without load, it is highly advisable to make all adjustments with the amplifier loaded, if possible.

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\(^2\) Millen, "A Quick-Switch 'Phone Transmitter for Two-Band Operation," QST, November, 1936.

the plate voltage should be reduced to lessen the danger of burning out the switch. Switches now on the market will do a satisfactory job of shorting in kilowatt transmitters so long as the amplifier is loaded, but a few minutes operation at full plate voltage without load may spell the end of the shorting switch. This, despite the fact that the switch made by at least one manufacturer is capable of carrying around 75 amperes without damage!

The second point, established by some measurements made recently in the QST laboratory, is that shorting should always be from the low-potential or "cold" end of the tank, especially when three or more bands are to be covered. No observable loss is introduced so long as this rule is followed, even when a single coil is made to serve for four bands. If the shorting is from the "hot" end of the tank, the losses are negligible when two adjacent bands are to be covered, but are apparent, although not unduly high, when the third band is attempted.

Covering four bands with one coil appears to be completely impracticable if shorting is done from the high-potential end of the coil.

A good check of the efficiency of a shorting system can be obtained after a few minutes continuous operation of the amplifier. If any heat at all shows up in the tank, the active turns should be warmer than the shorted turns. Reversal of this condition indicates loss in the shorted section, in most cases traceable to relatively high resistance in the shorting mechanism.

On large coils where most of the turns are shorted for high-frequency operation (for instance, a 100-meter coil operated at 20 meters) it is not unusual for a potential gradient to develop along the shorted section. A neon bulb slid along the coil will readily show such a condition. Additional shorting at several points along a long coil would seem to be indicated in such a case. However, we were unable to measure any difference in losses whether the coil was shorted in several spots or simply as a whole; losses were negligible in either case so long as the shorting was done from the cold end.

SWITCHING BALANCED CIRCUITS

When balanced circuits—push-pull, or balanced circuits used for neutralized amplifiers—are switched, the same principles apply. Since the center of a balanced coil is the low-potential part, it is desirable to short outward from the center, as shown in Fig. 4. If more than two bands are to be covered, this means that two switches must be used; they may be ganged, of course. Two switches are likewise required if shorting is done from the high-potential ends inward, although as already pointed out this method preferably should not be used for covering more than two bands. In this case it is necessary that the switch arms be well insulated from each other and from ground, since the full tank voltage appears across the switches.

If circuit balance is to be maintained from one band to the next, it is necessary that the switching system be symmetrical. Care should be taken in mounting switches so that both will have the same capacity to ground, especially when the amplifier is mounted on metal.

OUTPUT COUPLING

So far the discussion has been confined to circuits considered simply by themselves, or simply coupled by the usual capacity method to a following stage. When it is necessary to couple out of the circuit by any other means the problem starts to become complicated, from both electrical and mechanical standpoints.

It is difficult, for instance, to use a single link for link-coupling to a following stage or to an antenna-tuning unit. A link which gives the proper coupling on one band is fairly certain to give too much or too little coupling on others. Too, it is necessary to put the link at the hot end of the coil if shorting is from the other end. Coupling to the cold end is desirable for reasons which have been discussed many times before in these pages; however, with coil shorting there is no choice in the matter because it is practically impossible to couple a link to shorted turns. Assuming a satisfactory solution of the number of link turns for various bands can be worked out, an additional switch is likely to be needed, in turn requiring more space and introducing mechanical problems, especially if the switches are to be ganged.

If the coupling is to be direct, through a tap on the tank coil, the situation is about the same as with link coupling—an additional switch, with an extra set of taps, is required. Taking the relatively simple case of a screen-grid output amplifier working into a pi-section antenna filter, this means that on top of a switching arrangement similar to that in Fig. 3 an additional switch with four extra coil taps will have to be installed—a total of two switches and seven taps to cover four bands. This arrangement was used for three

(Continued on page 89)
An Improved Speech Preamplifier
Details of a Flexible, High-Fidelity Unit
By Cyrus H. Fraser,* W8BBK

This article describes an improved preamplifier circuit in which the cost of construction has been reduced by the use of a resistance network used to connect the double button carbon microphone to the amplifier circuit thus eliminating the input transformer, and also shows a plate circuit having two tuned networks designed to increase the amplification at the high and low frequencies. This type of amplifier may be used to compensate for the deficiency of the dynamic speaker at the high and low frequencies, as in public address systems, or it may be used to compensate for the falling off of the noticeable hum which was eliminated and the frequency response of the amplifier was improved. With this input arrangement it may be necessary to use more than six volts of microphone battery to obtain normal microphone current, depending upon the type of double-button microphone used.

Briefly, from Fig. 1, the theory of the input circuit is as follows: As the diaphragm swings in direction A by the action of a sound wave the carbon granules are compressed on this side causing a decrease in resistance and an increase in current in side A, the current in side B decreasing at the same instant by a decrease in the pressure on the granules on this side. If the microphone is balanced, the current in side A will equal the current in side B.

The voltage at any instant impressed on the grid of the first amplifier tube will be the IR drop across R1, equaling the voltage across R2, R3 and R4.

If the microphone is not balanced, the wave form will be distorted by unequal voltage drops across R3 and R4.

This input circuit has less gain than one with an input transformer. If necessary this may be remedied by adding one more stage of resistance-coupled amplification to the succeeding circuit usually used with the preamplifier. This additional stage will be found cheaper than a high-grade input transformer, will have less loss at high and low frequencies, will take up less space than a high-grade input transformer which is necessarily large, and the additional stage is lighter and does not increase the hum level to any noticeable extent.

There has been some controversy regarding the advisability of increasing the amplitude of the higher audio frequencies on radiotelephone transmitters due to side band interference, but it is now generally conceded that when the station is used for voice only the amplitude of the higher frequencies of the voice is so small that no interference is noticeable. It is these higher frequencies or harmonics that make the speaker sound natural.

The plate circuit described here is composed of two tuned circuits resonant at 60 and 14,000 cycles. At the resonant frequency the impedance of the plate circuit is increased and consequently

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* 48 Glenwood Avenue, Buffalo, N. Y.
the overall amplification of the amplifier is increased. It can be seen that as the tube plate resistance increases, the amplification of the tube increases. In the case of resistance-coupled amplifiers one might wonder why we do not increase the plate load resistance indefinitely, to the end that the voltage amplification would equal the amplification factor of the tube. But if the plate resistance is increased to a large value we have an unstable plate circuit and the drop in voltage through the resistance becomes so great that an increased plate supply voltage is necessary to make up for the additional drop in the plate load resistance. We can increase the applied plate voltage but this increases the size and expense of the power supply with not enough increase in voltage amplification to warrant it.

The direct current resistance of the 200-henry choke should not be higher than 3000 ohms, and the 34-henry choke should not be over 400 ohms for efficient results. The lower the resistance the more gain will be obtained at the resonant frequencies; but if too low a resistance is used the amplification will be peaked at these two frequencies only, and the overall curve for the amplifier will be undesirable. At any other frequency than the resonant frequencies the plate load impedance will be lower and therefore the amplification will be lower. By using a 30,000-ohm resistance in series with the resonant circuits the amplification on frequencies between 60 and 14,000 is maintained at a slightly lower value than the amplification of the amplifier is increased. It can be seen that as the tube plate resistance increases, the amplification of the tube increases. In the case of resistance-coupled amplifiers one might wonder why we do not increase the plate load resistance indefinitely, to the end that the voltage amplification would equal the amplification factor of the tube. But if the plate resistance is increased to a large value we have an unstable plate circuit and the drop in voltage through the resistance becomes so great that an increased plate supply voltage is necessary to make up for the additional drop in the plate load resistance. We can increase the applied plate voltage but this increases the size and expense of the power supply with not enough increase in voltage amplification to warrant it.

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adjustment by sliding a smaller third strip up and down between the two. There should be very little sparking at the points. The vibrator should give out a vigorous buzz. It will pay to spend plenty of time experimenting with different thicknesses of paper and adjustments of the thumb screw. A fraction of a turn from where it works best, the points start arcing. You must have good points. They cost only a nickel a pair so have some spares. A little arcing usually spoils them in short order.

I have taken 40 watts from this outfit, but it is more stable at 35. I use 36 volts input, usually, sometimes only 30, which gives 30 watts output from the supply.

The keying relay is a Ford cut-out, stripped of wire and rewound full of No. 32 d.c.c. wire. A 1-µfd. condenser across the keying points may be advisable. The rectifiers are a pair of Type 1A. Full-wave rectification is used. Half-wave rectification didn't work at all. The filter consists of a

(Continued on page 64)

"Fists" I Have Seen

By F. H. Schnell, W9UZ*

Fred Schnell has built himself a tape recorder and is having a lot of fun examining "fist-prints." One of the chief things disclosed is that our ears are remarkable mechanisms to make anything out of some of the mangiest sendings the air. Some of it is pretty good but subject to easy improvement. The records reproduced in this article were made at random in the 7-mc. band. The recorder itself is inexpensive and can be made by any clever amateur. We shall have a description of it in an early issue.—EDITOR.

FULLY aware of the risk of severe "panning" for criticizing the other fellow's "fist," it is being done here with comments that seem pertinent towards correcting the mechanical faults. It is hoped that these comments will be accepted in the spirit in which they are offered. Much tinkering with the Mac key at W9UZ, making numerous adjustments to duplicate some of the typical errors, has been productive of results and some corrective suggestions are submitted. The business of recording is still too new and there is much to be learned about what the recorder reveals. Therefore, no definite statements can be made one way or the other in some instances. However, it is clearly evident that a great deal of room remains for improvement in "manipulation."

Running down the list: W2AYN: mechanically perfect with his automatic transmitter at 35 w.p.m.—that's the pattern! W3BPD: needs a wee bit better spacing, otherwise one of the best. W3BES: dashes too short and choppy. W9GMV: clipping it off at a pretty good rate but not enough spacing between words. W9MIK: not enough spacing, dashes of irregular length, but good adjustment on the dots. W3AJO: dot adjustment too light. W5COA: improper construction of the letter "C," too much spacing between the three dots and the dash of the letter "V" which makes it sound like "ST." 6 dots for the figure "8"—slow down the dots. W2DPB: dot contacts too close. W9DO: practically the same as W9GMV, although both of these operators clip it off at a merry rate. W9TYL: dashes too short. W3EM: dot contacts too close. W2HRA and W3HC: well-made characters with good adjustment on the bugs. W9MWH: dots too choppy, probably caused by too much spacing between contacts. W2FIS: a good example of "packed" manipulation—rather difficult except for one who knows how to do it and still retain character details. W1YL: improper spacing between letters. W8GQZ: "CQ" run together with practically no spacing. W1EH: well-defined characters, very good bug adjustment, very slight tendency to run the last dash of "I" and the "E" together in the call "W1EH"; otherwise the best approach to the auto of W2AYN and the best record thus far for uniformity and balance.

It must be remembered that one adjustment of the contacts, weights and springs of the bug will adapt it to only one speed of so-called mechanical perfection. It is possible to vary from the speed by "packing" as W2FIS does it, but this requires skill and operating ability. W9GMV and W9DO "pack" it but more spacing between words could be tolerated.

You've heard "fists" on the air and you've heard some of the same gang blowing whistles at a convention and noticed the whistles maintain the same characteristics. Now the automatic recorder discloses those things which make individualistic "manipulators" and perhaps some of them are not quite as snappy as the owner thinks they are. For instance, notice the tendency for the long third dash in the numeral "8"—da doh daaakh dít dít. That is nothing more than a bad habit acquired from having it pounded at the eardrum by some operator who, in all probability, picked it up the same way without realizing it.

* 4915 No. Sawyer Ave., Chicago.
Signals Picked at Random in the 7-mc. Band

W2AYN
W3BPD
W3BES
W8FAR
W9GMV
W9KZZ
W9KXE
W9MIK
W3ZD
W3AJO
W9TWC
W6KWA
W8VW
W2DPB
W9DO
W2EQQ
W9MXX
W9TLY
W9RNW
W8JYP
W3BM
W9MX
W9TFX
W9VVL
W8DFH
W2HRA
W3HC
W9MWH
W2FIS
WIFTR
W1YL
W1AOO
W8GQZ
W1EH

March, 1936 23
Oakland Radio Club Votes Plaque

To Be Awarded in A.R.R.L.'s Cairo Commercial Occupancy 1936-1937 Survey

At a recent meeting of the Oakland Radio Club, of Oakland, Calif., it was voted that a suitable award be made to the individual amateur showing the most outstanding work in the Cairo Survey.

To this end a silver wall plaque is on display at the club rooms of The Oakland Radio Club. The plaque is to be awarded to the individual, chosen from results turned in to headquarters of the American Radio Relay League at Hartford for the year beginning March 1, 1936, to March 1, 1937. The plaque is to be known as the “Col. Claire Foster Award,” and at the time of presentation will be suitably engraved with the name of the amateur making the best showing.

The plaque itself is eleven and a quarter inches, by fourteen inches overall, ebony base and polished silver insert. A picture of the plaque is presented herewith.

Rules are of the simplest. Competitors must show in submitting Cairo Preparatory Commercial Occupancy Survey log sheets the individual who is the actual observer. Club surveys will not in themselves count on individual scores except as reports are submitted in duplicate by individuals (one to HQ., one to the group control) or a written memorandum covering Rule 4 (a, b, c) submitted to Hartford monthly or oftener, making possible a correct and continuous summary of individual activity as counting toward the award. The word of the A.R.R.L. Cairo Award Committee will be final.

Survey information may be obtained from League Headquarters or from the secretary of The Oakland Radio Club, W6QW, 849 Milton Street, Oakland, Calif.

Cairo Survey Rules for Award of Plaque

1. All Cairo survey logging reported must take place in the period March 1, 1936 to March 1, 1937.

2. All logs should follow the form 1 or forms approved by the Cairo Committee and show the identity of stations, character of transmitted material, the time, duration and frequency of transmissions as accurately as possible.

3. Equal credit will be given for reports on either the 4-4½ mc. or 6-8 mc. ranges prescribed for survey examination.

4. The “most outstanding work of any individual” will be considered as depending on (a) the number of different stations logged with complete details, (b) the time or duration of total observations reported, and (c) the regularity and number of weekly reports received in the one year period.

5. Work by an observer cooperating in “group” surveys shall count for an individual only where the individual work is separately reported making a correct and continuous summary of individual activities in the survey available to the judges.

6. All logs will be examined after analysis by an A.R.R.L. Award Committee whose decision shall be final.

R.S.G.B.'s “First International” 28-mc. Contest

The results of A.R.R.L.'s one-year 28-mc. contest appeared in the January issue of QST (page 19), with details on the national highs and W9NY’s excellent work, which won him the watch charm award.

Covering the same period, R.S.G.B. held a world wide 28-mc. contest. We are taking the liberty to report the highlights from data given in the January, 1936 T. & R. Bulletin:

“Mr. B. J. Kroger, X1AY, has been adjudged world winner, and becomes the permanent holder of the very valuable silver trophy presented by the R.S.G.B. Mr. Kroger ran up the very high score of 4842 points with an input of between 40 and 80 watts. His transmitter used two ‘10’s in push-pull.-close behind Mr. Kroger came Mr. Con. Bischoff, VK9LZ, who piled up 4071 points. VK’s and one ZL account for his first 30 contacts made up to January 27th, then followed QSO’s with W9NY and W2TP on March 23rd after a two months’ break. J2HJ was worked on the 24th, whilst X1AY provided the big thrill just a week later. On this day, the 31st, 10 W6’s were also worked, as well as W4TZ, VK9SA and J2HJ.

“Third place was taken by Mr. J. T. Dixon, W4AJY, who scored 2590 points, mostly from U.S.A. contacts. He had 75 such QSO’s during June and July. In September OA4J, LU9BV, IEP, 3DD, 3DH, X1AY and VK4BH were worked.

“The most remarkable log submitted was that from Mr. Waring, W9NY, who finished fourth with 2260 points. This gave a complete record of every 28-mc. call transmitted during the contest, and ran to 47 foolscap sheets. A truly remarkable effort. We commend to the attention of all

(Continued on page 64)
Fees? The F.C.C. and Congress are again talking about fees for licenses for radio stations and operators. The Commission has nearly five hundred people in its staff now, and the idea is to pass on the expense of this administration to the services which benefit from it. Broadcasting would inherit most of the radio expense, of course, and the amount charged us would seem insignificant by comparison. But the A.R.R.L. is opposed to any fees whatever for amateur operation, believing that that would be very short-sighted national policy. We can put up a swell argument, too. The League is therefore expressing itself on the subject to the Commission and will do everything possible to save us from this unnecessary and undesirable expense. The Commission won't get enough out of us to amount to a drop in the bucket, but as individuals it would hurt many of us like sixty. This subject has been up several times in recent years and so far this time it is still in the preliminary stages, but QRX for a possible call for membership assistance.

Blind Transmissions The recent excrescence of miniature broadcasting by some amateur 'phones has put the F.C.C. monitoring force on the warpath against all one-way transmissions by amateurs. We think that the amateur should have the right to engage in a one-way communication to an individual equipped only with a receiver, provided the communication is of the type normal to an amateur. The League has had this question up at the F.C.C. and is promised a ruling which will permit blind communications to a particular receiving point, provided the communications are of the usual amateur type and in no sense broadcasting.

Music Testing The F.C.C. has decided that the number of abuses of the privilege of transmitting music for test purposes scarcely warrants a rescinding of that provision in our rules. They are going to concentrate, instead, upon pinching the offenders. Most of the violations take the form of trying to entertain either an individual amateur listener or a group of short-wave listeners. This is the broadcasting of entertainment, not amateur communication, and it is prohibited to amateur stations. The monitoring stations are therefore being instructed to go after the violators. Our regulation permits the transmission of music only for brief tests, not by the half-hour, and for bona fide experimental work, not the entertainment of an audience.

F.C.C. Notes Change of address, even to the house next door, requires modification of amateur licenses. It is not sufficient to notify the Inspector. Upon receipt of such notification the inspector sends an application blank. Sometimes a member writes us, demurring about filling out a long form and wondering if it is necessary. The answer is yes. Proper procedure is to write the inspector for an application form, fill it out and mark the heading for "modification," and send it direct to the F.C.C. at Washington, returning your license. Return both licenses, if you still have separate ones. The new license, by the way, will be for a period of three years from date of modification. Proof of activity is not necessary. After having filed for modification you may operate at the new address in portable status, filing monthly notice thereof with your district inspector and remembering to sign the portable indication, until your modified licenses are returned.

We would like to point out an error in nomenclature commonly made by amateurs, in confusing "districts" and "call areas." For example, the region where W6 calls are used is not the sixth district. It used to be, but all that was changed years ago. That region is now simply the sixth amateur call area. The sixth district, or District No. 6 as it is officially known, is something quite different, being the area served by the inspector at Atlanta.

Dig down your copy of the F.C.C. regulations and note the following amendment:

111. Eligibility for reexamination. An applicant who fails examination for amateur privileges may not take another examination for such privileges within ninety days, except that this rule shall not apply to successive examinations at a point named in Rule 30-A.

The examinations in the cities other than the district headquarters are substantially ninety days apart but sometimes only eighty-eight or eighty-nine days, and this amendment permits an amateur who fails the examination at one such city to take it at that same city when the inspector next visits it, even though the elapsed time is not quite ninety days.

Diathermy The Commission is aroused over the disclosures regarding diathermy QRM, "The Shadow." They may seek some amendment to the Com-

(Continued on page 68)
G’MORNING, oaf,” greeted Wilburforce, as he heaved himself into Charlie’s guest chair and helped himself to a cigarette. “Don’t tell me you’re not going to enter the DX contest, which same begins tomorrow night.”

“I won’t tell you any such a thing, lid. I’m going to enter and use up my two weeks’ vacation by making W.A.C. three times a day.”

Wilburforce sighed. Charlie should make W.A.C. three times a day he thought as he gazed with envy on the rack and panel all decorated with meters and gadgets and a pair of '04A’s—and the Single Signal super. Another sigh.

“Well, Charlie, it’ll be a great contest. It’ll create plenty of good will in these troubled times, huh? Friendliness and brotherly love among the hams will do a lot and go a long way and all that sort of thing. I’m going to do my part with my noble pair of ten’s and my snazzy t.r.f.”

Charlie looked benign and fraternal as the dickens. “That’s the spirit, Wilburforce, my friend. Brotherly love and good will created by a contest like this will do a lot in days like these. You and I will have to sort of cooperate and so forth. I’ll give you a chance and you give me a chance, and we’ll work plenty of DX, fella.”

“Okay, mud turkle, my pal. And when your gozzle gets rough and your arm gets that glassy feeling, come over and refresh yourself from my private stock and watch my ten’s run cold at 120 watts.”

Charlie beamed. Drinks were produced and toasts were toasted and the two bosom pals parted with nothing but love and kindness surging about in their hearts.

Promptly on the minute, at the very GT, Charlie turned on his receiver and draped the cans over his head and lit a cigarette and twiddled the dial. Ah, what a life! Signals just dripping all over, right out of the clouds and now to start off with a nice, zippy, friendly call to ZT6K. An immediate QSO. Number here, number there, please, QRK? Lovely! 73 and CUL diddle-de-dar-dar-dar! Just like that. The first points and the first continent. Now for another. Well, how elegant... HCLFG rolling in nice as anything. A nice, zippy, friendly call. Hot dog! There she be... “R OK ES TNX BT NR HR BLURPETY BLURPETY BLURPETY BLOOP CLONK,” etc., for three minutes. Charlie turned purple. That blighted geranium Wilburforce

must be clattering around with his ten’s! (Profanity!)

Ah! There, the air was clear again. That was Wilburforce calling a CM2. Ah well. He didn’t intend to do that. Give him a little call in a minute and remind him to fix the key clicks.

Wilburforce tuned up his crystal and his doubler and his push-pull ten’s and pushed the watts around. The plates were slightly pink, but what matter a bit of pink here and there. The key was twiddled experimentally, the monitor listened to. Magnificent! A bit of listening at the receiver. Perfect night! A CM2 calling “CQ TEST W-VE.” Okay, big boy, wait a minute. The key was attacked with vim and vigor. Well, blow me down! A QSO right off the bat, just like that, by golly. Number here, number there. All okay and “TNX 73 SK.” First points, first CM. Mmmm!

Well, well, well! There was YV3LO smacking out a CQ. Another vicious and vigorous call. Blast my timbers, he came back! “R OK HR NR CLUNK BLA-A-A-A-A-A-AH-AH BLAH BLAH BLAH!” Horrors! That’s Charlie pushing a kilowatt right through my head! Ah well, I’ll just have to drop over and see him.

“Hello, that you Wilburforce? This is Charlie. Say, old man, you have some pretty nice key clicks over my way and it sort of smears me up a bit. Have you got a filter on your key? Oh, you don’t need any? You are keying in the grid circuit of the final? I see. Oh, yes. Well, I’d appreciate it if you’d experiment a bit with a filter anyway. Not kicking, you know, heh-heh-heh, but just thought I’d let you know. Well, good luck and so long.”

Knock, knock, knock!

“Hiyu, Charlie. Just thought I’d drop around and see you for a minute or so. Worked much? Oh, W.A.C. already this early in the morning? Fine business. Oh, I’ve worked a few sundry CM’s and a Mexican and a couple South Americans or so. By the way, your old kilowatt certainly does put a blanket on my receiver. When you have the key down I can’t hear anything at all. Do you suppose you could lower your power or change your antenna or something? I’m not kicking, you understand, but just thought I’d let you know how things were. You say I ought to have a super? Well I haven’t. And I haven’t got a kilowatt, either. Well, be seeing you. So long, pal.”
Charlie was vexed beyond words. Every time he'd get a QSO and about half of one number, Wilburforce's key clicks settled his hash for him. Doggone that guy, anyway! Nice fellow and all, but he ought to have a bit more decency about him!

Wilburforce was getting mad. Each time he'd snap a DX station out of the QRM, Charlie would start banging away and hurt his ears and smear everything on the t.r.f. Nice guy and all, but no milk of good old human kindness. Something should be done to a fellow like that.

"Say, listen, Wilburforce, this is Charlie again. You better fix those clicks if you know what's good for you. I'm not taking a two weeks' vacation and going without sleep and everything, and burning up a few kilowatts of juice just to sit here and be entertained by a squad of beastly clicks like you're turning out!"

Knock, knock, knock!

"Hiyu, Charlie. Boy you're sure knocking the devil out of things for me with your blasting over here. I know it's fun to draw an eight-inch spark off the feeders with a pencil, but couldn't you do pretty well and have a lot more fun with lower power or something? No? Well, I'm getting pretty mad about it myself. You better watch out, mister!"

Slam! Stomp, stomp, stomp!

A period of siege ensued. Charlie put a paper weight on his key and sat back and gloated. Wilburforce put his key in the positive lead to the ten's and manufactured a slip wheel out of a clock, and let her rip out dots for Charlie's entertainment.

It was pretty dark. And the fog was blowing in and it was getting cool. Charlie was walking along the street toward Wilburforce's house. Suddenly he met Wilburforce.

"Hello, where you going? I thought I still heard that infernal machine of yours clacking away when I left the house. And what's that you've got in your hand?"

"Oh, hello, Charlie. Well, as a matter of fact, I was headed for your place. I thought I heard your sawmill still putting out steady when I left my house. And this is a baseball bat that I got for my kid last Christmas."

"Oh, I see, Wilburforce. You intend to get nasty about things, huh? Well, as a matter of information, I've got a hammer here I got as a present for my brother-in-law, who's a carpenter, but I'm going to let you have it!"

"Ah, yes, I see. Well, Charlie, this baseball bat I was bringing over to your house you can have right now."

Wham! Pow! Whop! Smack! Clunk!

"That'll teach you to have key clicks!"

"This'll show you how to push a kilowatt around. . . . Oof!"

And so ended the good-will DX contest as far as Wilburforce and Charlie were concerned. The world, in its troubled and hectic days, with war brewing everywhere, was a great deal better off. Good will and brotherly love pervaded. The old ham spirit was triumphant. Wonderful fraternalism among the hams. Ah, radio! Oh, ether Gods! Lovely.

Reception reports from stations located in Virginia, the Carolinas, Florida, Texas, Arizona, New Mexico, Oregon, Colorado, Nevada, the Dakotas and Minnesota are requested on the 20-meter 'phone signals of W9YAB, the station of Fred Q. Gemmill at the University of Kansas, Lawrence, Kansas, in connection with thesis work on directional antenna systems. These areas lie in the null regions of the antenna in use at present, and signal reports will be especially valuable. The station is on the air for at least an hour each morning, and longer periods on weekends.

Fellows who incline to vertical antennas for 20-meter work will be interested in a rig being marketed by W9GBT, Robert Foltz of Sterling, Illinois. It consists of a two-section tube of a new type of spring-tempered one-inch copper tubing, capable of standing up with only three guy ropes. The usual types of copper tubing are not satisfactory because of lack of rigidity.

A Low-Cost Crystal Transmitter

(Continued from page 16)

transfer power to the antenna. The "link" connecting these two coils may also be a pair of "push-back" wires twisted together. When the antenna circuit is hooked to the transmitter, a rise in plate current will take place. The amplifier is then tuned to minimum plate current.

The antenna tuner condenser is now tuned to give the highest amplifier plate current and the amplifier is again trimmed for resonance. These adjustments, together with adjustment of the coupling link between amplifier and antenna, enable one to set the amplifier plate current at a reasonable operating value (between 50 and 60 ma.). It must be remembered that the meter is connected to read the total of oscillator and amplifier plate current and that the oscillator value must be subtracted from the total to give the amplifier input.

Two months of operation under normal ham conditions have shown this rig to be an efficient and practical piece of gear. Don't let 'em kid you —high power isn't everything in this ham hobby.
THE third A.R.R.L. Canada-U. S. A. Contact Contest, held from November 8th (6 p.m.) to November 10th (midnight) was thoroughly enjoyed by all who were able to participate. In the contest, each W/VE contact had the basic count of one point, with an additional two points being given for “the handling of any traffic regardless of the amount.” A number of contestants misinterpreted “the handling of any traffic” as meaning that messages had to be exchanged as in SS contests, and thereby lost some valuable time while on the air. Congratulations are particularly due to those making the highest ten scores in the United States and Canada. Certificates have been sent to each of the Section winners, signed in full by the committee who sponsored the contest as well as the Canadian General Manager.

THE TEN HIGHEST

<table>
<thead>
<tr>
<th>Canada</th>
<th>U. S. A.</th>
</tr>
</thead>
<tbody>
<tr>
<td>VE4QZ</td>
<td>23,481</td>
</tr>
<tr>
<td>VE2DG</td>
<td>22,732</td>
</tr>
<tr>
<td>VE3EQ</td>
<td>21,955</td>
</tr>
<tr>
<td>VE3QD</td>
<td>21,840</td>
</tr>
<tr>
<td>VE3DJ</td>
<td>20,741</td>
</tr>
<tr>
<td>W1BF</td>
<td>15,120</td>
</tr>
<tr>
<td>W9TYF</td>
<td>13,135</td>
</tr>
<tr>
<td>W3DMQ</td>
<td>12,285</td>
</tr>
<tr>
<td>W1EZ</td>
<td>11,685</td>
</tr>
<tr>
<td>W2GKR</td>
<td>11,277</td>
</tr>
</tbody>
</table>

VE4QZ successfully took VE5HQ’s place as the top VE this year by working 125 W stations in 41 A.R.R.L. Sections with an input to the final stage of 45 watts. VE3QD worked the most W’s, 188, while VE5HQ again worked the most W Sections, 43, two less than in 1934. Seven VE’s worked more than 120 W’s during the short period of the Contest, VE2DG “bagging” 151, and VE3DJ 145. VE1EP’s score of 18,921 was made by two operators, VE1EP and VE1HG, and is therefore not listed with the “ten highest.”

W1BF took undisputed lead of the W’s by contacting and handling contest traffic with 80 VE’s in all VE Sections!!!! W9CJ, 1934 winner, worked 50 VE’s. W8JIN “hooked” 60 VE’s, W3DMQ 67, W1EZ and W2GKR 63, and W5FIP 59. In 1932 no W worked all VE Sections, and in 1934 five W’s worked all VE Sections, while in 1935 36 different W’s worked all seven VE Sections!!!! Every reporting station from Indiana accomplished this feat, and W1’s, W2’s, W3’s, W6’s and W7’s, all did it without difficulty. It is worthy of note that among the leaders nearly every section of the country is represented. The first twelve W8’s scored higher than the 1934 winner, while only two VE’s were able to do it. Many W’s worked that elusive VE Section for the first time and many VE’s were able to add the 45th State to their list of QSO’s. Many W’s worked all Canadian Sections several times over. VE4QZ, the leading VE, wins the handsome cup presented by the Wholesale Radio Co. Limited, of Toronto, as well as a Hammond Transformer donated by Hammond Mfg. Co. of Canada Limited. The Johnson Mfg. Co. presented a 14-m. “Q” Antenna to VE5HQ, as third prize. Fourth prize went to VE3QD, two high voltage filter condensers, presented by Polymet of Canada Limited, and fifth prize, two Band Switches were presented to VE3Dj, the winner of fifth prize, by the Ohmite Mfg. Co.

W3DMQ wrote: “Attribute my score to judicious use of twelve crystals and the use of three bands. Broke sleep­losing record. Started contest aged 15, and was aged 16 when it ended, my birthday being November 11th.” W9DH forgave contest until the last hour and then worked four VE’s in four VE Sections. W9RA was sorry he didn’t work his brother VE5LP, although his sister, W9TSV, was heard working plenty of VE’s, and said, “The contest was great, creating new friends, bringing old ones closer together.” W5EZA worked all VE Sections and his first VE1 with less than 8 watts input.

W1E2 offered an excellent suggestion, “that in future W/VE Contests VE stations in the middle of the bands might well use the familiar DX ‘Q’ signals, indicating the portion of the bands they intend to cover, which would also tend to reduce QRM from stations in the remote section of the band.” VE1RP, the Ohmite Mfg. Co. presented a 14-m. “Q” Antenna to VE5HQ, two high voltage filter condensers, presented by Polymet of Canada Limited, and fifth prize, two Band Switches were presented to VE3Dj, the winner of fifth prize, by the Ohmite Mfg. Co.

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Several VE’s worked VE5, while three W’s worked the Northwest Territories of Canada, which comes under VE5. W3JTT, W9FOQ, W5CPT, VE5HQ and VE4RX all won in their respective Sections for the second successive time. Each year’s contest has seen an increase in activity, and it is hoped that next time more of the participating stations will send in their logs to aid the Committee in checking logs, and so that those who did not take part will really observe something they have missed. Those who were in this contest “earnily await the next.” The Contest Committee wishes to thank all those who took such pains to prepare neat logs, and for the fine cooperation by many who did not “actively participate.” It is planned to make this Contest an annual affair, and your continued enthusiasm and support is requested by the Committee.

(Continued on page 60)
Pentodes as Class-AB Amplifiers

In operating pentode-type tubes in high-power audio stages of the Class-AB type it has been customary to use the tubes not as pentodes but as triodes, the screen being connected directly to the plate in each tube. This method of connection does not retain the characteristic high power-sensitivity of the pentode-connected tube, however. On the other hand the regular pentode connections, with screen at the same d.c. potential as the plate but grounded for audio, cannot be used in Class-AB amplifiers because the plate potentials required for high power outputs (of the order of 350 volts) would cause the power dissipated in the screen to be far beyond the safe value. If, however, the screen voltage is kept down to its normal value for Class-A service—about 250 volts—the plate potential may be increased without damage to the tube.

The advantages of using the pentode connection in Class-AB service are greater power sensitivity—less grid voltage swing required and less power taken from the driver—than for triode operation, generally greater output, especially with self-biased circuits, and lower total distortion at maximum output. The following information on operating 6F6 tubes as pentode Class-AB amplifiers is taken from an Application Note published by RCA Manufacturing Company, Inc.

A typical circuit for 6F6 pentodes as Class-AB amplifiers driven by a single 6F6 triode-connected is given in the diagram; these should be by-passed by large capacity condensers in the usual way. It will be noted that this circuit differs from the regular push-pull amplifier circuit only in that the screens are operated at a lower potential than the plates. If fixed bias is to be used on the power stage, the negative high-voltage return should be made to the cathodes, a source of fixed bias being inserted in place of the cathode resistor indicated.

Tests have shown that the optimum plate-to-plate load is substantially independent of the voltage regulation of the power supply (this factor must be considered, since the current varies with the signal) and likewise of the voltage regulation in the screen circuit. It is also independent of the bias system used, being a function of the power output desired, the permissible distortion, and the allowable plate and screen dissipation. Plate and screen voltage regulation is a factor in the determination of the optimum input transformer ratio, however, and the biasing method also is found to influence the input transformer design. Optimum operating data are given in the following table for both fixed and self bias.

### TABLE I

<table>
<thead>
<tr>
<th>Driver—6F6</th>
<th>Fixed Bias*</th>
<th>Self Bias</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input signal, r.m.s.</td>
<td>10.1</td>
<td>10.3 volts</td>
</tr>
<tr>
<td>Plate load resistance</td>
<td>21,800 ohms</td>
<td>33,100 ohms</td>
</tr>
<tr>
<td>Max. power output</td>
<td>289</td>
<td>301 mw.</td>
</tr>
<tr>
<td>Interstage transformer</td>
<td>1.54:1</td>
<td>1.74:1</td>
</tr>
<tr>
<td>Turn ratio, pri. to sec.</td>
<td>73.5</td>
<td>64.4%</td>
</tr>
<tr>
<td>Peak grid input power</td>
<td>210</td>
<td>168 mw.</td>
</tr>
<tr>
<td>Peak grid input voltage (per tube)</td>
<td>47.4</td>
<td>50.5 volts</td>
</tr>
<tr>
<td>D.e. grid current (per tube)</td>
<td>1.2</td>
<td>1.0 ma.</td>
</tr>
<tr>
<td>Zero-signal plate current (per tube)</td>
<td>17</td>
<td>27 ma.</td>
</tr>
<tr>
<td>Max. signal plate current (per tube)</td>
<td>29.5</td>
<td>37.5 ma.</td>
</tr>
<tr>
<td>Max. signal screen current (per tube)</td>
<td>2.5</td>
<td>4.0 ma.</td>
</tr>
<tr>
<td>Zero-signal screen current (per tube)</td>
<td>8.0</td>
<td>7.5 ma.</td>
</tr>
<tr>
<td>Power output (two tubes)</td>
<td>17.3</td>
<td>17.1 watts</td>
</tr>
</tbody>
</table>

* Fixed bias, -26 volts.

In the above table, the voltage regulation of the plate supply is assumed to be equivalent to 1000 ohms in series with the plate and an additional 2000 ohms in series with the screen from a plate supply with perfect regulation, on the assumption that in an actual receiver or amplifier the plate voltage would be obtained directly from the first filter condenser while the screen voltage would be secured from a point on the voltage divider or through the drop in a speaker field coil. These figures probably represent average conditions.

(Continued on page 68)

### New Receiving Tubes

A new duplex-diode triode, to be known as the 6R7, has been added to the metal tube series, according to announcements from Raytheon and RCA-Radiotron. The triode section of the 6R7 is a medium-µ affair, designed to give...

(Continued on page 70)
Art-Metal Finish

The Application and Treatment of Crackle Enamel

By Paul E. Millington,* W9KSW and Roger Zuau,** W9UW

A DURABLE and handsome one-coat finish for laboratory and radio equipment is now available through the development of a so-called crackle enamel or paint, known commercially as “art-metal finish.” The product is manufactured in a variety of colors, of which the easiest to apply and generally the most satisfactory for amateur use is plain black. Besides having a high viscosity, its application and treatment differ considerably from the more familiar types of metal finishes.

Either one of two general methods for the actual application may be used. The best, probably, is the use of a power sprayer capable of handling the heavy liquid full body. A hand sprayer with an adjustable nozzle is satisfactory, although the difficulties encountered with such an apparatus are not appreciated until its use is attempted. In either case, the paint spurts as it issues from the nozzle. However, this effect is entirely normal and necessary in building up a moderately heavy even coat. The paint may be applied successfully also by means of a soft brush, undoubtedly a more convenient method for most amateurs. Brushing should be light and continued only long enough to insure an even application. The resulting coating of material must be normally heavier than an ordinary paint, although very thick applications are to be avoided. As a rule, a few small bubbles will remain distributed over the surface after brushing. While these are not particularly harmful, the larger ones may be pricked open with a sharp wire. The effects of spurting from the sprayer, or brush marks, in case the second method has been elected, soon disappear, the final surface presenting a smooth glistening appearance. Suspiciously thin places may be covered further by allowing a fine stream of the paint to flow in from a stick, or the brush, held above the surface. Panels should be supported horizontally to obviate running, while articles of irregular shape must be covered less thickly, some practice being necessary before the optimum thickness of paint can be secured.

Once the piece is covered satisfactorily, it should be allowed to air dry under comparatively dust-free conditions for a period of one-half to two hours, and then heated for one hour or more at a temperature of 200° to 250° F., measured by an accurate thermometer. The baking can be accomplished on an ordinary gas stove oven large enough to hold the piece. Panels should lie flat, usually supported on one of the removable grills. If the oven is small the door may be left open, the article allowed to extend outside and the front boxed in with cardboard. In such cases, the object must be reversed during the baking to insure proper heat treatment. Temperatures must not exceed 250° F., otherwise blistering occurs. Over a limited area blisters can be pricked open, patted down and the article returned to the oven. The longer the heating, the harder the finish, although an hour and one-half is amply sufficient for most purposes.

The paint, due to its asphalt-like character, is soft while hot, even at the end of the heat treatment. Hence great care must be exercised in moving the finished articles before they are cold. Articles previously painted with an ordinary paint or enamel can be treated directly providing the old finish does not blister or crack off at 250° F. Should this occur on preliminary test, the old material must be removed completely before the art-metal finish is applied.

Bakelite can be handled as metal except that some provision must be made to support large panels at several points, since bakelite softens appreciably at the baking temperature. Sprayers and brushes are cleaned readily by the use of toluene, xylene, or even acetone, which are available at many large paint stores and at all chemical supply houses. Turpentine, gasoline, and naphtha have proved to be ineffective.

As a rule, the texture of the finish will vary from article to article, since amateurs find it difficult to control conditions exactly. Then, too, graining of a surface sometimes occurs, probably due to slightly uneven application. However, these variations are pleasing to most people rather than otherwise.

Connecticut State Convention

(New England Division)
April 4–5, 1936

Place: Bridgeport, Conn.
Hotel: Stratfield Hotel.
A good program has been prepared. Watch for the publicity.
PROBABLY one of the biggest ham problems is that of putting up the best antenna system that the location will permit. Nearly any amateur will admit that a good antenna system is half the battle, yet the time and effort spent on the sky wire is far from being in proportion to the importance of that unit. If we only could remove the radiating portion of the antenna from surrounding objects, this problem would be considerably simplified. But how to get a half wave flat-top for 160-meter 'phone or c.w. on the top of a small apartment house? It’s quite a job! (Fig. 1).

The usual device for lowering the fundamental frequency of an antenna is well known. It is our old friend the loading coil, and was very widely used in the old days. It behaves best when inserted at a voltage node. Our 160-meter flat-top can be brought into step by putting the proper value of loading coil in the center, as in Fig. 2. Loading coils can also be put at the ends of the antenna, but here they operate partly as a capacity load at the ends, and will not be discussed now. That leaves the loading coil in the center as the alternative. However, there is a hitch to this proposition, that of making, adjusting and weatherproofing the coil.

Let us consider an equivalent circuit to replace the coil. A pair of closed or shorted transmission lines possesses inductive reactance, providing the length is less than one-quarter wave. Conversely, a pair of open transmission lines less than a

Most of us—particularly those living in the cities—are cramped for the necessary space in which to hang the antenna, and as a result take a questionable refuge on the higher frequencies. Probably lack of room has kept many a ham from enjoying the relatively open spaces on the lower frequencies, particularly 1.7 mc. There is also the problem of b.c.l. QRM in crowded localities. If we only could remove the radiating portion of the antenna from surrounding objects, this problem would be considerably simplified. But how to get a half wave flat-top for 160-meter 'phone or c.w. on the top of a small apartment house? It’s quite a job! (Fig. 1).

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An Unorthodox Antenna

By Yardley Beers,* W3AWH

MANY antenna systems, though theoretically good radiators, have the weakness of radiating at angles often not effective for communication. In addition, theory cannot provide sufficiently for the presence of objects such as metal roofs, gutter pipes, BCL antennas and the like, which usually exist on the premises of most amateurs. Hence an antenna which is designed from experiment rather than theory would seem to be justified.

Such an antenna has been designed by the writer’s friend, Mr. H. J. Siegel, W3EDP. On first coming on the air two years ago, though he consumed over a thousand feet of wire in experimenting with antennas of the usual types, W3EDP failed to get satisfactory results. His goal was an antenna which could be operated efficiently on all bands, so he set about to design a new antenna, trying to find the best compromise between radiating angle and theoretical efficiency. The radiating angle of an antenna depends not only on the height above ground and the orientation with respect to the horizontal but also on the length. Being unable to alter the first two factors, W3EDP varied the third.

A one-hundred-foot roll of wire was hung up to his mast and tried out for several weeks on 7 mc. The results were carefully tabulated, with due allowance being made for adverse conditions. Four feet of wire was then cut off and this process repeated. Almost every reasonable antenna length was tried, and then the entire process was repeated several times. When all the tabulations were complete, a length of 84 feet seemed to stand out as being the best of all the combinations tried. It may be apropos here to state that the antenna in all cases was inductively coupling to the final power amplifier by a paralleltuned tank circuit on all bands. This parallel-tuned circuit was arranged for variable coupling to the final power amplifier tank coil so that it could be adjusted for maximum efficiency and so that the load on the final amplifier could be controlled. It is important to mention here that low C in the antenna circuit gave by far the best efficiency. High C caused a high circulating current and looked very nice on the thermocouple ammeter but was nil for results.

Not liking entirely the idea of an end-fed single wire antenna, W3EDP set about to find a counterpoise for the best results with his 84-foot antenna. Going through a pruning process similar to that with the antenna itself produced a counterpoise length of 17 feet as the one working best in combination with the antenna. This combination seemed to work excellently on 160, 80, 40 and 10 meters, but on 20 meters a counterpoise length of 6½ feet seemed to outshine all others. The parallel tuning arrangement remains untouched for operation on all bands. W3EDP was a bit skeptical about the operation of this system on 10 meters, so he put his transmitter down there to find out. Results were about equal operating with the 17-foot counterpoise and in operating without any counterpoise at all.

A typical application to an AVC-equipped superhet receiver is shown at A. An overmodulation indicator for transmitting is given at B.

1 120 Renfrew Ave., Trenton, N. J.
just before midnight. Roughly speaking, the antenna seems to give best results in a direction at right angles to its length. It also has the unusual property of emitting a very weak ground wave. On 7 mc. W3EDP's signals have been barely audible across town, when at the same time he was QSO the west coast and getting an R8-9 report.

Though this antenna may seem unorthodox to many, the results obtained with it should justify it fully. Using a pair of 40's with 50 watts input to the final P.A., W3EDP has consistently received R7-8 reports on 7 and 14 mc. from five continents. In addition he has worked 75 countries in all continents within two years with this little rig from an average DX location, a record not duplicated by many using higher power. W3EDP has used his antenna system at two different locations with equal results. In addition the writer has used this antenna in a badly screened location, between two houses and under several trees, yet without altering the dimensions from those given him by W3EDP he has obtained excellent results on 3.5 mc., having worked Europe several times with a pair of 10's.

This antenna is not offered to the reader as a cure-all for his antenna troubles. To discover its true value it will have to be tested at more locations of different characteristics. The dimensions may have to be altered slightly in some locations for maximum efficiency. It is the writer's belief that the design of this antenna perhaps may be the basis of further antenna experiments.

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The 6E5 for Checking Overmodulation

A method for checking overmodulation by the use of the new electron ray tube—the "magic eye"—is suggested by Clarence C. Moore, W9LZX. Overmodulation in either the upward or downward direction can be detected, and the gadget can be used to check incoming signals as well as one's own transmitter.

Typical circuits for both receiving and transmitting are indicated in Fig. 1. Circuit A shows how the 6E5 can be connected into a superhet receiver using a diode rectifier. The grid of the 6E5 is connected to the a.v.c. side of the rectifier load resistor. Audio coupling is omitted in the interests of simplification although the connections in the receiver would not be disturbed. The width of the shaded area on the target is dependent upon the voltage developed across the diode load resistor and hence upon the received signal strength. On the method of using the tube W9LZX writes: "The 'magic eye,' when nearly closed on a strong carrier, has light yellowish-green edges on the two sides of the opening. With modulation there is a fuzzy appearance between these edges, but with overmodulation the two bright edges themselves will shift closer together. With downward modulation the opposite occurs. The most accurate reading is obtained when the eye is open about 40 degrees. The a.v.c. on the super cannot be used at the same time because it would compensate for any carrier shift. The audio gain control may need to be turned down while the i.f. gain is brought up high enough to get proper readings on weak stations."

Incidentally, the 6E5 can be used as a tuning meter when the a.v.c. is connected in.

For transmitting, the circuit shown at Fig. 1-B is suggested. It is equivalent to that at A except that a triode with grid and plate connected together is used as a rectifier. The tuned circuit is adjusted to resonance at the transmitting frequency. The circuit must be well shielded so that the only signal pickup is through the tuned circuit.

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Adapting the Patterson PR-10 for 10 Meters

Since the 10-meter band has opened up many amateurs owning Patterson receivers would like to listen on that band but are unable to do so, because the PR-10 and smaller Patterson sets will only tune down to 16 meters. However by means of an adapter we have been using our Patterson PR-10 with excellent results on the 10- to 8-meter band.

The adapter consists of a 10-meter grid coil of the dimensions given in Fig. 2, tuned by a midget of 100 to 250 µfd. L1—Grid coil, 6 turns No. 14 wire, spaced 1/4 inch between turns; coil diameter 1/2 inches. L2—Antenna coil, same construction as L1, but 2 or 3 turns.

The 10-meter grid lead clips on the grid cap of the first detector tube after removing the usual grid-cap connection. The antenna is then removed from the antenna post on the receiver and clipped on a small antenna coil of 2 or 3 turns coupled to the 10-meter grid coil. We have our antenna coil mounted on the end of the grid coil. If a doublet is to be used it may be coupled to the grid coil by a turn or two.

To tune on the 10-meter band first place the band selector switch to the 20-meter band. Then set the main dial at approximately 50 and proceed to tune with the band spread dial if a PR-10 model is used. If not, then all tuning is done with the one tuning dial on the receiver. After setting
the main dial to the frequency the grid condenser, \( C_1 \), should be adjusted for maximum noise level.

The receiver in this fashion is working off the harmonic of the 20-meter oscillator. The output is nearly as good as on 20 meters.

---Malcolm P. Mobley, W6JYH

Adapting the QST Three-Tube Transmitter to Ten Meters

The transmitter using a 47 crystal oscillator, 10 buffer-doubler and 203-A final described in February, 1934, QST can very easily be changed to work on 28 mc. Using a 7-mc. crystal the coil \( L_1 \) in the crystal plate circuit should be changed to 8½ turns of No. 12 enamelled wire, close wound on a two-inch form. Coil \( L_2 \) in the doubler plate circuit becomes 4 turns of No. 12 enamelled wire, spaced the diameter of the wire; the neutralizing winding consists of 4½ turns close wound one-quarter inch from tank coil. Coil \( L_3 \) in the plate circuit of the final stage is changed to 2 turns of quarter-inch copper tubing spaced about \( \frac{1}{2} \) inch, the diameter remaining the same.

With this size buffer-doubler coil the rig can be worked on 7 mc. using the 10 stage as a buffer.

Have used this arrangement for about a week off and on and have reports of R5 to R9 from the West Coast and Europe.

---A. W. Kovatch, WSBYM

Crystal Oscillator

Fig. 3 shows two crystal keying circuits which operate entirely on the r.f. portion of the circuit and break no d.c. contacts. That shown at A is used by Nat C. Smith, W9UJ-W2CZU, who writes:

"This method eliminates the key clicks so that it is impossible to tell when the transmitter is keyed when listening to the receiver; no clicks, just a shushing sound, is the result. A relay is required. The contacts need not be very husky as no sparking is evident. The back contact of a s.p.d.t. relay is used. "Pressing the key removes the ground from the crystal and the plate milliammeter will show normal current for the crystal in oscillation. When the key is released, the relay grounds the crystal and plate current rises about 25%. My oscillator with 375 volts on the plate has the following currents:

Crystal grounded—40 ma.
Crystal oscillating—25 ma.

"Naturally the stages following the crystal must be biased to practically cut off to prevent tube damage when excitation is removed."

A system operating on much the same principle is shown in Fig. 3-B. In this case a keyed loop coupled to the plate tank is used to detune the circuit and thus control oscillation. This arrangement is suggested by S. G. Read, W8JUQ. It has been his experience also that key clicks are completely absent on a receiver in the same room.

The keying loop need have only about two turns, closely coupled to the plate coil. To tune, close the key and adjust the plate tuning for oscillation, tuning far enough on the high-frequency side of resonance to give clean-cut keying. When the key is opened the circuit is detuned and oscillations cease.

Code Practice Set for Eliminating Clicks

Low-power stations using the key from an old code practice set on the transmitter can eliminate key clicks very simply. Connect the key leads from the transmitter to the outside terminals on the buzzer set (as if connecting batteries for code practice). Hook a condenser of about one \( \mu \)fd.

(Continued on page 59)
Commenting on the RST system, the D.A.S.D. recalls to mind the T-scale suggested some years ago by J. Fuchs, OE1JF, and reproduced at that time in QST. This system has achieved almost universal adoption in Germany and widespread use amongst other European amateurs, although it is not generally employed through the rest of the world. It is suggested that this may be due to lack of information concerning the scale, and that this situation be remedied through adequate publicity. This we are glad to provide.

The principal advantage of the Fuchs’ scale, which is reproduced immediately following, is that it takes into consideration the stability of the received signal, and provides unmistakable definitions of quality. Freely translated, the definitions are:

T1—Plates fed by raw a.c., 50 to 60 cycles.
T2—Plates fed by a.c. or r.a.c. of musical frequency.
T3—Plates fed by r.a.c. without filter.
T4—Plates fed by r.a.c., smoothly filtered, stable.
T5—Plates fed by r.a.c., well-filtered but unstable.
T6—Plates fed by r.a.c., well-filtered, very stable.
T7—Plates fed by d.c., unstable (i.e., chirps, etc.).
T8—Plates fed by d.c., stable, but clicks, spurious radiations.
T9—Plates fed by d.c., perfectly stable.

This system, by the way, represents the T-scale system in the well-known European W-R-T reporting system.

Prefixes:

We have a variety of new prefixes to report this month. Under British jurisdiction, the following changes have been made: Ascension Islands are now ZDS, St. Helena is ZD7, and Mauritius has been assigned VQS.

Mexico, as almost everyone must know by now, has used XE since January 1st.

The anomalous situation with regard to Greenland and The Faeroes has been cleared up by the assignment by the Danish government of OX to Greenland and OY to The Faeroes. The latter, by the way, are considered part of Denmark, whereas Greenland is a Danish colony.

**TBTOC:**
Opening up of the 28-mc. band has lent renewed impetus to the number of claimants for the TBTOC (Three-Band Trans-Atlantic Club) classification. Among the newcomers:

- W9MIN, with D4ARR
- VE3WA, with VK3YP
- LU1EP, with ON4AU
- VK3MR, with W5CRA
- VK5HJ, with W5CRA
- VK3KK, with W6JJU
- J2LK, with W6JJU
- J2LU, with W6JJU
- E18D, with W1AF
- ON4LX, with W1AF
- Pa0FX, with W1SZ, D4ARR with W1SZ have graduated to the FBTOC, doing the job on 28, 14, 7 and 3.5 mc. W6JJU, is close to a TBTOC WAC, which would indeed be something.

In this connection, it should be pointed out that at present no certificate is being issued in
connection with TBTOC. In the December, 1934, issue of QST, on page 49, a suggestion by W6FFP that certificates be provided to those qualified willing to pay a nominal sum was presented. The response to the suggestion at that time was negligible. Perhaps now, with a larger number of TBTOC members, and with all this new-found prosperity we are hearing about on the b.c. chains, the answer is a different one. How many TBTOC-er’s would be willing to pay a certain amount, probably a dollar or so each (less if enough wanted them), for a unique and distinctive co-operatively-financed certificate establishing their honored place in the highest existent DX category (hi)! Let’s have a showing of hands.

**National:**

The month’s budget of news: **Bolivia:** H. E. J. Smith, ex-CT2BK, writes that none of the Bolivian calls now listed are effective, licenses having been cancelled for more than two years because of the war with Paraguay. Until this is finally concluded there won’t be any amateur radio in this country; and in any event, the authorities don’t care a whole lot for amateurs, although there are some genuinely interested experimenters. Receivers are generally permitted, however, and, except in the city of La Paz itself, which is in a hole, conditions are quite good. **Brazil:** Vasco Abreu, PY1AW, tells us that during the last week of November a small rebellion burst out in a few places in Brazil. It was promptly overcome, but meantime PY stations were instructed to stop their activities until orders to the contrary were issued. Last word is that this order is still being strictly observed. PY1AW reports an average QSL rate of 54% on the part of W stations, the 3rd district being high with 70% and the 2nd district low with 40%. **Denmark:** H. T. Petersen, OZ7Z, reports among other things, that OZ2WB/9Q has worked all Australian and New Zealand districts, a record. OZ2M worked all U. S. districts and four Canadian last October. **France:** On last November 1st André Auger, FS8EF, long and favorably known as the constructively active president of the R.E.F., was forced to resign his position due to the pressure of personal affairs. He is succeeded by Georges Barba, F8LA, an old-time amateur whose call will be familiar to many, and who gives assurance of leading the R.E.F. in the same successful paths as M. Auger. The latter will continue actively in charge of foreign relations, including I.A.R.U. matters, at the request of the Council. Another report from France gives the American winners in the 1935 "Coupe du REF" competition. WSMAH took first U. S. Honors, followed by W8QGB and W8KOL, who were paired for second place, and W8KWJ, W9TBX, W8ERZ, W1FPP and W3UVA, all of whom were tied for third place. In Canada the winners were VE1ET and VE3HF. Both WSMAH and VE1ET will receive special certificates in recognition of their work. **India:** B. M. Tanna, Hon. Secretary of the Indian Radio Amateurs’ League, sends us the following information concerning the radio regulations in India: All Madrid bands are allowed, except that the 3.5-mc. band is restricted to 3750-4000 kc. Phone is allowed on all bands. Except in special cases the maximum power allowed is 10 watts input to the aerial (actually, 10 watts output). Third-party traffic, although not legally allowed, is tolerated. There are about 115 licensed amateurs in India, of which about 25 are active on the air. The I.R.A.L. has a membership of about 300. **Kenya:** The contest held by the Radio Society of East Africa early last year was won by R. J. Fittall of Nairobi, the runner-up being D. C. Harding, also of Nairobi. **Norway:** At the annual general meeting of the N.R.R.I. the following new members of the board were elected: President, Bjarne Barkbu, LA4A; vice-president, Ahlert Horn, LA2Q; secretary, O. Johannesen, LA4K; members, A. Nybro, LA3I, and Chr. Becker, LA3J; alternates, G. H. Petersen, LA1D, and B. Th. Fjeld, LA1Y. **Rhodesia:** R. A. Jubb, ZE1JN, writes: “The regulations over here are stiff but excellent; 50 watts is the limit to the final amplifier; crystal control is compulsory on the 14- and 7-me. bands; all the amateur bands are available; key filters compulsory; overmodulation is illegal and numerous other items which are for the benefit of the B.C.I. as well as giving all of us a fair share of the band to work in.” ZE1JY, ZE1JX and ZE1JC are all QRP, not more than ten watts input is used by any of these stations. ZE1JM, ZE1JN, ZE1JO, ZE1JS, ZE1JT, ZE1JY, and in a few weeks ZE1JJ, can all be considered in the 40-watt class. All of them use two type 46 tubes in their final amplifiers; some use push-pull, some don’t, but although the crystal oscillators and frequency doublers are of various design, the tube used in the finals of all these stations is the good old 40. The 802’s ordered ten months ago have not arrived in this country (Continued on page 64)
Activity reports were "up" this month and general amateur operating in all fields near the seasonal peak for the year. Traffic figures were bettered due to holiday traffic and to the A.A.L.S. traffic contest in which there was a high degree of amateur interest. New plans for spot frequency nets are announced for Central California, and in the Wisconsin and Washington sections. The Virginia Net frequency has been changed to 3059 kc.

The "DX" fraternity looks forward to the annual A.R.R.L. tests as a high point of the season, and we are glad to say that W6CUE predicts fine DX conditions for the dates announced. He has been keeping a cyclical record of ups and downs in the A.A.L.S. conditions over the last several months. The "quota" plan (for W/V/E participants only) which developed from the published letters of W4EG, W5NW, W9FM, etc., will have its first test in this year's A.R.R.L. DX Competition. Depending on the majority reaction of participants to this feature this may be stiffened, or relaxed, or eliminated altogether in the future. All comments are carefully analyzed each year so the generally desired trends may be written into future rules of all activities. As always, the amateurs of each country or A.R.R.L. Section compete directly only with hams of their Immediate Section, where conditions for making an Award are substantially the same. The Rules for a given locality apply in the same way to everybody insuring fairness to each who takes part. Good operating fun and DX are always available in our March tests. We hope all readers will take part and get their share. All reports, large and small, and your general remarks on "the best thing" and "the worst thing" that happened in the Contest will be appreciated.

Interest in W.A.S. achievement is extremely high. Many report needing but a few more cards to qualify for the certificate. A few hours working at almost any band and you find stations looking for their additional states for W.A.S. In Morris, Arizona's QSL-5 W6BDJ says (about W.A.S.), "It stimulates continental QSOs where continuous communication may be held, and anybody holding it will at least have worked a few stations. . . . Probably one or two WAC's will find it can't qualify, and will suddenly take a new interest in signals beginning with "W." Methinks it is a far more worthy goal than WAC, if one must have an alphabetical. It is just possible it will revive the ancient practice of W.A.S. . . . " A lot of us find that after all we can't locate the card we just knew we had from a contact made some time ago with far away Nevada or Vermont. Well, establishing a new contact there right away and getting that necessary acknowledgment to submit under W.A.S. rulings makes an interesting problem that adds point to our time spent on the air. Perhaps it encourages us to build crystal-switching or band-switching into the "heap." At any rate it sharpens our perceptions in tuning the band over in looking for the elusive station, and therefore the licensee becomes in a better position to tackle a particular communication job (of locating stations and getting them to answer) when a wire tie-up or flood emergency develops unexpectedly one of these fine days. A.R.R.L. members are bonded together in an organization dedicated among other things to the maintenance of friendliness, and a high standard of conduct. It is entirely in keeping with that purpose that we devote regular time of amateur radio with each other over this whole continent; that we cement that bond of friendship by exchanging some memento or record of our contact. The time-honored QSL-card is perhaps the most simple and practical means of swapping this additional token of a new or renewed radio friendship, giving equipment details and data on the signal for purposes of record that may have great value. Many old-timers (along with amateurs boasting brand-new tickets) find it again a heart-warming experience to greet the mailman with outstretched hand for the handsome tokens of the amateur brotherhood that also serve as stepping stones to W.A.S.

QSL—QSP ALWAYS

Familiar slogans, those! Many a card has carried one or both. The feeling behind the words is really indicative, we think, of the true spirit of amateur brotherhood. The marks are those of fraternity and equality. Are you, brother ham, always ready to QSP or QSL? Will you always do your best to take a message and get it through for your brother amateur, or for the public welfare? Do you know A.R.R.L. member's message form? How to check a message? Will you take a moment to talk to your brother ham, or help him test his transmitter or is yours one of those "robot stations" they tell about? Will you slow down for the man who says, "QRS"? Are you tolerant and understanding of other big branches of amateur radio beyond your own special interests? DO you always come through with a card (QSL), when requested? In short are you a good fraternity brother? Can you be depended on in any day hamming or in a pinch? Long may the slogans live. Much more can be said on "real fraternalism" as applied to our amateur radio. It is all brought to mind by those excellent expressions that say so much! QSL-QSP ALWAYS.

--F. E. II.--

W.A.S.

Complete rules for membership in the new Worked All States Club appeared on page 33, January QST. Attention is called to Rule 2, which reads, "Contacts with all forty-eight states must be made from the same location." The "same location" has been defined so as to permit working of amateurs within one general locality. No two street addresses where your radio work (represented in letters or QSL-card acknowledgments from the 48 states) has been accomplished can be more than 25 miles apart and count for W.A.S. Club membership.

Have you checked up on your contacts and QSL's to see how you place towards W.A.S.? The list of Charter Members will appear in April QST. Will your call be among them? Send in your cards NOW!

Does anybody need NEVADA for W.A.S.? W6BIC, Nevada SCM, advises that W6BTJ, W6LOD, W6KBD, W6MVP and W6AJP (all Nevada stations) are trying for W.A.S. on 3.5 mc. every morning from 1:30 a.m. PST on. Here are the frequencies of several Nevada stations: W6UO 3846.2 kc., W6KVQ 7150, W6GGO 3985, W6AJP 3985, W6LCU 14,092 and 14,074, W6BTJ 3935, W6BIIC 2840 c.w. and 3924 and 3960 'phone.

New England Division Director Bailey, W1KH, suggests a W.A.S.b.N.C. Club (Worked All States But No Cards)! He says the club symbol would be a LYRE!!

A message recently received following the announcement of the WAS Club reads as follows: "Please issue me a W.A.S.T.R.S.C. Certificate." Investigations with the aid of our chief cryptographer disclosed that the mysterious letters stand for "Worked All But Three States And Received Cards From All States But Nine Club!!!" How about you? III!

March, 1936 37
The Cairo Commercial Occupancy Survey

OBSERVERS’ HONOR ROLL

Cairo Commercial Occupancy Survey

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<td>W9NO</td>
<td>Joe Kohler</td>
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Director Groves suggested it, the Cairo Committee approves, and we are happy to present above the Honor Roll of amateurs who have submitted reports and are continuing to submit logs of “commercial occupancy” in the Cairo Preparatory Survey. These are men who are doing something more than “talk about” more frequencies. They are amateurs who are giving unselfishly of their time that their amateur representatives at Cairo and the conferences that precede it may be provided with vital facts, knowledge and practical information, with which to work in our common interest.

The above Honor Roll includes all Cairo survey work reported to A.R.R.L. Headquarters to date. The listing of calls or names has been made as closely in the order of the volume of survey work performed by each individual as possible. Starting in April QST a monthly Honor Roll will be published.

Are you doing your part? Every true amateur should be on this effort and able, with these Observers, to wear the special A.R.R.L. button (¾ inch size) which is restricted to those who actually submit logs. Note also the announcement elsewhere in this issue of a silver planus award for the most valuable and consistent individual observing effort between March 1, 1938 and the same date in 1939.

The Cairo survey blanks are available to every W or VE ham who wants more frequencies for operating work and is willing to put in some time making observations in the 400-500 kc. range. Any receiver with a beat oscillator that will cover these ranges or even a substantial part of one range, can be used. A card or message will bring you details.

The Milwaukee Radio Amateurs’ Club “50-mc. International Contest” is getting under way. If you missed the announcement, see January QST, page 27, and start reporting weekly to assure yourself credit towards the beautiful 10-inch loving cup! W9NFS has a transmitter on “five,” crystal-controlled using a pair of 52’s, input about 400 watts. He is on daily in the morning and in the late afternoon and evening. W6JN (San Francisco) reports his activities centers on making field strength tests on beam radiators at the moment, using a pair of 52’s, input about 400 watts. He is 1.m daily in the morning and in the late afternoon and evening.

A transmitter on “50” is and are building a suitable receiver to pull in DX signals. They suggest that the gang sending DX tests on 50 mc. use or concentrate on the 50-50.5 mc. part of the band. Also they request local ‘phones everywhere to kindly refrain from using this part of the band for duplex or local rag chewing.

W9NY and W9GHN are getting on “5” and are building a suitable receiver to pull in DX signals. They suggest that the gang sending DX tests on 50 mc. use or concentrate on the 50-50.5 mc. part of the band. Also they request local ‘phones everywhere to kindly refrain from using this part of the band for duplex or local rag chewing.

It is suggested that all 50-mc. hams drop a line to W9NY or W9GHN in Milwaukee to line up some schedules for transmitter and listening, since these will doubtless develop into the first DX contacts to be reported towards this M.R.A.C.- A.R.R.L. Cup Award.

Each year the Adaman Club of Colorado climbs Pike’s Peak, regardless of weather, and as the New Year breaks, sets off fireworks. The Peak’s Amateur Radio Association members have worked with Joe Rohrer, W9EYN (of KOA), in experimental work leading up to a broadcast of the event this year. While the broadcast was being put on, the amateur members of the party, W9GLI, Archie Haase, and W9VXX, Tom Roark, were operating the five-meter rig handling the Adaman communication with the Springs. In addition, they were testing for possible contacts with Denver, 75 miles away, and finally hooked up for a short two-way QSO with W9DSB of Denver. The boys on the Peak also heard W9ESA and W9GHN, both of Denver. In Denver, the Peak outfit was heard by W9DSB, W9ESA, W9FK, W9YXX, W9MFF, W9FSA and W9FXX, who were at W9DSB’s place. This success marks the culmination of three years of effort toward this end, and has hopped interest up to fever heat.

Next objective . . . signals between Denver and the Springs, straight over the Palmer Lake Ridge! We are putting a 200-watt Class C modulated set here next week with a beam toward Denver. W9NY has started something, and I can think of nothing to give me more pleasure than a five-meter QSO with him from here one day.

W9KX’s transceiver on the Peak (27 pounds) utilized a 49-30-19 antenna. A telegraphing aluminum quarter-wave rod antenna, 4 feet 1 inch long, worked against the operator’s body as ground. Input to the oscillator was 32 watts from 5 batteries. We had a chance for a real study of conditions. We had five trips up this peak and on all, conspicuous fading. When signals were weak at one point, they would be strong at another, and steady contact with the expedition was only maintained through our having several points here in town. The signals in Denver, 75 miles away, were generally better than they were in the Springs, only about 11 miles away. Contacts with the Peak were maintained from WHDU’s after 7 p.m. and the signal strength varied several times through fading cycles during which it rose to R-8 and sunk to barely readable.

The old standbys here have been W9GHN, W9GBQ, in Denver, and W9HZD, W9KZV, and W9KZV in the Springs. These few have stuck to five-meter work consistently. Data collected on more than a dozen fruitless trips up the Peak will now be put to use in a concerted effort to break down the Palmer Lake Ridge barrier between the two towns. This is our first milestone toward our ultimate objective, five-meter DX. The better part of next year will be spent on high-power five-meter work. The location is most strategic, both from the standpoint of advantages and difficulties. If we fellows are to get most fun out of it, we’ve got to make it a DX band. THAT’S WHAT WE’RE GOING TO DO THIS YEAR. (COMING, MILWAUKEE HI.)

56-mc. DX Contest

The Milwaukee Radio Amateurs’ Club 56-mc. International Contest is getting under way. If you missed the announcement, see January QST, page 27, and start reporting weekly to assure yourself credit towards the beautiful 10-inch loving cup! W9NFS has a transmitter on “five,” crystal-controlled using a pair of 52’s, input about 400 watts. He is on daily in the morning and in the late afternoon and evening. W6JN (San Francisco) reports his activities centers on making field strength tests on beam radiators at the moment, using a pair of 52’s, input about 400 watts. He is 1.m daily in the morning and in the late afternoon and evening.

A transmitter on “50” is and are building a suitable receiver to pull in DX signals. They suggest that the gang sending DX tests on 50 mc. use or concentrate on the 50-50.5 mc. part of the band. Also they request local ‘phones everywhere to kindly refrain from using this part of the band for duplex or local rag chewing.

It is suggested that all 50-mc. hams drop a line to W9NY or W9GHN in Milwaukee to line up some schedules for transmitter and listening, since these will doubtless develop into the first DX contacts to be reported towards this M.R.A.C.- A.R.R.L. Cup Award.

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56-mc. DX Contest
Winter Brings Emergencies! QRV?
By Benton White, W4PL

It is reversing the usual order to have an ice storm come in over Georgia, but $6,000,000 damage was reported in Atlanta alone. Trees, wires and poles crashed. For several days the only power available was from a few underground cables. The weather being strangely warm, a solid sheet of ice, a road so slippery that four chains couldn't hold a car on it? In a driving mixture of rain and sleet that froze instantly to everything it touched? Did you ever try to put up an emergency antenna in the dark with every tree, post, roof and window ledge shodden in slippery ice? Well, W4APX, assisted by W4DOH and W4BAG, did all of this, and he was on the air and had outside contact established by 5 a.m.

Eighty meter c.w. was used and the set-up was made on the second floor of the Court House. The first antenna was a piece of insulated wire tied between two trees in the Court House yard, as high up as a man could reach in the slippery darkness. No insulators were available and the feeders went out the window and down to the flat top!

Indoor antennas were later tried, and the one that ran from the clerk's office and down the hall worked better than the one that was tied to the judge's chair and went, via the sheriff's room, to the clerk and master's office. But the outside antenna, raised to twelve feet, got the best reports and was in use at the end.

Message blanks were left at the hotels, post office, telephone and telegraph offices, and drug stores. Regular collections were made and for three days W4APX and W4DOH, one or the other on duty hourly, kept 5000 people in touch with the outside world.

The traffic file presents a queer cross-section of human affairs. Here is one from one of the commercial communications companies; "All lines out at midnight ... ice getting heavier... rush crew men and 20 pairs cables," Stern stuff, that one, and the receiving station must hurry it to its destination by radio, or Western Union, or long distance.

Well, well; over in Augusta somebody must have been tossing a notable New Year's party, for here are a whole bunch of "regret.a" from Monroe's fairest. "Rounds instead of champagne!" And here is one from one of the commercial communications companies; "Ring, advise the dean of women that they will be late returning to school." And whadda you know about this one! A young buck from Atlanta and his YL out for a little spin, and here they are in Monroe with the engine frozen under the hood, and the wheels frozen to the ground. From his anxiety to contact Athens we judge that his YL's OM must own the biggest shotgun in the state of Georgia.

It is the holiday season and lots of movement, and suddenly everything is halted, and communication is gone. In the town are travelers caught enroute; local people who have planned to go somewhere—and can't; people expecting visitors—who ought not now try to come; matters of health and business and pleasure at loose ends. All are served by the magic of coil and condenser and vacuum tube, plus the spirit and training of the amateur.

If opportunity—and emergency—knocks at your door at 8 a.m., some morning, can you do as good a job? Have you a transmitter that you can move with reasonable ease, or is it portable by Mack Truck only? Do you know the standard form and procedure for handling traffic? Do you know the Q signals and the abbreviations in ordinary use that will help the operator at the other end, straining his ears at weak and wavering signals, to make perfect copy?

If so, fine! If not, then NOW is the best time to prepare!!

World's Largest Ham?

W9TLQ, 327 lbs., president of the 1.75-mc. "Eighth of a Ton Club," is suggested as the "world's largest ham." Any competition? W9ONR, 280 lbs., is vice-president of the group, and there are several "scrub-team" members (those between 200-250 lbs.), namely W9PEH, W9SRO, W9AAJ, W9LXJ and W8KKE.

Skip is often responsible for unusual routing of DX traffic. Here's an example: A message from ZS6AM to W2EDW traveled ZS6AM-W8AZI-W6LFL-W2UTO-W2EDW. The reply was routed through W2CTO-W6LFL-W8AZI-W3CHG-ZS6AM.


March, 1936
CQ DX, or Duck Soup for All

By M. R. Campbell, VK3MR* via W2GOX

I READ with interest VE3IG’s letter, “CQ DX,” in QST, November 334, and a reply by W6YJ in QST, February, 1935.

Having managed to sneak in a few DX contacts between "W" QSO’s, am in a position to offer a few remarks and a suggestion or two on this DX racket. VE3IG remarked, "what is duck soup for one ham, may be poison for another," but this is duck soup for all who may need it.

VE3IG claims that he gets more DX by calling "CQ DX," while W6YJ gets by calling the DX stations. W6YJ mentioned the number of countries he had worked with his method with a 5 to 10 watts, and our friend from VE went into a lot of mathematical calculations as to his system. His own system is a combination of both with special regard to the position on the band, which is most important and depends on whether you are calling "CQ" or an individual station. There are a few chaps in locations that are not the best for DX and, again, there judgements in excellent positions but do not take advantage of it.

Before there is any desire to work DX, one has to hear it, which necessitates a good receiver and the ability to handle it under all conditions and also to understand conditions. Also you have to know the capabilities of the antenna, and realize its strong and weak points, regarding radiation pattern, etc. Then again, you have to see that the transmitter delivers the maximum amount of RF to the antenna via the feeders.

If you can say "Yes" to these questions, the working of DX becomes quite simple, providing certain things are kept in mind.

You will often notice that some hams can work DX in fine style and get big reports up to 8-8-0 from countries many thousands of miles away and another chap, a few miles away, with less power, may get only R-4-6 from these same stations, but when it comes to a DX Test, the low power man romps home; not because he is in a better location. It’s simply because he has what we might call “Radio DX Sense,” and can tune down or up the band, whichever the case may be. If he can’t get him and others are, it’s ten to one you’re not getting there or your signals are being QRMD. If you are not getting there, and you can work stations just as far or farther in other directions, it is quite likely that your antenna is not good for that direction.

While on the subject, I’d like to say that it’s the antenna that gets you there. Power helps once your antenna has put your signals over the horizon. There are DX stations that puts the signals with a bang to that DX station, one that just gets you there, and the other that doesn’t. Under good conditions, the third antenna may get there but under real bad conditions, it’s the first antenna that does the trick. If you want to work stations just as far or farther in other directions, it is quite possible if you can judge when to call a station. If the station being called tunes from the HF end or the LF end and your frequency is about 2 kc. in from the edge, don’t call for five minutes. Two or three calls will be OK. The farther you are in from the edge, the longer you should call. Use judgment.

I will finish here with a true yarn regarding the above. During the last “W” tests, using 7285 kc., I called CQ and worked W9FM. He called me twice, snapped over and received his number OK, listened again and heard a hopeful QST, W9FM, who worked 7FY on February 19th. 7FY was given as Timor. GAL is wondering if this is the first W/T Timor contact. Has anyone any information?

W4DRZ, Fort Lauderdale, Fla., reports 7me, hot for 1X9 during December. Among the consistent signals he lists are: Between 6:00-9:00 a.m. E.S.T.: K2CCG, 7100; KOMTE, 7120. Between 6:00-9:00 a.m. E.S.T.: VE2BS, 7100; VK5ME, 7080; VK6KB, 7110; KAI7R, 7100. Between 5:00-9:00 p.m. E.S.T.: EBA7AV, 7105; EAA4AB, 7120. Between 7:00-9:00 p.m. E.S.T.: EBA9F, 7090; FTA1A, 7105. Between 5:00-8:00 a.m. E.S.T.: SPF1F, 7115. All these stations average 58 or better. W2AW QSO’s 7K7J (7070 kc.) on January 24th, 4:50 p.m. E.S.T.; he received S7; 7K7J was S6. W4CN, North Carolina, lists some more or less rare ones in the “Tarheel Ham,” which we reproduce here: EAS1A, 7120 kc., 9 p.m.; EASAF, 7100, 9:23 p.m.; LUX5C, 7150, 12:40 a.m.; SPIDE, 7025, 9:40 p.m.; S11A, 7040, 10:35 p.m.; YRSNP, 7140, 1:40 a.m.; HJ4ABC, 7150, 9:05 p.m.; YM4AA, 7035, 2:10 p.m.; LU1AJ, 7170, 12:25 a.m.; SPF1F, 7150, 11:05 p.m.; CPIAC, 14,350, 8:50 p.m.; 256AM, 14,300, 4:50 p.m. These were all worked or heard during December. A battle royal is in progress for the presidency of the “210 DX Club” between W8DVS, W8BSF and W8DWW. W8DWW holds the honor at present with 89 countries to his credit with his ‘10s. The club now has members in all districts except W2 and W7. ON4CC reports that ON4AC has by all hams, there would be less use for headache powders.

It’s quite a simple matter to sit in a conspicuous place in the band and call "CQ DX" for ten minutes and then listen to see how many stations are calling you. With this method, you will work a lot of DX in a long time. This method is OK for stations in other countries during “W” tests. The idea is to work a lot of DX in one country in a short time, and that can be done by listening out for DX stations, and calling the DX stations. It’s not much use calling these stations if you don’t take into consideration your position in the band, with respect to the station you intend to call.

The whole secret is to put your signals under the nose of this DX station so he will hear you as soon as he starts to tune down or up the band, whichever the case may be. If he always tunes from the end that his signal is on, it’s a simple matter. Even if you find that he tunes from the other end, you simply QST there and if you can’t get him and others are, it’s ten to one you’re not getting there or your signals are being QRMD. If you are not getting there, and you can work stations just as far or farther in other directions, it is quite likely that your antenna is not good for that direction.

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If your frequency is near the HF end of the band, always tune from that end and the same applies to the LF end. If you are exactly in the middle of the band, tune from the LF end, and if a few Kc. higher in frequency than the middle of the band, tune from the HF end. If this practice was used

* 194 O’Ream Road, Coburg West, N. 13, Vic. Australia.
gone to Persia, where he will stay several months. It is ex­pected that he will be on the l n connection with the silent period observed on Sunday, ...

W3CGE 47 67 1245 1359
W3CHF 91 74 1291 1459
W3DSS 42 140 1188 1900
W4AJT 180 102 1602 1284
W4MN 211 520 1578 1278
W4IP 26 43 1198 1265
W5WT 73 67 1151 1348
W6ECE 260 180 830 1924
W6QZ 19 200 892 1177
W6CUU 139 259 708 1184
W8AMT 31 66 105 1101
W9FAM 51 35 1015 1101
W8GQO 61 107 914 1062
W8HL 11 300 985 1097
W9R 23 152 880 1055
W10GK 72 208 746 1026
W10D0 82 109 836 962
W10JQ 70 188 940 1052
W10KAI 305 178 825 957
K1ALO 255 325 290 855
W8LOF 210 190 458 896
W8NN 70 150 729 896
W9QN 61 94 892 847
W9R 30 30 377 856
WHWE 226 110 408 528
W8NE 196 260 425 618
W8MC 20 43 749 872
W8LCC 122 56 692 780

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

W1PEF 220 W1PEF, 191 W1PAF, 107
W1WT. 211 W1RC, 105 W9CV, 104
W1KH 210 W1KQ, 103 W1AMT, 103
W8GDH, 210 W8GYX, 128 W8GYX, 102
W9ZD, 117

BRASS POUNDERS' LEAGUE
(December 16th—January 16th)

Call Orig. Del. Rel. Total
W8FLA 2050 14 3000 5914
W8BCX 175 64 4489 4682
W8MYT 262 52 2400 2725
W8IBF 75 65 1975 2194
W1KCS 524 152 1988 3184
W1GUF 238 148 2172
W3EDP 234 123 1865 2013
W3JME 886 119 748 1754
W4ADY 46 30 1968 1714
W4LDF 817 108 676 1699
W5L3E 100 68 1291 1459
W6BDI 10 115 1408 1408
W6JEP 254 276 2180 2451
W8GGE 47 67 1245 1359
W8CHF 91 74 1291 1459
W9FSA 42 140 1188 1900
W8CQ 180 102 1602 1284
W8MN 211 520 1578 1278
W8IP 26 43 1198 1265
W5WT 73 67 1151 1348
W6ECE 260 180 830 1924
W6QZ 19 200 892 1177
W6CUU 139 259 708 1184
W8AMT 31 66 105 1101
W9FAM 51 35 1015 1101
W8GQO 61 107 914 1062
W8HL 11 300 985 1097
W9R 23 152 880 1055
W10GK 72 208 746 1026
W10D0 82 109 836 962
W10JQ 70 188 940 1052
W10KAI 305 178 825 957
K1ALO 255 325 290 855
W8LOF 210 190 458 896
W8NN 70 150 729 896
W9QN 61 94 892 847
W9R 30 30 377 856
WHWE 226 110 408 528
W8NE 196 260 425 618
W8MC 20 43 749 872
W8LCC 122 56 692 780

MORE-THAN-ONE-OPERATOR STATIONS

Call Orig. Del. Rel. Total
W8CRT 605 1421 2031 4081
W8SN 1300 521 1601 4312
W8CF 1275 715 1922 3067
W8EOU 811 217 1334 2362
W1D0W 26 4 1257 1331
W8KXL 27 46 723 840
W4BH 61 45 454 502
W8DQ 303 177 1577 1754

A.R.B.S. STATIONS

Call Orig. Del. Rel. Total
W1QA (W8OK) 7 7 1846 1853
WVLW (W8BMC) 4 14 1658 1707
W1QT 62 4 1322 1388
W1M1 (W8GXM) 135 70 910 1016
W8MN (W8DCN) 60 34 1002 1038
W8UD (WLE2Z) 565 39 1127 1062
W8LF (WSEWEW) 50 25 754 787
W8LT (W8DDE) 72 91 344 357

A total of 500 or more, or just 100 or more deliveries will put you in line for a place in the B.P.L.

* November—December.
** October—November.

For the last time, the W6GAL contest was held on Sunday, January 16th, in commemoration of the memory of the late King George, R.S.G.B. sent a message to W8KWA It

Scientists at the Naval Research Laboratory have been working a few of the rare ones: CIPAC, Bolivia; ZPAC, Paraguay; NY1A, Nicaragua; HJ2D, Colombia; K7UA, Alaska; all 14 mc. He worked J2LJ recently at 0200 G.T. inside of one hour W6GAL had two very FB contacts with VQ5AC and VQ5AF in Mauritius. He maintained full schedule with VQ8AC. VQ8AF is "screechy d.c." about 14,350 kc., VQ8AC either 14,360 or 14,270, also a "screechy" note. The best times for west coast VQ contacts seems to be around 1600 G.T., reports G1AL. G1AL also says that TG1AF, broad r.a.o., 7015 kc., has been coming through lately. V7UH3, 14,386, and VU2CQ, 14,300, are consistent every morning from 7:15 to about 9:50 a.m., says W2AJW. His first contact with V7UH3 made him WAC after more than 13 years on the air. W8BKP lists a few frequencies: SP11H, 7150; YR5NP, T6, 7125; FB5AA, T9, 14,300; PM3D, T9, 14,290; BM8WZ, T7, 7200; ZB1, T8, 7190; SUISS, T8, 14,350; CE804, T4, 1400. W8SBKP reports QSO with FQ8VB, January 4th, 3 a.m., 7 mc.

W1DUM, Warren, Maine, sends some interesting items: Van, operator of NY1LAB fame, is now working under call of W6GCX at Long Beach, Calif. ZS1AH is the chief of the Capetown Fire Department (according to ZS1AL). On January 25th, W1DUM heard, identified, called and worked VK2R, Sydney, a phone station. It is believed to be the

March, 1936
first Maine-VK 'phone contact. On January 26th, 1DIU worked VK5J-B, who changed to 'phone after contact was re-established, with fair results. The VK5J-B QSO was most satisfactory, his 'phone being S7, readability 3-4, at W1DHU.

SN3A was logged at 2:27 a.m., January 28th, about 14,375 kc. W1DJO reports a schedule with J3CIR on about 14,300 kc. every evening at about 7:00 P.M. E.S.T., 14,300 kc. Next DX station hooked by J3CIR after finishing with J3CIR one night was C6S3CR. HI, Signals from LU, CE, K5, ZL, ZT8 may be heard on 14 mc, between 11:30 p.m. and 2:00 a.m. E.S.T. for about two weeks of each month. W1DIU has also heard K6, ZBI, ZE1 and several Europeans at this time.

The usual quota of "ship QSO's" and "ships heard" are reported this month. W1DIU heard XE5M, while off the Brazilian coast, near high frequency and of 14-mc. band. W9MLF worked GTCP, the S.S. Thistle Glenn, on January 12th, 2:48-3:18 a.m.; this ship was outside the high-frequency end of the 7-mc. band, very rough note. W9MLF inquires whether any other hams have worked GTCP, and if so, how to send QSL's. W6LCD reports QSO with XESM, reported this month, W1DUJ heard XESM, while on the Mexican coast, a.c. note. W1GBD on January 26th at 7:49 a.m. logged a station signing NZ1BO on the 3500-ke. band and working W7BNE. NZ1BO said he was on a ship 86 miles from Eureka, Calif. Has anyone any dope on such a station?

W3BZB believes in "service to his fellow hams"; when he hears a good bit of DX he passes the dope along. Logging DX has been his hobby for 2 years, and recently he gave him a call, interspersing at regular intervals during the call EAFIS his frequency for the information of others who might be trying to locate him. FB, From the Fifth District W6ERM sends some notes: Heard January 2nd—AC1AN, T9, 14,300 kc.; when he was T9, c 14,130 kc., and it was his first W6 QSO, he worked ON4CJJ, about 13,390 kc., T9, and it was his New Year right W6GAL snagged VQ4CRO at 1600 G.T., sending an old W2CDA. W2HHF worked U2NE, W9BSF, W9CSJ, W9GQN, W9JQM and stating especially what fortn of auxiliary power is available. A membership card, which also serves as the major activity. Any ham operating between 7200 and 7300 kc. is eligible to membership. Meetings are held daily at 7:00 p.m. and Sundays at 9:30 a.m., PST. The 7294-ke. Club now numbers close to 100 amateurs. For further details get in touch with W6ZKX, 1821 Chestnut St., Berkeley, Calif.

The A.R.R.L. Emergency Corps New Members


At this writing membership in the A.R.R.L. Emergency Corps total 153. The Corps is open to all hams, amateur and amateur organizations possessing equipment (transmitter, receiver and auxiliary power) suitable for operation in an emergency when regular power and communication facilities are disrupted. All amateurs having such equipment are invited to enlist in the organization. Simply send a post card requesting membership, giving your favorite nickname and a brief description of what frequency bands it works, etc. (CQ 73" to raise club members."

The A.R.R.L. Emergency Corps now numbers close to 100 amateurs. For further details get in touch with W6ZKX, 1821 Chestnut St., Berkeley, Calif.

The winter graduating class at the Benjamin Franklin High School, Los Angeles, has among its members five hams: W6KHZ, W6LHZ, W6LHY, W6LHW and W6MA2.

CLUBS! Many groups are getting started in earnest on an organized observer program in connection with the winter \(2100 \text{ to } 2200\) G.T. O.B.S.

The following is a supplement to the A.R.R.L. Official Broadcasting Stations in November QST (page 60):
W. L. Miller, W7AAN, is doing an outstanding organizing job in the 8 me. survey following out a 14-week program. In the Rhode Island Section, S. W. Atkinson, W1AFO, is progressing with a similarly successful 4-mc. survey.

Beginners Net

W2HT is establishing a net on the 3500-ke. band for beginners using low or moderate power and sending at a speed newsmen can copy. This net is to cover the Second District and parts of the First and Third Districts. The net is intended to stimulate an interest in traffic handling among new hams and to bond together those fellows who are just starting in the game. Further information communicate W2HTT, 26 Pierpont St., Brooklyn, N. Y.

American Museum Expedition to New Guinea

Mr. Ewing Julstedt, W2IVN, is the radio operator of the American Museum of Natural History’s Expedition to New Guinea. The purpose of the expedition is to collect specimens of birds, animals and plants life in a section of New Guinea hitherto unexplored. The expedition, consisting of a ground party and an airplane, is now being taken into the interior and left, with supplies to be furnished by the air party. The two groups will be kept in radio communication, the expedition having three complete transmitting sets.

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Station Activities

Maritime—SCM, A. M. Crowell, VE1DQ—NOVA SCOTIA; VE1ER tops the list this month with the finest total in months, result of regular schedules well kept. GL, R. M. Bill Hone, says all who have not received the club circular in error, write for a new one. Details of frequencies on which contact can be made are given in the complete address.

Traffic: VE1ER 189 GL 143 KA 1 HH 22 IV-4B 4.

Ontario Division

Ontario—SCM, John V. Perkins, VE2QK—R.M.A.; GTA, 3RK, 3G, 3DU, 3WX, 3TM, 3QK, 3SG. ABW makes Braspender’s League. Congrats, Jeff! VD hits another in interest in 7-mc. traffic schedules. JT continues to work fine DX on 7.5 mc.; a VO, three ZL’s, three Q’s, an IB and a K7 are his boasts in the past month’s operation. JT manages to handle some traffic along with keeping chummy with his cronies on the higher frequencies. QT is looking for schedules on 3503 kc., between 7 and 7:15 a.m. JT is charter-member No. 9 in W.A.S. Club. The London gang scoffs at those who say it is impossible to set up a 7-mc. net. JT pegs along with E6, 100 watts P.P. par. with 50 watts input on 7 mc.

Atlantic wants a truck and fourteen men to move his new rig. VO ‘phone, is now using: remote control, working duplex on the London gang and tells us that: ACO is going great; BT grid modulates 59’s on 1.9 mc. ‘phone. IM works plenty of “W’s” on 3.5 mc. JB, North Minto, N. B., uses four ‘45’s P.P. par. with 50 watts input on 3.5 and 14 mc. GU blew his filler condensers. ON is still working on his 1.75-mc. ‘phone. GA is heard on 1.75 mc. ‘phone. VZ and AEM hold down good traffic: HG is still working plenty of “W’s” on 3.5 mc. again. New arrivals on 14-mc. ‘phone: AW, AX, GR and ET. FO, GL and CP taking ‘phone. GK has new crystal rig. GF is new Truro ham. OU is hearing DX and is interested in C.W. FOQ and YC are all remodelling rigs. OH is heard occasionally from the Ottawa gang.

Collgrats to Ted and Bill, 9BW, on the arrival of Nancy K. PA and TN, the Windsor gang was strengthened by the arrival of IK, who boasts of the latest design in ham radio gear. He is going along and that the 7-mc. band feels the presence of KB, PA and TN.

Traffic: VY1Y 2 OA 4 C 5A 10 OA 33A 73.

Maritime—SCM, A. M. Crowell, VE1DQ—NOVA SCOTIA: VE1ER tops the list this month with the finest total in months, result of regular schedules well kept. GL, R. M. Bill Hone, says all who have not received the club circular in error, write for a new one. Details of frequencies on which contact can be made are given in the complete address.

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it or not, all are members of the newly organized "73 Club"...
The Cairo Survey

Route 1, Box 257, Scappoose, Ore.

Editor, QST:
Please slip me the dope on the Cairo Survey. I have been rather hesitant about volunteering for this work because of my limited equipment, but I guess maybe I can be of some assistance. It looks like the League needs me and I'll be damned if I'll be a quitter, anyway!...

--Gordon A. Leap, W7BYQ

1015 College Ave., Iowa Falls, Iowa

Editor, QST:
VE3GG certainly hit the nail on the head. After reading his letter in January QST, I felt that I was sort of shirking, to say the least, in not taking part in the Cairo Survey. So even though I'm still in my last year of high school, I want to do my part in the Survey. Send me the dope right away.

--Harrison Lehmann, W9SQK

Alhambra, Calif.

Editor, QST:
The nature of my work makes it impossible for me to have any fixed hours on the air, but nevertheless I do have quite a bit of available time, and if I can be of any service in the Cairo Survey work would be more than glad to do so. ... I visit most of the radio clubs in Southern California and ... will be glad to give the boys a little pep talk and see if we can get some cooperation.

--V. G. Wiley, W6FGS

Hydro, Ontario

Editor, QST:
I would like to take part in the Survey. ... I have listened for hours on end to commercial stations sending a series of V's de WBUNK de WBUNK V V V ... I see no reason why amateurs should be crowded into narrow bands when between the amateur bands I have found blank spaces 300 kc. wide without so much as one signal.

I have been told by fellows at college that boys in school have no time for amateur radio. That may be true, but still I think I could find a few hours a day, and a few minutes to fill out a blank, if I could have a part in obtaining new amateur frequencies. —Everett D. Thomas, W4DKM

Editor's Note.—Since publication of January QST, 134 new Cairo Surveyors have volunteered, some representing groups which bring the total number of new volunteers to well over 200. A good percentage of these show that they were inspired by VE3GG's plea. How about you? Are you doing your part?

"AN OPEN LETTER TO ALL RADIO AMATEURS"

Editor's Note.—Owing to space limitations, several portions of VE3GG's letter in January's "Correspondence" section under the heading "Cairo Survey" were necessarily deleted. These sections, indicated by dotted spaces in the January letter, follow:

104 Logan Court, Raleigh, N. C.

Editor, QST:
... [Speaking of the type of man engaged in Cairo Survey work] It is then when he silently contemplates a situation where he has spent half a life time and thousands of dollars of his hard-earned income on his radio hobby, and compares it with his golf, which did not cost him one tenth of the outlay. His life membership in the golf club from its early inception, when three pioneers first broke the ground for the course, now assures him at least, that when he wants to use his clubs, he can, without having to choose between standing on the side lines, or scrambling through a horde of yelling youngsters chewing up the green with everything from a hockey stick to a claw hammer.

In spite of the fact that he knows statistics will show the bulk of our radio amateurs to be under 20 years old, that the majority of these are of high school age, that a large percentage of the radio licenses issued each year are taken out by boys who drop the game for good after the second or third year or earlier, depending upon the changes necessary when preparing for their career in life, and the natural susceptibility to YLitis, in spite of all this, I say, we find our bald-headed Cairo Survey man swinging his dial back to the job of logging the commercials and compiling his lists for Headquarters.

He realizes full well that each year a new swarm of transient and generally irresponsible youths are turned loose all over the precious amateur frequencies, coming and going annually like a blight, often crippling and rendering the bands useless half the time. He knows that any child of...
sixteen years can, with three or four dollars put even Mr. Maxim himself off any eddy he cares to make, and furthermore KEEP him OFF for as long as he wants, and should Mr. Maxim, in a spirit of cooperation, try to work the child, HE himself is driven down to a sending speed which is the basis stem of half the QRM.

What guarantee has our friend of the Cairo Survey that even if his work helped to win new frequencies, that the same conditions will not prevail on the new assignments as prevail now on the present bands? None whatever! The new frequencies (if they ever come) are doomed to devastation already by the present system of licensing, and allotment of frequencies which allows any irresponsible kid who swears he can send at 10 per minute and get someone to draw him a diagram, to wallow around on ANY amateur band at will. An editorial some time ago in QST where an amateur was charged with perjury for "assisting" eight applicants to secure licenses gives an accurate cross-section of the intolerable situation in this respect.

To the member of our organization who has the welfare of the A.R.R.L. above all paragraphs will sound an ominous warning; on the other hand thousands of "transient amateurs" will not even bother to finish this article. Then why in Heaven's name, should we persist in a policy which defeats our own ends by granting every Tom, Dick and Harry the same amateur status as your Cairo Survey men, right off the bat?

The situation has now developed to a stage where the following changes should go into effect at once:

(1) Forbid the issue of any more amateur license, until further notice from the A.R.R.L.

(2) Set a definite LIMIT on the strength of the amateur army, and keep the army up to strength by the re-issuance of cancelled or abandoned licenses to new applicants. No new call to be issued to a "dead" account.

(3) Cancel all licenses held by persons under 18 years old, or any license held by a person with less than 1000 operating hours on any amateur band.

(4) No license to be issued in future to any applicant under 21 years old, on the grounds that a radio license for amateur work demands something more from the applicant besides the dubious 10 words per minute, and the scrawled copy of a radio circuit. It demands mental stability and sufficient intelligence to appreciate the serious responsibilities involved in becoming a member of the most remarkable organization the world has ever known.

(5) Any license assigned to a probationary band, other than the regular amateur bands. If new frequencies are not immediately available for this purpose, then—assign 10 kc. on each of the present bands exclusively to probationers giving them a "P" prefix until such times as they can pass a strict examination on the "Q" list along with send and receive at not less than 20 words per minute. Frequency violation of a "P" station to cancel his license forever. We do not have to tolerate violators. The idea is to put an amateur license at a premium, where it rightly belongs, instead of something you can find in any ashcan.

(6) All "P" stations to report once a year by arranged sked with A.R.R.L. Inspector for examination as to progress made towards minimum standards set by the A.R.R.L. Sub-standard performance in comparison to time license has been in force to be sufficient cause for the recommendation of cancellation. Inspectors to be appointed within reasonable operating range in every district from the staffs of the O.K.S. or from the ranks of competent volunteers for such work.

(7) Two observations, not less than seven days apart, by an appointed A.R.R.L. observer of ANY station using a note other than xtal, or pure d.c. to be sufficient cause for cancellation. The seven day period between checks to be allowed as sufficient time for the operator of the offending station to have received reports from stations worked in regard to his note and same remedied. Station testing will not count as an observation; an actual QSO must be in progress before the Observer will record any infraction of this rule.

(8) All "P" stations to be silent from 24.00 o'clock local time every Sunday to 00.01 the following Tuesday, local time.

——— "Mike" Cashay, VE3GG

Cairo Suggestion

730 N. 6th St., Grand Junction, Colo.

Editor, QST:

I wrote the fact that any demands by amateurs for additional frequencies at the Cairo conference are likely not to meet with over-enthusiastic response from commercial and other interests, it has occurred to me that it might perhaps be the part of wisdom for the amateur proposal to involve the ceding of portions of the existing amateur frequency assignments, in exchange for other more desirable allotments.

In this connection, I should appreciate hearing from you as to your reaction to the following system of amateur frequency assignments:

5 meters — 56,000- 60,000 kc.

10 meters — 24,000 - 30,000 kc.

20 meters — 14,000 -15,000 kc.

40 meters — 7,000 -7,500 kc.

80 meters — 3,500-3,750 kc.

160 meters — 1,750-1,875 kc.

The advantages and disadvantages of such a system are of course immediately obvious, and I shall not discuss them further. They simply involve bargaining away some less needed for some more needed territory, and, while I am not very familiar with the actual process of reaching agreements at these conferences, I feel quite sure that such a plan of offering concessions in return for advantages desired would be more likely of success than would a plan of demanding favors while offering nothing in return. . . .

—Duane Maxvi, WBDQD

Hey, You "Ten"-Meter Gang!

Wayburn, Sask., Canada

Editor, QST:

This afternoon I was listening in on 28 m., and found it to be quite active, with lots of "phones coming through very well. On changing my receiving coils to go up to 20 meters, I was surprised to hear a large group of signals coming through in a new place. Knowing my 20-meter coils would not bring in 10 meters, and hearing a local on 20 putting a strong harmonic in the band, I wondered if all the other signals I could hear could be harmonics also. Imagine my surprise, however, when I heard W7— calling "CQ ten." The point is that a large number of hams have their rigs and receivers working on the wrong harmonic (presumably the 3rd harmonic of 40-meter crystals.—Editor) and are working each other in a band proposed by them to be 10 kc. but which actually is not. A check with my absorption meter showed this . . . How many ten-meter bands have we? The new band was very well inhabited, VE4UN lists some fifteen calls heard there.—Editor. These allows simply don't know any better. I hear them say "No DX" and "No phones." Well, they will find both on ten.

This matter appears to me to be of great importance and should be looked into at once.

—W. J. Meta, VE4UN

January Editorial: Getting QSO

1923 Lewis Ave., Long Beach, Calif.

Editor, QST:

It was with somewhat mixed emotions that I read your contribution to the "The Editor's Mail" in the January 1936 QST, concerning calling and Q'ing procedure; for right there before my eyes was supposedly-futile brain-child of mine that was being dragged out of the moth-balls in which it had lain for five full years! (Continued on page 48)
On Measuring Modulation at the Receiver

WE HAVE received so many letters requesting information on how to measure the percentage modulation of received signals, that we can hardly do better than to start our third year of this series with a subject of such general interest.

Such measurements are by no means as difficult as is generally supposed. The connections are made as shown in the illustration at the right. The common terminal of the horizontal and vertical deflection plates is tied to the receiver chassis. The free terminal of the horizontal deflection plates is tied to the plate of the last I.F. tube in the receiver through a 0.5 μfd. blocking condenser, and also connected through a twenty thousand ohm resistor to the free terminal of the vertical deflection plates.

These simple connections are all that are required, but in making them certain precautions must be observed. Since this system is tied to the plate of the last I.F. tube, the wiring should be carefully made to have minimum capacity to ground, and the last I.F. transformer should be retuned after the connections are made.

The principle of operation is not complicated either. The signal is impressed directly on the horizontal deflection plates, causing a horizontal trace. At the same time, the signal is also impressed on the vertical deflection plates, but because of the 20,000 ohm resistor, the vertical trace is out of phase with the horizontal and an elliptical pattern results.

Three typical patterns are illustrated at the left, all reproduced from unretouched photographs. A National CRO Oscilloscope was employed, connected to an HRO receiver. The top picture represents an unmodulated signal. It is a single, sharp oval line. If the signal is now modulated, the trace will be seen to widen to a ribbon, as shown in the second picture. It should be noted that this widening occurs in "both directions"; that is, the outside length of the oval increases, while the length of the inside dark area decreases. If these two dimensions are called D₁ and D₂ respectively, the percentage modulation can be calculated from the well-known formula:

\[ \text{Modulation} = \frac{D₁ - D₂}{D₁ + D₂} \times 100 \text{ (per cent)} \]

As might be expected, for 100% modulation, the dark area in the center of the pattern decreases to zero. This point can be determined quite accurately. If the signal be over-modulated, the illuminated area increases still further, and a bright spot appears in the middle of the figure. Such a pattern is shown in the lowest illustration. This last pattern is quite unmistakable, and looks for all the world like the revolving turn-table of a phonograph with a record in place. The exact amount of over-modulation cannot be calculated, but this is not particularly important since all percentages of over-modulation are equally illegal under the regulations.

One or two precautions must be observed in interpreting the signals. The most important thing to remember is that the device measures modulation at the second detector of the receiver, not necessarily at the transmitter. Errors can be due to two sources. Defects in the receiver, such as cross-modulation, poor frequency characteristic and improper coupling of the H.F. oscillator, can all affect the apparent modulation. In a well-designed receiver the resulting error is quite small, and in any case, results can be readily checked by tuning in a transmitter whose modulation is known. Such a test can usually be arranged without any difficulty, since a large number of transmitters are equipped with oscilloscopes these days.

The second source of error is more of a variable. Static, heterodynes and similar disturbances appear at the second detector as a modulation of the carrier (since otherwise they could not ride through the receiver). Since these extraneous signals are superimposed on the regular modulation, they will make the signal appear to have a higher percentage modulation than is really the case. Therefore, in order to make measurements it will be necessary to have the signal out in the clear. Even when conditions are very bad, it will usually be found that there are moments when the signal is clear and a moment is enough when one is watchful.

We recommend that you try it out. In addition to being easy to rig, and fascinating to watch, a very useful monitoring service is performed. Unfortunately, many amateurs have not found it possible to equip their stations with oscilloscopes or equivalent equipment and measurements at the receiving end seem the best way to keep the air free from over-modulation interference.

JAMES MILLEN

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

47
I made a dash for my file of QST, and after thumbing through some ten ancient and dog-eared copies, I found what I was seeking. There, on page 86 of the December 1930 QST, was a letter I had sent in concerning the CQ-answering problem. At the time this letter appeared, the bands were crowded, but compared to present conditions, they were relatively whole. The whole idea was to cut down the necessary calling time and to raise our batting average in contacts established. However, the addition of a couple of letters at the end of a CQ to indicate at which end of the band the CQer would start listening constituted superfluous signals in the minds of certain members of the amateur fraternity, and after a slight flurry of interest, the whole subject was laid on the table. Now, after five years, the subject has again been brought up in an improved and more comprehensive form, and the headquarters staff has indicated interest, so what is to prevent the idea from being developed to its fullest right now? If an idea has merit the amateurs will not hesitate to adopt it; once it is placed before them and its advantages pointed out. Let’s keep after this thing until we arrive at something which will be acceptable to all concerned, and which will eliminate these five minute (or longer!) answers to a snappy 3 times 3 CQ?

---Orin C. Lesta, W6DZK

3059 Marathon St., Los Angeles, Calif.

Editor, QST:

Regarding your editorial in January QST, I can suggest one thing in this connection and that is that ham's try electron-coupled oscillators as I have done and as several amateurs with whom I am acquainted are doing. It is very convenient to change to other frequencies in the same band quickly and accurately.

The e.o.-exciter unit is the most convenient and useful unit I have ever come across. In this connection, let me state that I have found it much more stable than crystal control unless an elaborate and expensive crystal oven is used. In fact, I don't care to ever go back to crystal control after using the electron-coupled oscillator.

I have done some extensive experimenting with electron-coupled frequency meter-monitors and the one I now have has never had to be re-calibrated but once since I built it and that was when I drove some nails into my receiver table without removing the frequency meter. Anybody that will do a trick like that ought not have a good instrument (hi!). It was built late in 1934 and held its calibration to 100 cycles for ten months until the above incident occurred, and when I re-calibrated it, it held its calibration up to the present day. I have no doubt it is closer than 100 cycles but the curve I have won't show any closer than that. At present I am not on 'phone, but on o.w. the ability to change from one frequency to another is mighty convenient. . . .

---Leland R. Ford, W6GKN

825 West End Ave., New York City

Editor, QST:

... On the difficulty of getting QSO, I believe you have overlooked the more important points of the question.

Most hams, nowadays, have much better receivers than they had a few years ago. They bring in more signals that can be copied, so that besides the greater number of signals of good intensity we can also bring in a larger number of weaker signals. Therefore it takes much longer to tune across the band after a CQ. Also the fellows are making their answering calls shorter (in most cases a good idea) due to your insistence on calling 3 times 3, so that there isn't much use in looking over more than one-third of the band after a CQ.

It seems to me that the solution to the problem you have mentioned lies in the general adoption of "break-in." If that were done, a fellow who had sent out a CQ would know that he was going to be called until he answered someone, and therefore he would be able to tune over the whole band. It would mean longer calls and, in one way, more QRM, but that would be offset by the fact that everyone would stop calling as soon as our CQer pressed his key again. To prevent the continuation of calls from fellows who might not have been heard, the ham who sent CQ and heard no reply, if he elected not to send another CQ, could send "TEST!" once or
AMATEURS who wish to acquire complete RCA factory-built and factory-tested transmitter equipment recently announced may begin with the RCA ACT-40-R. This is a complete r-f unit, including power supply. With a minimum of accessories it can be used as a 40-watt C-W transmitter, giving you in every respect the highest standards of quality and performance. The ACT-40-R is particularly useful as an exciter unit for high-power stages, eliminating the necessity of building your own multi-band exciter unit. The unit may also be used as the power stage in association with your present modulator and antenna coupling units, if desired . . . Plug-in coils permit operation on 160, 80, 40 and 20 meters. No change in neutralization is usually required when shifting to adjacent bands . . . This rugged, convenient unit permits you to go on the air at once with RCA dependability. Later, other RCA units may be added for operation on phone as well as C-W, with 40 or 200 watts. Thus the RCA unit plan of construction again demonstrates its great advantages to you. Write for complete details.

AMATEUR RADIO SECTION

RCA Manufacturing Co., Inc.
Camden, N. J., a subsidiary of the Radio Corporation of America
National has a socket for every amateur need. A few are pictured above. At the top right is the big JX-100, a wafer-type low-loss socket for power pentodes such as the RK-28 and RCA-803. Below it are two fifty-watt sockets with sturdy side wipe contacts. Type XC-50 is entirely of low-loss Steatite, while type XM-50 employs the more conventional metal shell and is lower in price. Next comes the Isolantite wafer socket for Octal (metal) tubes, followed by two sockets for acorn tubes. The acorn pentode socket is assembled on a square copper base and has built-in by-pass condensers for stable high frequency operation. The Acorn triode socket has an Isolantite base. And last, but by no means least, is the amateur's favorite receiving tube socket.

January Editorial: 'Phone

Zanesville, Ohio

I read with considerable interest your editorial in the January issue. I agree with it for the most part, but wish to take exception to one part. I heartily agree with your stand on broadcasting for entertainment purposes. It is not only unprofessional, but often illegal. So much for that. But why can't we acknowledge SWL cards? I average about two SWL cards a day and have always answered them all. It has cost me a little but so has my interest in amateur radio; in fact, my chief hobby is amateur radio. You certainly admit that it is not necessary to have a station to be an amateur. I don't mean that you can transmit without a station, but transmitting is only one half of radio, the other half is listening. It is highly probable that a sizable bunch of folk will also lock the frequency but allow adjustment as well. Perhaps this problem is just one more of the supposedly tough ones that come along for the amateur and which, under the spur of necessity, he just naturally goes ahead and works out.

W3DVO

131 Washington Ave., Oakmont, Pa.
become simple with

SIX Types to Cover ALL Problems

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

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

TYPE D — Direct reading of total resistance of resistors connected in parallel, and total capacity of condensers connected in series. Price, 50c, postpaid.

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

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

TYPE F — Permits measurement of resistance, from 1 ohm to 1 megohm by use of a voltmeter. Makes an ohm-meter of your voltmeter. Price, 50c, postpaid.

AMERICAN RADIO RELAY LEAGUE, INC.
WEST HARTFORD, CONNECTICUT
friends in radio have been made in this way. From my letter you may get the idea that I am a newcomer in radio. This is far from the facts. I have been interested in radio since 1912 when I had my first receiver, one of the old Navy tuners with a loading coil that was quite long. I forget just how long, but it was plenty big. Then in 1920 I became interested in radio from a broadcasting angle, as a lot of other experimenters did. I was content to listen and experiment until 1932, when I obtained my transmitting license, and have been on the air ever since. I know it sounds sophisticated to grumble about SWL cards, etc., but I don't think it reflects the spirit of ham radio and wish to take this opportunity to express my disapproval. . . .

--Chas. W. Cover, W8KVF

Entron's Note.—The editorial in question objected not to acknowledging SWL cards by means of QSL cards or letters, but to their acknowledgment over the air, à la early broadcasting stations and their fan mail. Discouragement of short-wave listeners is certainly not QST's policy; preservation of amateur radiotelephone as a two-way communicating medium, as opposed to illegal and unethical private broadcasting, most assuredly is. . . .

207 N. Arden Drive, Beverly Hills, Calif.

Editor, QST:

I certainly agree with the editorial in this month's QST about 'phone procedure, especially the entertainment part. After hearing a certain W6 last night I am so mad I can't see straight! His transmission was something like this:

He talked for a minute or so to the fellow he had the QSO with, and then began strumming on a guitar and singing slightly off key. After a few songs he said, "W6—has just completed a modulation test and is not broadcasting for entertainment purposes." There was a little more talk and then he said, "And here's a modulation test for so-and-so," and again burst into song. He made several "modulation tests" for various friends, in the meantime cluttering up the air while someones with a message may have been QRM'ed and many persons were undoubtedly annoyed.

The ham bands are overcrowded with good operators and we don't need these fakes who not only break the F.C.C. rules but destroy the amateur spirit.

I wish that the League would start a drive against these fellows. With all the fine hams on the air we could get rid of the offenders easily if we got down to business. How about it?

--Irene Kahn

Pentodes as Class-AB Amplifiers

(Continued from page 29)

The type of distortion present depends upon the signal level. At low levels only the second and third harmonics are present, the second harmonic being attributable to the driver stage. Higher-order harmonics do not appear until the output is about eight watts (at this level the total distortion is approximately 2%), after which the fifth, seventh, ninth, and eleventh harmonics appear. These harmonics represent an appreciable part of the distortion at maximum output.

The input transformer efficiencies given above are average for the type of transformer. The leakage inductance should be small. Any serious deviation from the ratios specified will result in either lower power output or increased distortion.

Experimenters' Section

(Continued from page 54)

across them. Screw down the adjustment screw on the buzzer so that it clicks instead of buzzing.

The clicks will stay in the buzzer and out of BCL sets. At W3EEK all interference with the family b.c. set is stopped although the transmitting aerial runs not five feet from the b.c.

Say You Saw It in QST — It Identifies You and Helps QST
### The All-Star Build-It-Yourself Transmitter

See page 83, Feb., 1936, QST, then send for circular which gives full details and power job (400 watts input) composed of finest parts such as Thorndarson, Hammarlund, etc. All chassis and panels are punched, chassis being cadmium finish, panels black crackle finish. Save by building it yourself.

### P-25 Power Supply —for CW-25 transmitter with matching chassis

<table>
<thead>
<tr>
<th>Output Voltage</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>600 volts each side of C.T.</td>
<td>$2.45</td>
</tr>
<tr>
<td>2 A. C. 10 amps.</td>
<td>$1.95</td>
</tr>
<tr>
<td>2 A. C. 5 amps.</td>
<td>$1.25</td>
</tr>
<tr>
<td>203-A Metal Plate</td>
<td>$4.75</td>
</tr>
</tbody>
</table>

### Thordarson Cased Transformer

- **600 volts each side of C.T.**
- **2 A. C. 10 amps.**
- **2 A. C. 5 amps.**
- **203-A Metal Plate**
- **$4.75**

### Mac-Key Semi-Automatic and Straight Junior Model

- **$4.95**

### GROSS C C Transmitter — Output 25-30 Watts

The "CW-25" transmitter kit due to its low cost makes it possible for anyone to own a modern crystal controlled station. A schematic hook-up and parts layout sheet as well as tuning instructions are furnished, thus enabling the least experienced operator to wire and put the set on the air, for real results. The "CW-25" is supplied with a shrivel finished sturdy metal chassis under which all parts are mounted, making the wiring and components dust-proof. A plug-in crystal holder is furnished with the kit. Only one milliampere is required for tuning the transmitter and each stage is provided with a jack for this purpose. The "CW-25" uses one '47 as crystal oscillator, one '46 as buffer or doubler and two '46's in the amplifier stage. A set of three coils supplied with kit for 20, 40, 80 or 160 band. Additional coils 75c each.

### Outstanding!!!

**Gross Crystal Holder**

White ceramic commercial type crystal holder — priced at less than ordinary holders. Adjustable pressure, dust proof, no tools required to open. Takes crystal to 1 1/2" square. Plugs standard 1/4" spacing. Most efficient job yet.

- **$1.00**

### Barr DB3 Transceiver

- **less tubes and crystals**
- "$16.20"

### Combined Cased Filament Transformers

- **2 1/2 V. C.T. 10 amps. for 866's**
- **10 V. C.T. 1 amp. for '39's or '52's**
- **10,000 Volt Insulation**

- **$3.25**

### Gross Cased Transformer

<table>
<thead>
<tr>
<th>Voltage Range</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>659 v. ea. side of C.T.</td>
<td>$13.50</td>
</tr>
<tr>
<td>759 v. ea. side of C.T.</td>
<td>$12.50</td>
</tr>
<tr>
<td>750-1000 v. ea. side of C.T.</td>
<td>$11.00</td>
</tr>
<tr>
<td>850-1350 v. ea. side of C.T.</td>
<td>$9.00</td>
</tr>
<tr>
<td>(The ideal job to give 750-1000-1250 V. D.C. with choke input)</td>
<td>$8.25</td>
</tr>
</tbody>
</table>

### Bliley Cystals

- **HF-20 M Mounted Crystals**
- **$7.50**
- **BC2 Cased Holders**
- **$1.00**
- **BC3-40-80 M Mounted Crystals**
- **$2.00**
- **LDR-2-40-80-160 M Mounted Crystals**
- **$4.50**
- **Exact Freq. if in stock or within 10 Kc.**
- **$5.50**

### Taylor Transmitting Tubes

- **866 Heavy Duty**
- **$1.45**
- **825 Carbon Plate 40 Watts 750 V.**
- **$4.95**
- **203-A Carbon Plate**
- **$12.50**
- **203-B Metal Plate**
- **$3.95**
- **HD-203-A Carbon Plate**
- **out of stock**
- **$17.50**

### Guaranteed Tubes

- **Carbon Plate**
- **$4.35**
- **866-A 10,000 volts inverse Peak**
- **$1.85**
- **203-A Carbon Plate**
- **$8.45**

### Noise Silencers

See James J. Lamb's Sensational Article in February QST.

#### Type A for Superhet Receivers Having Two I.F. Stages

- **Kit of parts, minus tubes**
- **$3.85**
- **With tubes**
- **$6.35**
- **Wired and tested unit, minus tubes**
- **$5.85**
- **With tubes**
- **$8.35**

In ordering mention if your I.F. tubes have 4-, 5-, 6-, or 7-prong bases so that we may supply correct plug. If you require octal 8-prong plug, if your receiver uses metal tubes, add 30c to price of kit or wired unit.

#### Special Type B for Superhet Receivers Having One I.F. Stage

- **Kit of parts, minus tubes**
- **$6.95**
- **With tubes**
- **$10.10**
- **Wired and tested unit, minus tubes**
- **$10.95**
- **With tubes**
- **$14.10**

Mention make and model of set used. Add 50c to kit or wired unit if your receiver uses metal tubes.

### All Parts, Cabinet and Punch Panel Included in Both Units

- **P-25 POWER SUPPLY**

- **$14.95**

### Hallcrafters Super-Skryder

Complete with 9 Metal Tubes...$79.50

Same as above. With Crystal...$89.50

See Technical Article P. 36 Aug. QST.

### EIMAC Unsurpassed Transmitting Tubes

- **Performance — Ruggedness — Power — Price**
- **50-T Output 75 to 250 watts.**
- **$12.50**
- **150-T Output 150 to 450 watts.**
- **$4.50**
- **300-T Output 350—700 watts.**
- **$6.00**

### Transmitting Filter Condensers

- **Compact, cased, with standoff insulators**
- **Working Voltage**
- **1000 V. 1500 V. 2000 V.**
- **1 mfd...$1.10**
- **2 mfd...$1.45**
- **3 mfd...$2.00**
- **4 mfd...$2.45**

### Gross Radio, Inc., 51 Vesey Street, New York City

Say You Saw It in QST — It Identifies You and Helps QST
### FOR ALL BANDS

**Type 677-Y**

**Type 677-U**

**SPECIFICATIONS**

<table>
<thead>
<tr>
<th></th>
<th>Type 677-Y</th>
<th>Type 677-U</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>4¼ inches</td>
<td>3½ inches</td>
</tr>
<tr>
<td>Diameter</td>
<td>3¾ inches</td>
<td>2¾ inches</td>
</tr>
<tr>
<td>Threads</td>
<td>30</td>
<td>21</td>
</tr>
<tr>
<td>For Use On</td>
<td>160 and 80 m</td>
<td>80, 40 and 90 m</td>
</tr>
<tr>
<td>Maximum Wire Size</td>
<td>12 B and S</td>
<td>10 B and S</td>
</tr>
<tr>
<td>Price (form only)</td>
<td>75 cents</td>
<td>50 cents</td>
</tr>
<tr>
<td>Type 677-PI Spacers</td>
<td>30 cents per pair</td>
<td></td>
</tr>
<tr>
<td>Type 678-P Plug Base</td>
<td>70 cents</td>
<td></td>
</tr>
<tr>
<td>Type 678-J Jack Base</td>
<td>65 cents</td>
<td></td>
</tr>
</tbody>
</table>

Order direct from this advertisement, including remittance, and we ship prepaid anywhere in the United States.

For catalog of many other amateur parts ask for Bulletin 936.

---

**FOR ALL BANDS**

**A Monitoring Kink**

Owners of superhet receivers will be interested in this simple method of using their receivers as monitors. It is suggested by John N. Montgomery, 3rd, W8HUV, who writes:

"Here is a very simple monitor which costs nothing to build. Just place the send-receive switch in the lead from the first detector and r.f. tube cathode resistors to ground. When this circuit is broken the oscillator tube acts as a frequency meter-monitor when tuned to the local transmitter. This has worked on every super which we have tried it on, including several commercial receivers. It was tried originally to prevent r.f. in the antenna from burning out the r.f. gain control, but has worked so well as a monitor that I would not be without it. The only disadvantage is that the set has to be tuned to the transmitter in order that the signal may be heard on each transmission, which means that it must be retuned on each transmission during a QSO."

---

**A.R.R.L. QSL Bureau**

For the convenience of its members, the League maintains a QSL-card forwarding system which operates through volunteer “District QSL Managers” in each of the nine U. S. and five Canadian districts. In order to secure such foreign cards as may be received for you, send your district manager a standard No. 8 stamped...
THE HAM that buys a Super Skyrider with Crystal Filter at $89.50 is buying all that he needs for short wave reception. Here is a receiver that covers the radio spectrum with unsurpassed efficiency, including the standard broadcast band and the 10 meter band, so active of late. Recent Hallicrafters' laboratory developments have greatly increased the Super Skyrider efficiency on this particular band.

It's complete, without a single extra to buy, with a convenient band switch (no cumbersome plug-in coils), controlled Crystal Filter Circuit (an absolute necessity on any receiver because of amateur band congestion), 9 Metal Tubes with their superior performance characteristics, Iron Core I. F. System (first used on the Super Skyrider) and a dozen other exclusive Hallicrafter developments.

Think of these features when you're buying short wave reception, and see the Super Skyrider at your jobbers today. It's supreme for short wave reception and complete at a single moderate price.

- 9 Metal Tubes — Dovetail perfectly with our efforts to improve signal to noise ratio — eliminate noisy tube shields — reduced inter-electrode capacities and shorter leads afford greater gain.
- Iron Core I. F. System — greatly increased sensitivity and a signal to noise ratio unattainable with an air core system.
- Duo-Micro-Vernier Band Spread — provide improved logging accuracy — provides electrical band spreading and micro-vernier tuning in an exclusive and distinctive dial.
- More efficient Crystal Filter Circuit, controlled by variable knob on front of set gives one signal selectivity — without reducing sensitivity.
- Beat Oscillator with continuous range.
- Modern Band Changing System — any desired bands in the short wave spectrum with the turn of an exact positive switch — no cumbersome plug-in coils.
- Compact — all completely enclosed in one convenient and efficient cabinet 19¼" x 10" x 10".

See your jobber today or write for complete details.
when Trouble hears its ugly head

and the customer starts talking in three-letter words it's time you got wise to yourself and changed to CENTRALAB.

Noisy, nerve-teasing reception can very often be permanently cured with a dose of "One Centralab Radiohm to one Radio."

It works miraculous cures. Try it next time you're out Trouble shootin' — and a mere handful service practically any set made — better than ever before.

Results — 3500-Kc. Transoceanic Tests

(Continued on page 18)
ALL you need to build this professional-looking ALL-STAR TRANSMITTER is a soldering iron, screwdriver and a pair of pliers. Drilled chassis and detailed instructions, including photographs, enable you to duplicate the laboratory results. No laborious drilling or machining. Instructions are so explicit and complete the job can be done without using the schematic drawings. Yet, efficiency has not been sacrificed to simplify construction.

Photographs and Diagrams Accurately Guide You

Instruction Sheet, which is provided with each foundation unit, contains 21 photographs showing in detail the standard parts used. Each part is identified by a key-number for quick, easy identification. Besides the photographs, there are eight diagrams, one for each unit and one for the complete unit.

Nothing Discarded!

Build step by step the various units without discarding anything from previous stages. If you own a suitable low-power unit, you can add the ALL-STAR High Power stages and complete the 400 or 500-watt jobs. Or if you already have a CW transmitter, the speech amplifier and modulator can be added for phone operation.

Sponsor Manufacturers
THORDARSON ELECTRIC MFG. CO.
500 W. Huron St.
Chicago
HAMMARLUND MFG. CO.
424 W. 33rd St., New York
CORNELL-DUBILIER CORP.
4377 Bronx Blvd.
New York
TRIPLETT ELECTRIC INST.
CO.
Bloomington, Ill.
OHMITE MFG. CO.
4809 W. Flournoy St.
Chicago
E. F. JOHNSON CO.
Waseca, Minn.
CROWE NAME PLATE MFG. CO.
1749 Grace St., Chicago

Build in Easy Steps
Save $200 to $300

Complete 40-watt CW transmitter — 40-watt phone transmitter — 600-watt CW transmitter — or 400-watt phone — can be built at savings up to $200 over a factory-built transmitter of equal appearance and performance.

Foundation units and all the STANDARD parts required to build any or all ALL-STAR TRANSMITTER units are stocked by local supply dealers. Complete constructional data and diagrams, 25¢ postpaid, or FREE with foundation units.

See Your Jobber or Write to any of the sponsor-manufacturers listed, or to ALL-STAR HEADQUARTERS, 222 W. Adams St., Chicago.
RAYTHEON FAMILY

There is a RAYTHEON 4-Pillar Glass; All-metal; or Amateur Tube for every purpose.

RK-28 — The RK-28 represents the ultimate in RF pentode design at the present time. Filament emission (10 volts, 5 amperes) is ample to provide long life at full rated power input. CW output of 200 watts is obtained with only 1.8 watts driving power.

<table>
<thead>
<tr>
<th>PLATE VOLTAGE</th>
<th>2000 Volts</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLATE CURRENT</td>
<td>140 M.A.</td>
</tr>
<tr>
<td>SCREEN VOLTAGE</td>
<td>400 Volts</td>
</tr>
<tr>
<td>SCREEN CURRENT</td>
<td>60 Volts</td>
</tr>
<tr>
<td>SUPPRESSOR VOLTAGE</td>
<td>45 Volts</td>
</tr>
<tr>
<td>REQUIRED RF INPUT POWER</td>
<td>1.8 Watts</td>
</tr>
<tr>
<td>REQUIRED MOD. POWER</td>
<td>2.7 Watts</td>
</tr>
<tr>
<td>OUTPUT</td>
<td>200 Watts</td>
</tr>
</tbody>
</table>

Base — Jumbo 5 Prong Isolatite
Overall dimensions: 9" Long x 2½" Diameter

RK-34 — Type RK-34 is intended for service on the five and ten meter bands. Complete isolation of the plates in this dual mode tube, with plate connections brought out on top of the bulb, raises efficiency to a high level. The base is isolatite.

<table>
<thead>
<tr>
<th>PLATE VOLTAGE</th>
<th>6.7 Volts</th>
</tr>
</thead>
<tbody>
<tr>
<td>HEATER VOLTAGE</td>
<td>6.7 Volts</td>
</tr>
<tr>
<td>HEATER CURRENT</td>
<td>0.5 A.</td>
</tr>
<tr>
<td>PLATE VOLTAGE</td>
<td>2000 Volts</td>
</tr>
<tr>
<td>GRID BIAS</td>
<td>64 Volts</td>
</tr>
<tr>
<td>PLATE CURRENT</td>
<td>31 Volts</td>
</tr>
<tr>
<td>POWER OUTPUT</td>
<td>1.2 Watts</td>
</tr>
</tbody>
</table>

Base — Large 7 Prong Isolatite
Overall Dimensions: 3½" x 1½" Diameter

RAYTHEON AMATEUR TUBES

Easy to Drive

RAYTHEON PRODUCTION CORP.

30 E. 42nd St., N. Y. 55 Chapel St., Newton, Mass.
445 Lake Shore Drive, Chicago, Illinois
555 Howard Street, San Francisco, California
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LEEDS LEADS AGAIN

OF COURSE the "NOISE SILENCER" is the greatest aid to radio reception in years.

OF COURSE our engineering staff was immediately alive to the vast field of application of a small adapter to thousands of superhet's, both amateur and B C L.

So...we developed the LEEDS "QUIET CAN" an amazingly compact dingus housing all the necessary parts and tubes. Just bolt the Quiet Can on the cabinet or chassis, make three connections, observe a few precautions as outlined in the instructions, and say Goodbye to noise.

On the left we have an inside view of the Quiet Can measuring only 2⅞ x 5½ x 6¾ overall with cover. Filament supply is ingeniously obtained by the use of a resistance type line cord with the tube heaters in series, eliminating the bulk and hum producing possibilities of a filament transformer.

On the right we picture the Quiet Can mounted on an FBXA with noise control conveniently located near the crystal controls. A hole in the chassis is provided, so that the potentiometer may be turned at right angles, the shaft extended and brought out of the front panel.

You bet we figured on thin pocketbooks and quantity sales. By buying large stocks of material we are able to pass on a considerable saving to you.

The complete kit of parts with 3 tested RCA or Sylvania metal tubes...$6.55 The Quiet Can wired and tested with RCA or Sylvania metal tubes, IF aligned to your IP frequency...$8.55

Shipping weight 5 lbs. Like all Leeds products the "Quiet Can" is unconditionally guaranteed.

THORDARSON TRANSFORMER special 1200 volts CT 200 ma. 5 v. 3 amp. 7½ v. 3 amp. 2½ v. 10 amp. a quality cased job...............$2.45
Thordarson 12 henry 250 ma choke. 1.95
Thordarson cased class B transformers input and output.
For 46's. Per pair. .........$6.17
For 210. Per pair. ...8.23
For 203-A. Per pair. 17.64

TRANSFORMER SPECIAL G. R. uncased transformers, 220 volts each side of center tap at 100 mls, two 5-volt filament windings. Ideal for "C" bias supplies. Each...........$4.99

The record is 100% perfect.

Thousands of microfarads of Leeds oil filled Condensers are in use without one case of failure.

1 M F 1000 v. $1.10
2 M F 1000 v. 1.45
1 M F 1500 v. 1.45
2 M F 1500 v. 1.95
1 M F 2000 v. 1.75
2 M F 2000 v. 2.45

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LEEDS offers outstanding values in quality transmitting TUBES, backed by our name and guarantee.

WESTINGHOUSE and SANGAMO x 6xxxx, x 614 over four meters, listed last month: 110-120 volt, 60 cycle, 2-wire meters; 5-10-25 and 50 ampere capacity...$3.50 Shipping weight 15 lbs.

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World Wide Service to Amateurs
45 Vesey Street
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Tel. Cortlandt 7-2612

LEEDS Unconditionally Guaranteed Crystals

X-cut 160 and 80 meters ...........$2.25
X-cut 40 meter ................3.25

LEEDS Unconditionally Guaranteed Crystals

Crystal pickup 11" arm; special. ..............$6.75

TRIMM 2000 ohm phones $1.89
4000 ohm ..................$2.25
FROST TRIMM featherweight $5.88
2000 ohm ..................$1.45
FROST 3000 ohm $1.65
DX 20,000 ohm imp. ...........$2.65

WESTERN ELECTRIC type P-11 ....3.95

LEEDS Leads as the only distributor in the country, handling G.R. Amateur accessories and laboratory apparatus. Bulletin No. 936 mailed on request.

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THINK OF IT! 2 books full of invaluable information, to be had for just the mailing costs! One with 20 complete transmitter designs including 12 tested transmitter RF section designs and 8 modulator and speech amplifier designs. Circuits, complete parts specifications, inductances, etc. all included. Outputs ranging from a little fellow all the way up to the big ones comparable to the best broadcasters. Ten complete designs for public address amplifiers in the other book. It includes one for every purpose, from 3 Watts to 30 Watts output, tried and tested designs that you can build, with complete parts lists for each.

These books should be in every amateur's technical library. Just 22 cents in stamps, to cover postage, brings them both to you, or get them from any Standard Distributor. Send for your copies today.

STANDARD TRANSFORMER CORPORATION
856 Blackhawk Street, Chicago, Illinois
EVERYWHERE WE HEAR THE MOST ENTHUSIASTIC PRAISE OF OUR NEW MANUAL OF AMATEUR COMMUNICATION,

The Radio Amateur’s Handbook

In the second month after publication we have sold and shipped 40 tons of copies, not only in the United States and Canada but in every land where there are amateurs. Why? Because the A.R.R.L.'s Handbook is the standard manual of amateur practice, known for ten years to be written by expert amateurs who know their stuff and can explain it so you may employ their knowledge.

The new 1936 edition is nearly twice as big as its famous predecessors. Written by the amateur technicians who have made QST famed and reliable: It’s an extraordinary piece of work — even if we do say so ourselves. Jim Lamb, George Grammer, Ross Hull, Clint deSoto, and others. Communicating dope by Handy, background stuff by Budlong. C.W. and 'phone. All the way from 160-meters to 1 ¼. Simple and complete. Theory, principles and constructional specifications. Transmitters and receivers, antennas and feeders, power supplies and monitors. Some for every need, every purse. Lavishly illustrated both with photos and diagrams. Dozens of copyrighted original tables of tube dope and charts. Not only technical questions but operating ones, legal ones. And a profusely-illustrated advertising section which is a handy catalog of the best gear in America, right where you want it. The complete answer to the ham’s prayer.

480 pages, 6½ x 9½, in the familiar QST format, heavy dirt-rejecting cover. Unquestionably more words of technical advice, and sounder and more interesting and reliable advice, than has ever been sold before for a measly Bucks 1. Printed in the usual textbook form, this book would be two heavy volumes for about nine good Iron Men plus another for postage. It’s the world’s best buy in amateur radio literature.

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FOR BEST RESULTS IN AMATEUR RADIO, ORDER YOURS TO-DAY!

American Radio Relay League, Inc.
West Hartford, Connecticut

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YEARLY BINDERS
Those who take pride in the appearance of their lay-out and wish to keep their reference file of QST's in presentable manner, appreciate the QST binder. It is stiff-covered, finished in beautiful and practical maroon fabrikoid. Cleverly designed to take each issue as received and hold it firmly without mutilation, it permits removal of any desired issue without disturbing the rest of the file. It accommodates 12 copies of QST and the yearly index. Opens flat at any page of any issue.

With each Binder is furnished a sheet of gold and black gummed labels for years 1919 through 1938. The proper one can be cut from the sheet and pasted in the space provided for it on the back of the binder. A file of several years of QST, kept in order in binders, is a most valuable reference library for any Radio Amateur.

Price $1.50 postpaid
Available only in United States and possessions

THE AMERICAN RADIO RELAY LEAGUE
WEST HARTFORD CONNECTICUT

What the League is Doing
(Continued from page 25)

...communications Act to extend their authority over apparatus capable of such interfering radiation. More effective technological collaboration with manufacturers of equipment is planned. What with diathermy and automobile ignition interference, there is plenty of room for some effective cooperation.

Ratifications Great Britain on August 23rd last bound herself and North Ireland and Newfoundland to the terms of the Madrid convention and its radio regulations. The acceptance also applies for all British territories except the colony and protectorate of Kenya. The radio regulations not having been accepted on behalf of Kenya, a binding treaty relation does not exist with it and third-party traffic is still OK.

Southern Rhodesia has also ratified.

STATIONS WORKED—PERIOD NOT INDICATED
(By W/VE Stations)


STATIONS WORKED IN FIRST PERIOD
(By G/PA Stations)

G2IN: VE1E(1) G2ZQ: W1DQ ARB ARD OR TS(2) BEK FIP EZ SZ CSS EVF ME W2DQ AEP BM M H2Y GFF DUP W3E0P BS AWH W8AVK KBN MAH MOT VE3JT G8BD: W1BKL SZ(2) DHE FVK EVJ W2AEP GFF AMP W3AHW EBP G8KG: W1EF BPT 11 W H2J GVR TS VE1E(1) G8VL All phone—W1DBM CJW W2BWM BYR HS W3SL UD W4ACZ(2) CVQ BYY VE1E(8) G8PF: W1BFT CDX 8Z W2AEP DLO W8FIP P0A9D W1BFT G0J TS EF GVR EZ JN FXQ HNI IYW EXR W2GZF HXM W8MQ PA0FX: W1ADR 8Z

STATIONS WORKED IN SECOND PERIOD
(By G/PA Stations)

G2DQ: W1CDX 8Z BIP EVJ IKJ DJ TS W3E0P W8FIP(2) W9AEH VE1E(1) G2ZQ: W1DQ WSCNC V0IP G2ZQ: W1ZL EWD ME DLL TD CDX OR W2CAY GQX GOW HBS EVI W3VR W8U VKG LMI BEK FIP W5EQO NNZ AHE VE1E(1) G8BD: W18S CJW BKL HXT W2DLO W3E JFP W9AEH VE2GV G8KG: W1GTS ADR W8U Phone—W1CRW W8KR DRY BKM W3AHR VE1E(3) G8VL All phone—W1GUY W3DRY VE1E(3) G8BD: All phone—W1ADM CJW W2BWM BYR HS W3SL U8 W4ACZ(2) CVQ BYY VE1E(8) G8PF: W1BFT CDX 8Z W2AEP DLO W8FIP P0A9D W1BFT G0J TS EF GVR EZ JN FXQ HNI IYW EXR W2GZF HXM W8MQ PA0FX: W1ADR 8Z

Say You Saw It in QST — It Identifies You and Helps QST
SINGLE SIGNAL RME SUPER RECEIVER

In special satin finish relay rack mounting. A dust and shield cover, fully ventilated, may be had to protect the receiver proper. This combination unit is but another example of typical RME design and engineering.

Bulletin 69 will give you full details

RADIO MFG. ENGINEERS, Inc., 306 First Ave., PEORIA, ILL.

Radio Operator’s Course

Complete in
Telegaphy— Telephony

Practical Experience

Studio— Transmitter— Announcing

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More than 256,000 words—
over 500 diagrams, charts and photographic illustrations,
53 basic design formulas,
42 charts and tables
in the NEW
TWICE-AS-BIG
480-PAGE
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It’s the equal of a two-volume $7.00 textbook
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West Hartford, Conn., U. S. A.

Your statistics overwhelm me.
Here’s my dollar—(or $1.15; I live outside of U. S. A. proper).

Please send to:

Name

Address

High Voltage from 32 Volts D. C.
(Continued from page 28)
1-µfd. electrolytic and an overloaded 30-henry choke. At first thought, this would seem inadequate, but the high-frequency supply filters very easily.

A single 6Z4 was used for a while, but in its place considerably less output. The regulation was poor and it was necessary to have sufficient load on it to hold the voltage down.

The vibrator adjustment makes a lot of difference about the chirp, too. This rig draws not more than 2 ½ amperes when key is pressed and, of course, none when key is up so its average efficiency is quite high. It will handle 25 w.p.m. okay. Break-in can be worked with it also. I have my Type 45 filaments in series and beat them with five volts d.c. The 6-volt battery for the keying relay heats the rectifier tubes which are in parallel. Very likely, an excellent portable power supply could be built up like this, using No. 6 dry cells.

BOOK REVIEW


The secretary’s office of the A.R.R.L.'s establishment, which is also the license and laws information service, welcomes this book, for it provides the answer to the questions concerning police radio operation which are constantly being asked. The manual provides sufficient information to enable passage of the radiotelephone operator’s examination, third class. It deals with the following general topics: radiotelephone transmitters, receivers, general principles of electricity, operation and care of storage batteries, power supply apparatus, and radio communication laws and regulations, providing a comprehensive digest of these inclusive topics.

—C. B. D.

R. S. G. B. 28-Mc. Contest
(Continued from page 28)
serious 28-mc. workers an examination of Mr. Wareing's log. As an illustration of thoroughness and neatness we consider it to be of the highest order, whilst as evidence of sublime patience it has few equals, for on occasions W9NY shows making over 100 calls in succession without receiving a reply.

"Fifth position was taken by Mr. K. Shiba, J2IJH, with 25 contacts, most of which were with VK or W6. His total was 1401 points. That indefatigable South African ZS1H finished sixth with 1067 points. His first contest QSO was with G2HG on September 7, 1935. In the remaining few days of the contest he worked 3 G’s, 2 ON’s, 3 F’s, 2 LU’s, 2 D’s, 2 FA’s, 2 W9’s and a PA.

Mr. E. H. Conklin, W9FM, and Mr. M. R. Carlson, W9FFQ, made seventh and eighth places, respectively."

The T. & R. Bulletin goes on to list the participants, in the "order of merit," as follows: X1AY-4802, VK2LZ-4017, W4AJY-2899, W9NY-2388, J2IJH-4101, ZS1H-1067, W9FMM-929, W9GFZ-367, G3YL-779, F5OZ-702, G3TG-698, J2IS-683, D4BMJ/KJP-659, ZL3AJ-658, VK2FY-658, OK1AW-566, PAOQ-418, W9EGF-240, G3LA-204, VK4EI-153, G30J-144, D4OON-102, G6WN-90, VK4GE-75. Late entries were received from VK4BB-1627, VK3JJ-440 and ZL1BA-608. Certificates of Merit have been awarded to the first 10 stations.

In the A.R.R.L. Contest ten W/VE leaders placed in the order W9NY, W4AJY, WATZ, W4AGP, W6CAL, W6FQQ, W6FZ, W1BB, W6FM, W1CUN. The reason the order of merit in the two contests differs is that in A.R.R.L.'s contest greater weight was given the factors of "regular reporting" and the submission of experimental data and station description. The League's contest was open only to U.S.A. and Canadian amateurs.
Atlas Metal Boxes

The original cabinet of the knock-down type and the best. Completely receiver assembly and makes repair or change of the enclosed unit much easier since the top, bottom or any side can be removed in a moment.

Every Atlas box is finished in genuine baked-on wrinkle enamel, no crinkly lacquer being used whatsoever on either the screw tops or the hinged lid type. Another important point of superiority is the fact that all boxes except the two smallest, No. 1601 and 1801, have sub-chassis as an integral part of the box. No extra cost for a chassis - no tedious job of fastening in a makeshift chassis. In Atlas you have a complete box, intelligently designed, ready to use.

<table>
<thead>
<tr>
<th>No.</th>
<th>H.</th>
<th>W.</th>
<th>D.</th>
<th>Screws</th>
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<td>12&quot;</td>
<td>3.00</td>
<td>3.40</td>
<td></td>
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</tbody>
</table>

SOLID COPPER PEE WEE CLIP

An inductance clip that will not heat in strong R.F. circuits. Overall length, 1½". Jaws open to ¾". A Mueller product, long needed, never before available. No. 45 OS.

<table>
<thead>
<tr>
<th>Your cost</th>
<th>Each</th>
<th>Ten for</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>7¢</td>
<td>60¢</td>
</tr>
</tbody>
</table>

VOLTAGE REGULATED PLATE TRANSFORMER

Made to order for class B 210's. Gives steady 510 Volts DC at loads from 30 MA. to 200 MA. Made to sell at nearly $12 by a manufacturer known for quality over 40 years. Name can not be used in this deep cut price. Fully cased. Weight 28 lbs.

Limited quantity: Order now, only $6.95

Here It Is! Ready to Use!

THE NOISE SILENCER

Read R2 signals thru R9 noise!

A completely built unit to plug in your super. Uses three metal tubes and has its own filament transformer. Neat crackle finish cabinet 10" x 5" x 6". The greatest advance in the radio art in 20 years but it costs only...

$13.75

Bliley 20-Meter Crystals

Delivery scheduled for Feb. 25th. Mounted in Victron holder with plugs for standard 5-prong tube socket. Output up to 5 watts in conventional circuits with a 47 tube. Drift 20 cycles per meg. per degree Centigrade. Furnished from 14,000 K.C. to 15,000 K.C.

Within 2%: $7.50  Within 1%: $11.00  Within .05%: $15.00

National HRO Junior

This new remarkable receiver is in stock for immediate delivery.

Amateur's net cost: $99.00

RADIOLAB AIR DERBY

W6JC won the HRO, W8AIN the RMB 909, W8EDE the RST. The rest of the list prizewinners finished in this order: W6XG W8MCY W9QG W8GGX W7TAM W8CEZ W8BSO W8BSG W8AVY W9A2A W8ETT W8DO W8CGW W8BSU W8BSB W8F6G W8GGG W8EKG W8EHL W8AMO W8HCC W8C6O W8K2J W8Q0A W8MDA W8VX W8YFF W8C2R W8C6R W8G6X W8ETX W8TAI W8H8R W8H8D W8P8E W8MIN W8BOU W8T8E W8ASO W8DCR W8C6X W8AJA W8Q8R W8DOO W8H2E W8MDZ W8FOD W8DSX W8MDW W8DAY W8MNS W8JCE W8DOV.

Due to the fact that the judging was completed at a very poor time for early publication in QST it was deemed advisable to mail out announcements at once, which was done the last of January. Complete results were sent to all participating stations which finally appeared on the covers even though the station did not send in an entry. If you did not receive this announcement and would like to have it, it is yours for the asking. It contains a complete list of prizes, winners, pictures of the first three, and a statement by the Franco E. Testa Co., Certified Public Accountants, guaranteeing accuracy of results.

The DERBY is over, it was a lot of fun, a lot of work and, we hope, an enjoyable amateur activity. If you enjoyed it remember that 27 manufacturers who made it possible, they deserve your patronage and we of course would like to handle your orders.

RADIOLAB 1515 GRAND AVE. KANSAS CITY, MO.
For that Condenser Bank...  
UNCASED PAPER CONDENSERS

Handy, inexpensive, non-inductively wound paper sections. Neat shape. Black varnished paper cover. Pitch-sealed ends. Pigtail leads. Same sections as used in standard AEROVOX metal-cased units. For new assemblies. Or as replacements. You can’t beat them!

Available in short (SU), Medium (MU) and Long (LU) sizes.

In 200, 400, 600 and 1000 volt ratings. 1 to 6 mid.

Low in price. You save container cost. The most paper capacity for least money.

DATA
Send for 1936 Catalog covering complete condenser and resistor line. Also sample copy of monthly Research Worker.

Here’s How YOU Can Become a RADIO ENGINEER!

CREI training is open to every ambitious man who realizes that TECHNICAL TRAINING is the “short cut” to success! Constant new developments make Radio a profession of specialists... and offers the Radio Engineer a great opportunity to get ahead. CREI can help you as we have helped others out of routine jobs into well-paying jobs with a definite future.

Mr. E. H. Bietzke
PRES. OF CREI

See Actual Movie
Films of Our School

“A Trip Through The Capitol Radio Engineering Institute” is an interesting half-hour motion picture of our school, students, equipment, and faculty. We will be pleased to show it to you individually or as a group. Write or call in NEW YORK - Mr. M. Schiff, 29 Broadway — in CALIFORNIA — Mr. R. H. Guildford, 1087 W. Ocean Ave., Long Beach.

CAPITOL RADIO ENGINEERING INSTITUTE
14th and Park Road
Dept. Q-3
WASHINGTON, D. C.

VE-W Contest Scores
(Continued from page 88)

VE-W Scores—VE-W Contest, 1935

<table>
<thead>
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<th>Maritime</th>
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<td>VE2IK</td>
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W Scores—VE-W Contest, 1935

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<td>W3BVP</td>
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<td>W3XH</td>
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<td>W3MAH/8</td>
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<td>W3WR</td>
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(West Virginia)     (Wisconsin)

| W3PTE               | 5,903       |
| W3RQM               | 4,024       |
| W3RIP               | 2,988       |
| W3RIG               | 1,521       |
| W3RQO               | 725        |
| W3RQF               | 1,439       |
| W3RQH               | 1,080       |
| W3RQJ               | 810        |
| W3RQK               | 653        |
| W3RQJ               | 485        |
| W3SWF               | 6,514      |
| W3IWA               | 1,074      |
| W3RQI               | 41         |
| W3SWF               | 6,514      |
| W3IWA               | 1,074      |
| W3RQI               | 41         |
| W3SWF               | 6,514      |
| W3IWA               | 1,074      |
| W3RQI               | 41         |

(Continued on page 68)

Say You Saw It in QST — It Identifies You and Helps QST
The new Bliley HF 2 Crystal Unit brings added possibilities to the 20, 10 and 5 meter bands. You can now have that clean-cut crystal control note at these higher frequencies with a real saving in transmitter cost. Expensive, inefficient doubler stages are reduced to a minimum... overall efficiency is greater... power output for a given number of tubes is increased.

Supplied within 0.2% of your specified frequency between 14.0 and 15.0 MC. or choice from dealer's stock for $7.50.

**TWIN DIODE TRANSFORMER**

NATIONAL announces a new I.F. transformer designed for operating into a diode detector. Though of the same high quality as National interstage I.F. transformers, it differs from them principally in having a closely-coupled, untuned, push-pull secondary, and is particularly suitable for use in noise suppression circuits as well as in detector and A.V.C. circuits. Type IFD 175 or 450 to 550 k.c.

List Price $3.50

**An Improved Speech Preamplifier**

(Continued from page 81)

The frequency response curve is given in Fig. 2 as a function of the deviation from the 1000-cycle gain in decibels. Where the preamplifier is three or four feet away from the filament and plate voltage transformer, which is advisable because of hum pickup, it is an advantage to use the 6-volt type tube (6C) due to the lower drop in voltage in the filament supply cable because of the lower filament current taken by these tubes.

Condenser C9 and resistance R12 act as a filter.
ONLY ONE CARDWELL QUALITY, "THE FINEST!"

★ TYPE MT-100-GD ★

FOR USE IN BUFFER STAGES, 700 to 1000 volts, USING 211—50T—150—35—203A TUBES

★ PLATE EDGES ROUNDED AND BUFFED
★ MYCALEX INSULATION
★ 100 MMF. PER SECTION

AMATEURS: Note the number of times that CARDWELL Condensers are specified in circuit diagrams published for your use. Ask the leading Amateurs in your district and learn that they, too, prefer CARDWELLS.

ENGINEERS: In leading Laboratories throughout the world, CARDWELL Condensers are invariably used for circuit designing, resulting in the use of CARDWELLS in Land Stations, Marine Stations, Airplanes, Medical Therapy and wherever variable condensers are used.

THE ALLEN D. CARDWELL MFG. CORP., 83 PROSPECT ST., BROOKLYN, NEW YORK

CARDWELL ★ CONDENSERS

NORTHERN OHIO LABORATORIES

Branches in following Ohio cities—
CAMBRIDGE, SPRINGFIELD
WARREN AND
SHELBY
NOL

FOR THAT NEW 10-METER TRANSMITTER
BLYE NEW 20-METER MOUNTED
HF3 CRYSTAL UNIT

BETTER HURRY!
ONLY A FEW LEFT

Power Transformer
600 volts each side of C.T. 200
MA 2½ V. 10 amps. C.T. 5 V.
3 amps., 7½ V. 3 amps. C.T.
Only $2.35 each

RCA 803
NET $38.50

RCA 852
NET $16.40

Say You Saw It in QST — It Identifies You and Helps QST
in addition to that in the plate voltage power supply, to reduce hum in the plate voltage power supply to the first tube. Further increase in gain on the higher frequencies may be obtained in the succeeding power amplifier stages if used, by placing a condenser across the secondary of one of the interstage transformers. As the size of these condensers depends upon the design of the transformer, no definite values can be given although they generally are in the neighborhood of 500 to 750 µfd, if the transformer is designed for Class-A amplification. For a single secondary, one condenser is used, and two in series of the same value with their midpoint grounded, if the transformer has push-pull secondaries.

Two 100-henry chokes of standard make were used in the author’s amplifier. The amount of bass can be reduced by varying the amount of resistance in the variable resistance across L2 C7. The amount bass desirable in the amplifier will depend upon the type of equipment which it is used. For example, if used with a public-address system which has the large type dynamic speakers which in themselves favor the low frequencies, it might be advisable to omit circuit RB, L2, C7 and replace it with an additional 25,000-ohm resistor.

W2HFO tells of the ham who absent-mindedly wrote “hrs mi crd, where’s urs?” on all the Christmas greeting cards he sent out!

Another coincidence: W6CAL, moving to the East Coast, was assigned the call W7JPE. His first W contact, made on a “CQ SF,” was with a San Francisco station, W6JPE!

New Receiving Tubes
(Continued from page 85)

fairly high voltage-amplification and at the same time permit transformer coupling to the following audio power stage. It is capable of an output of approximately one-fourth watt and is therefore suitable for driving triode power amplifiers taking appreciable grid power. It is especially suitable for use in high-fidelity receivers.

Tentative characteristics of the 6R7 are as follows:

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heater voltage</td>
<td>6.3 volts</td>
</tr>
<tr>
<td>Heater current</td>
<td>0.3 amp</td>
</tr>
<tr>
<td>Plate voltage</td>
<td>250 volts</td>
</tr>
<tr>
<td>Grid voltage</td>
<td>-9 volts</td>
</tr>
<tr>
<td>Amplification factor</td>
<td>16</td>
</tr>
<tr>
<td>Plate resistance</td>
<td>3500 ohms</td>
</tr>
<tr>
<td>Mutual conductance</td>
<td>1990 micromhos</td>
</tr>
<tr>
<td>Plate current</td>
<td>9.5 ma</td>
</tr>
</tbody>
</table>

The tube has the usual octal base with 7 pins and top cap. Pin connections are as follows (see 1936 A.R.R.L. Handbook for numbering system): 1, shell; 2, heater; 3, triode plate; 4, diode plate; 5, diode plate; 7, heater; 8, cathode; cap, grid.

RCA-Radiotron also announces two new glass types, the 1A4 and 1B4, both screen-grid tetrodes for battery receivers. The 1A4 is of the variable-µ
MARCONI Announces A Commercial Service Type Receiver for AMATEUR Use


CANADIAN MARCONI COMPANY
Vancouver Toronto MONTREAL Halifax St. John's, Nfld.

There is only ONE TRIMM FEATHERWEIGHT headset. EXPERIENCE is one of the unseen factors in their manufacture. You can secure them at your favorite jobber.

TRIMM RADIO MFG. CO.
1770 W. Berteaue Ave.
Chicago, Ill.

RADIO METERS by HOYT

Moving Coil Type Accurate Reasonably Priced

A complete line of panel mounting meters for the radio amateur. Available in 2½". 3½" and 4½" styles. New line of 2½" meters now ready. Full information gladly sent on request.

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755 BOYLSTON STREET, BOSTON, MASS.

Click! ... you're in the Clear!

DONT fuss and fume when interference chokes your wave band. Don't waste valuable operating hours changing coils and retuning. Snap the OHMITE Band-Switch mounted on your control panel for instant QSY (frequency change). It's the modern way! Ask your dealer, or write for Bulletin 104 which contains diagrams for most basic circuits.

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I take in trade used apparatus. I sell on time payments.

I stock at lowest prices all amateur apparatus.


I have in stock the new All Star transmitter kits. Supplied assembled at nominal cost. Also Radio-Silver transmitters.

but $5.00 with order.

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Butler, Missouri

RADIO ENGINEERING
RCA Institutes offers 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. Illustrated Catalog on request.

RCA INSTITUTES, INC. Dept. ST-36
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Recognized Standard in Radio Instruction Since 1909

USE A MODULATION MONITOR TO COMPLY WITH FCC RULE 381

This modulation monitor reads directly percentage modulation on either positive or negative peaks and indicates carrier shift during modulation. May be used on frequencies from 500 to 30,000 kc.

A simplified version of the type of monitor required by the FCC in all broadcast stations by November 1, 1936. Requires no changes in your "rig."

NET PRICE $20.00

DOOLITTLE & FALKNOR, Inc.
7421 SOUTH LOOMIS BOULEVARD
CHICAGO, ILLINOIS

or "super-control" type, while the 1B4 is a sharp cut-off tube.

Following are the characteristics of the 1A4:

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Filament voltage</td>
<td>2.0 volts</td>
</tr>
<tr>
<td>Filament current</td>
<td>0.06 amp</td>
</tr>
<tr>
<td>Plate voltage</td>
<td>180 volts</td>
</tr>
<tr>
<td>Screen voltage</td>
<td>67.5 volts</td>
</tr>
<tr>
<td>Grid voltage</td>
<td>-3 volts min</td>
</tr>
<tr>
<td>Plate current</td>
<td>2.3 ma</td>
</tr>
<tr>
<td>Screen current (app.)</td>
<td>0.7 ma</td>
</tr>
<tr>
<td>Plate resistance</td>
<td>900,000 ohms</td>
</tr>
<tr>
<td>Amplification factor</td>
<td>720</td>
</tr>
<tr>
<td>Mutual conductance</td>
<td>750 micromhos</td>
</tr>
<tr>
<td>Grid-plate capacitance</td>
<td>007 µfd</td>
</tr>
<tr>
<td>Input capacitance</td>
<td>4.6 µfd</td>
</tr>
<tr>
<td>Output capacitance</td>
<td>11 µfd</td>
</tr>
</tbody>
</table>

The 1B4 has the following characteristics:

<table>
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</thead>
<tbody>
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<td>Filament voltage</td>
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</tr>
<tr>
<td>Filament current</td>
<td>0.08 amp</td>
</tr>
<tr>
<td>Plate voltage</td>
<td>180 volts</td>
</tr>
<tr>
<td>Screen voltage</td>
<td>67.5 volts</td>
</tr>
<tr>
<td>Grid voltage</td>
<td>-3 volts min</td>
</tr>
<tr>
<td>Plate current</td>
<td>1.7 ma</td>
</tr>
<tr>
<td>Screen current (app.)</td>
<td>0.4 ma</td>
</tr>
<tr>
<td>Plate resistance</td>
<td>1.2 megohms</td>
</tr>
<tr>
<td>Amplification factor</td>
<td>780</td>
</tr>
<tr>
<td>Mutual conductance</td>
<td>650 micromhos</td>
</tr>
<tr>
<td>Grid-plate capacitance</td>
<td>007 µfd</td>
</tr>
<tr>
<td>Input capacitance</td>
<td>4.4 µfd</td>
</tr>
<tr>
<td>Output capacitance</td>
<td>11 µfd</td>
</tr>
</tbody>
</table>

Both tubes have four-prong bases with top caps, the connections being as follows (RMA system): pins 1 and 4, filament; 2, plate; 3, screen; top cap, grid.

Characteristics of the 1B4 are identical with those of the 32. The grid-plate capacitance of the new tube is lower than that of the 32, however. The 1A4, which replaces the 34, is likewise lower in grid-plate capacitance, and has higher mutual conductance. The plate and screen currents are slightly lower than with the 34. Both the new tubes are of the type requiring a close-fitting shield for realization of the low grid-plate capacitance.

The construction of the 5Z4, the metal-tube rectifier, has been changed to use a solid metal shell comparable in size to that used on the metal audio power tubes. This replaces the old tall "ventilated" shell.

Operating Noise-Silencing Units

(Continued from page 18)

the noise control toward the "off" position will bring the signal back unchanged in strength; the stronger the signal the farther will the control have to be moved from the critical point to bring back the original strength.

If a bad buzzy noise comes along, a final adjustment can be made by setting the control at the critical point and adjusting the diode trimmer for minimum noise. The correct setting will be unmistakable, and the tuning should be fairly sharp.

Occasionally, tuning the diode transformer to resonance will cause regeneration and, in some cases, even may cause the i.f. amplifier to oscillate. This should not happen with an i.f. amplifier normally stable when all circuits are properly
Here's the latest NATIONAL ultra short wave receiver. Covers everything from one to ten meters. Super-regenerative circuit with high signal to noise ratio. Stage of RF built in. Uses one 954, one 6CS and one 6F6 tube. Ideal for mobile use. Calibration curves included. Net price with coils, less tubes and power supply.

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TRIMM HEADSETS
Built for hams. Weight 4 ounces. 24,000 ohms impedance only.

FAMOUS B. C. L. HUSH BOX
Here's what you've been looking for. Sensational success wherever tried. Solves the B.C.L. problem. A shielded wave trap with one or two hand tuning. Easily installed. Money back guarantee. Order Now!

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High Quality Wireless Key
This SIGNAL standard wireless key is designed to carry heavy currents. Furnished with either 3/16", 1/8", or 1/4" coin silver contacts. Equipped with navy type key lever knob and has lacquer finish over brass construction. Priced from $3.85 to $4.25 list.

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COUPLING: Extremely practical where space is limited, this coupling has isolatite insulation that will not char under flash over and does not absorb moisture. Equally important, it possesses high electrical efficiency as well as the mechanical rigidity so lacking in couplings of the fibre disk type. Catalog Symbol TX-9.

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- Meet every headphone requirement. They bring in weak signals strong and clear and will handle excessive volume without overloading. Response 50 to 10,000 cycles. No magnets to cause diaphragm chatter. Special designed cases minimize breakage. Light in weight. Only 6 oz. complete with headband and cords. A quality product at a low price. Details, Data Sheet No. 10. Copies on request. Send for one.

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This famous SYSTEM is backed by a Quarter Century of Success in training Amateurs and Commercial Operators who could be satisfied only with the best!

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

(Continued from page 44)

DAKOTA DIVISION

NORTH DAKOTA—SCM, Hartwell B. Burner, W9OEL—Assistant SCM, W. O. Morris, W9JZJ. DGS has an 80-892 line-up for 28 mc, EZ9 has a Gamatron in final with a few tests and is working new making and qsl call letters for the boys. OEL is kept away from home because of snow blocked roads. JZ9 is acting SCM this month, JAR reports 20 below zero in his shack. Brtr. TFC has 690 in Seattle on 14 and 28 mc. KZL is up to his ears in schedules. IQZ is busy with his GRL movie talks. EZ9 has no new receiver. USY has worked 35 states and is trying hard for W.A.S. MGR rebuilt in steel rack. PVA keeps the air busy at noon with Army net. SEQ's father, who is a railway engineer, took code test. The North Dakota gang has what is known as the Ancient and Honorable Order of Radio Dom Dora, Officers are: Grand All Highest Majestic Dom Dora: KZL; Most Highest Majestic Dom Dora: RJF; Most Grand Council-Dom Dora: SEQ; Grand Custodian of Dom Dora: DGS; Chairman of Board of Governors: STT; Board of Governors: DM, OEL, MGR, STJ, NUM; Grand Tossor of Ink: JZ9. The No. Dak. QSO Party will be held March 15th from 10 a.m. to 5 p.m. Prizes will be awarded. BTJ has a new McMurdo Silver Masterpiece receiver.

W9S8C 352 HJC 575 DGS 141 DYA 43 DM 6 O6L 381 Jar 19 TBC 140 KHL 599 TQS 3 USY 8 PVA 341

SOUTHERN DAKOTA—SCM, Mike G. Strahon, W9RIF—The South Dakota State Convention will be held at Rapid City, sometime in August. The Miller boys are for it 100%. Miller Radio Club, elected new officers: President—SEQ, vice-pres.: OEL, vice-pres.; PGV, sec.-treas.; P. P. Burke, activities mgr.; E. A. Anderson, news reporter. PGV and OED are building new rigs. LDU is building a new phone job. KIFQ is building a portable rig. FPR is on 3.5-mc. C.W. with new rig. SEQ is putting out fine phone. DIS is trying 5.6 mc. SMY is on 3.5 and 7 mc. with an FB rig. SOB is school teacher and has portable on 3.5 mc. IQD is on Yankton with FB sigs. MBA has a new 211D and is going to rebuild his FB rig. LAM is putting up new antenna, 264 ft. long. The South Dakota State Convention will be held at Rapid City this month, JID and RJF. OML is in O.C.O. coast. GRJ, PGV and RNH are movie ops. JBT still pounds in on his FB 1.75-mc phone. LAM is putting up new antenna, going to rebuild. 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and heard lots more in 3.5-mc. tests. KJY needs confirmation of a Nevada contact for W.A.S. 501 is new transmitter at NIU.' SKP's pastime is a two-hour rag chew about tube characteristics. PCI is contemplating new 50-watt. New Super Seven at SLU and TAY. NMY's new bug doesn't seem to raise the boys just right. LLV is trying to line up QSO party. For W.A.S. and one continent for W.A.C. DBO's first 1936 QSO took place just a few minutes past midnight. A.A.R.S. attracts TBZ. The '03A feeding the 7-mc. Zepp (on 3.5 mc.) at EAP reported new contacts from DX as well as getting total CW and 30 mc. QSO's from DX. The year they are busy with the antennas with all the breaks against him. OIU is scheduling RCCG, whose YL is a nurse at a hospital near OIU's. TXQ is going to Washington U. No QSO's on 56 mc., reports VCB. ACO has new 300-watt rig. POM is trying to line up a counter-program. TXQ is putting out at present is one from a clarinet. RWM is planning big things in DX schedules. UZG uses his bedspring for a counterpoise. A receiver should be judged by the way it works, says YL. TXQ wants to install a new rig. HUO leads state in traffic. HUF is assigned WLHV by the community Club, 1100 Grove Street.

Traffic: W9KJY 480 (WLTK 75) PLL 39 RNN 27 FNN 24 (TQG 70) ETO 61 103 ANR-HPC 92 EAP 81 and 71 DBO 68 (WLIT 13) FM 65 BJH 49 NNX 45 NQ 44 TBZ 43 NMY 41 DDO-ENQ 36 FTX 34 KA 31 CDA 50 OMW 20 KOX 12 TLZ 3 HBQ 111 EDQ 117 UI 480 (WLTK 75) PLL 39 RNN 27 FNN 24 (TQG 70) ETO 61 103 ANR-HPC 92 EAP 81 and 71 DBO 68 (WLIT 13) FM 65 BJH 49 NNX 45 NQ 44 TBZ 43 NMY 41 DDO-ENQ 36 FTX 34 KA 31 CDA 50 OMW 20 KOX 12 TLZ 3 HBQ 111 EDQ 117

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Newark's deferred payment plan, available to everyone in the U.S.A. makes it easy for you to own a

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NEWARK Oil filled — Oil impregnated Filter Condensers
2 mfd. 3000 V. DC. ............................ $1.50
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8 mfd. 3000 V. DC. ............................ $2.75
9 mfd. 3000 V. DC. ............................ $7.25

NEWARK PAPER FILTER CONDENSERS
1 mfd. 1000 V. DC. ............................ .56c
1 mfd. 1500 V. DC. ............................ .66c
THORDARSON No. T6878 Plate and Fil. Transformer. 600-0-600 V. at 200 M. A. 2½ V. at 10 amp., 5 V. at 3 amp., 7½ V. at 3 amp. $2.45
THORDARSON No. T6877 Heavy Duty choke. 15 henries at 250 M. A. ............................ $1.95

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DXR Interference Filter does the job!

Compact, shielded unit that may be used as wave-trap or low pass filter — now offered to amateurs for the first time.

Type A — any one band or frequency ................................ $1.25
Type B — any two bands or frequencies .............................. $1.35

Order direct from this ad or from your nearest dealer

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NEW! TOBE MICRANOL
Transmitting Condensers
PROCESSED IN OIL
Special Low Prices!

Processed in Micranol — These condensers will withstand peak surges of thousands of volts and will give long faithful service under hard working conditions. Positively sealed against moisture absorption. Housed in round aluminum containers with porcelain insulator supported terminals. Ring clamp for easy mounting.

Even for low power transmitters or PA power supplies these condensers are so low in price it is economy to buy them. Each condenser bears this famous TOBE trade-mark of highest quality technical apparatus. Note the small compact size.

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TC-1 1.0 Mfd. Container size 3½" x 2½" Diameter $1.70
Your Cost .................. .................................. $1.05
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or order direct. (Include postage.)

TOBE DEUTSCHMANN CORPORATION
CANTON, MASS.

(Continued from page 74)

tion of so many i.f. stages in close proximity may lead to oscillation troubles, however. Should the additional noise stage be tried and found to oscillate, one of the noise amplifier tuned circuits can be loaded down with resistance (50,000 to 100,000 ohms) to stabilize its operation; while this may result in lowered gain in the noise circuit, there still should be ample voltage available for noise suppression. Unless the cutting-off action as described above is obtained, whatever the arrangement used, full realization of the noise-reducing possibilities of the device cannot be secured.

Transmission-Line Loading for Short Antennas

(Continued from page 81)

quarter wave in length possesses capacitive reactance. This is indicated in Fig. 3. A shorted line one-fourth wave long is equivalent to a parallel resonant circuit. Incidentally the L/Q ratio of such a "tank" may be changed at will by moving the two voltage points from one end to the other of the quarter-wave line. The open end of the line (capacity) may be considered as paralleled to the shorted end of the line (inductance). Therefore we can replace the loading coil of Fig. 2 by a closed transmission line. For adjustment of the system a sliding bridge is suggested as shown in Fig. 4. Feeders can be attached to the loading line at an appropriate point (5-A) to permit feeding the set-up from a matched-impedance line. If the loading line is only a few feet long, the feeders will have to be attached to appropriate points on the flat top on either side of the center of the loading line, Fig. 5-B.

If the loading line is long enough to be brought into the window of the operating room, two systems of feeding are feasible. The customary pick-up coil can be used with series condensers for fundamental and shunt tuning for harmonic operation, as shown in Fig. 6-A, or a Collins type impedance-matching network may be used to cover all bands, with appropriate coil and condenser changes, as at Fig. 6-B.

Of course the popular Zepp feed system may be used if the operating room is properly located, and the operator prefers it.

If the matched impedance feeders are desired, the loading line should preferably be cut to the exact length for resonance. For operation at the even harmonics the short, or bridge, across the loading line should be removed. The point at which the feeders are attached will be different for each band, but will not be difficult to locate.

Strays

When making plug-in coils on tube bases, if the base is too short for the required winding a piece of an old three-cell flashlight case of the fibre type will just slip over the base, thus extending the available winding length.

—Ray Howdeshell, Minong, Wis.
ENGINEERED FOR COMMERCIAL ACCURACY

The Type 195 Bar and Filter Holder engineered for micrometer accuracy and constructed as only can be produced by precision craftsmanship.

The Holder, constructed of isolantite, is extremely rugged and impervious to the most severe humidity conditions. The highly glazed surface (leakage resistivity 10^16 ohms per sq. CM), low loss and stable characteristics (thermal expansion 7 parts per million per degree C at 20° C), make isolantite the ideal ceramic insulation.

ACCOMODATES 100 kc BARS and FILTER CRYSTALS from 450 to 525 kc.

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Street ................................................
City and State ...................................
Call Signal ....................................... Q
Continued from page 77)

For C.W.C. traffic. Even o’ man Walt, BtS, says that traffic handled properly is really great fun. His claims he has a 1940 model gazuater! NIT is new reporter from Walled Lake, NVP is still trying for DX—maybe somebody stuck a note in your receiver, and he will knock him to us one! OGY reports AIN has commiss’l license and is on the market for a job—if he can get an audition with the FB flat of his—he shouldn’t have any trouble! MZH is trying again for O.R.S. ODB is still in the first time ratas and keep up the nice work, Bob, KMH and NJG have consolidated, FWU, another new O.R.S., says we sure picked a regular guy for Assistant S.C.M. JUQ runs a pole setting machine for a living—for anytime you’re around they can say they’re more than happy. AHG may even bring your contraption along! JTK follows reporting for first time, because he was seven days late renewing it; tau warn handled properly is from Georgia via 4PL and got

3.5 for the wilds of 7 me. NAP is rebuilding and expects to QSO on 28 mo.—he’s working both coasts there. NIZ O.R.S. PBQ is after one also. FX continues his organization doing fine work on 3590 and 3835 kc. is Chair Warmer’s grats and keep up the nice work, Bob. KMH and NJG are after a Claes “A.” KAA and NUL W9PCU 202 PDE 177 TTY 131 CE 27 CWR 26 KDE 21 thru Mrs. DYH’s code practice) pops up with a wow of a...
one k.w. on 1.75-m. 'phone. LWX has new 2000-volt 500-
ma. transformer and is looking for Elmao 150. PRM has
pair of 211VE; he is getting on swell on 3.5-m. 'phone.
Wauau Club has 9CWG, 9LCX, 9HCH, 9NNM. P.A.M.; 9AED.
In keeping with the policy recently announced additional
O.R.S. appointments have been cancelled. There is no such
ting as an inactive O.R.S. New appointments: O.O.-
9AED, Wauau; A.P.-9MO, Appley; A.D.-9BAE, 9HMM. O.R.S.-
9H9M, 9DFZ, 9DZW, 9DNU. LEZ/RLUD sets new traffic record with 2120 messages.
Wauau Club has ten members and invites hams in the
area to call in through roof at 3:00 a.m. SJV has new 5OT in
his new shack. He is working on new antenna system.
SIP has sent in 179 QSO's during the year and has
worked South Africa twice with 45 watts. SIP went to 14-
me. with EHW and makes the B.P.L. this month. EFO is new A.A.R.S.
for 1936: AWP, pres.; DMF, vice-pres.; UlF, secy-treas.;
C.W. CVN and BEZ are working DX on 28-mc. 'phone.
BQR is still working A.A.R.S. schedules. DLK holds the
discreet note and makes the B.P.L. this month. EFO is new A.A.R.S.
member and is active on 3.5-m. 'phone. EFO is looking for a DX
hobby in Chicago. Friends of DHH should ask him about the
building of the new shack!!

Traffic: W6OXP 136 ZY 82 HSK 55 SES 35 UGE-
UP 17 JAW 15 AAT 14 RPP 15 TJI-OTL 3 TXY 1.
W8KNP-8 3.

MIDWEST DIVISION

IOWA-SCM, Phil D. Boedeman, W6LWZ/RLUD-
R.M. has 9CWG, 9LCX, 9HCH, 9NNM. P.A.M.; 9AED.

Traffic: W6LWZ 1459 (W6LWZ 661) AW7 2171 PGG-9GW-
28-mc. 'phone now on 28-mc. using 500 watts. WLDC is building
a new station and will be on 28-
and 14-mc. 'phone. GQF is back on
3.9-mc. 'phone after two years. CCY is having fun with
and VQI reports a 28-
oscillograph. BJP hopes to be back on the air soon. SQL is reported getting the bug again. VRZ is new on 1.75-mc.

Traffic: W9OXP 136 ZY 82 HSK 55 SES 35 UGE-
UP 17 JAW 15 AAT 14 RPP 15 TJI-OTL 3 TXY 1.
W8KNP-8 3.

WEST GULF DIVISION

NORTHERN TEXAS-SCM, Richard M. Cobb,
W6BII—DXA has been appointed Route Manager and
makes the B.P.L. this month. DLK is building a new A.A.R.S.
member and is active on 3.5-m. 'phone. EHW handles most of his
traffic on A.A.R.S. special frequencies. AZB will soon be
an A.A.R.S. EES is working for an O.R.S. appointment.
NW, our Director, has been running schedules with A.R.
R.L. D. He requests that we get more activity on the
Cairo Survey. DUR is also active. DNE is now 'l'.L.S. on
his 7 me. EJJ is pounding brass at AQY at
while she is recovering from an operation in the hospital.

Traffic: W5KJ 1026 FLG 988 RIZ 575 RAT 296 FXS
119 EY 114 ONZ 97 UIZ 14 JSV 11 PB 10 OFR 8 AWP 7
TVU 2.

MISSOURI-SCM, J. Dewey Mills, W6CJB—Five
Missouri hams make the B.P.L. this month, with AIJ leading
the gang. TGN worked 6 new Europeans on 28-
me. SGP is new R.M. Miss OUD says it surprises herself to
make the B.P.L. this month. WAEC is operating portable in
Chicago. MAF has 9AO, 8TH, 82Q, 8RT, and 8SP
for DX. AID is working with his new 5WA and
nearly 30 kW for W.A.C. but still

Traffic: W5KJ 1026 FLG 988 RIZ 575 RAT 296 FXS
119 EY 114 ONZ 97 UIZ 14 JSV 11 PB 10 OFR 8 AWP 7
TVU 2.

Traffic: W9OXP 136 ZY 82 HSK 55 SES 35 UGE-
UP 17 JAW 15 AAT 14 RPP 15 TJI-OTL 3 TXY 1.
W8KNP-8 3.

Traffic: W9MLA 1248 TGF 837 JOV 799 OUD 549 OLL
500 KIV 218 MDZ 228 FYF 235 IGW 203 TPK 146 DI
122 KES 56 RPC 51 JPP 40 NZN 32 KRG 25 RSO 22
MT 207 TPI 19 AFA 182 CDK 17 PAL 16 HU 14 TXR 1.

Traffic: W9OXP 136 ZY 82 HSK 55 SES 35 UGE-
UP 17 JAW 15 AAT 14 RPP 15 TJI-OTL 3 TXY 1.
W8KNP-8 3.

Traffic: W9OXP 136 ZY 82 HSK 55 SES 35 UGE-
UP 17 JAW 15 AAT 14 RPP 15 TJI-OTL 3 TXY 1.
W8KNP-8 3.
SPREADER: Light in weight as well as exceptionally efficient, these Steatite spreaders offer unusual advantages. The material is non-hygroscopic and weatherproof. The slender shape minimizes surface leakage. The power factor is of the order of 0.15%. The weight is but one ounce each. Catalog Symbol AA-3.

Net Price $1.18

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"HAM" SPECIAL Standard Teleplex
A highly efficient code teacher using heavy specially prepared waxed paper tape, having two rows of perforations. Write for Free folder Q.T. DEALERS -- Correspondence invited with dealers for protected territories.

We are the originators of this type instrument
72 Cortlandt St., New York City

IMPROVED Neutralizing CONDENSERS
for neutralizing tube capacities of XMITTER tubes. Also, ideal as tuning condensers on high and ultra high frequency receivers. Note these improved features.

1. New positive wiping contact on rotor shaft with adjusting screws eliminates noise on high frequencies.
2. Close fitting bearings hold to calibration. Insulated with ISOLANTITE. Soldered brass plate assemblies and heavy aluminum end plates make a rigidly constructed "fool-proof" job.

No. 567 — Max. Cap. — 4 MFD. Spacing .200" — List $1.40
No. 564 — Max. Cap. — 8 MFD. Spacing .189" — List $1.50
No. 565 — Max. Cap. — 15 MFD. Spacing .060" — List $1.50
No. 566 — Max. Cap. — 35 MFD. Spacing .095" — List $2.00
No. 897 — Max. Cap. — 35 MFD. Spacing .095" — List $1.85

40% DISCOUNT TO AMATEURS
BUD RADIO, INC. 1937 E. 55th Street Cleveland, Ohio

Notes on Band-Switching
(Continued from page 19)

bands in the 803 amplifier described in the current Handbook.

While this situation is bad enough from a constructional standpoint, consider what happens when a balanced circuit has to be used. Instead of two switches for shorting and coupling adjustment, four are required; instead of seven taps we have fourteen! All this on one circuit alone. If the output amplifier is push-pull with link coupling to the driver, a highly popular arrangement, then the switching arrangement of the plate circuit will have to be duplicated for the grid. Thus we end up with a total of seven or eight switches and innumerable taps for but one stage of the transmitter. When exciters and antenna equipment are added on it is not hard to perceive that the thing begins to resemble one of Rube Goldberg's contraptions.

Some simplification of the switching of a balanced circuit can be brought about by the use of a split-stator condenser for getting circuit balance and shorting from one end of the coil, since the ground point on the coil will automatically shift to the center of the active portion. However, this method is not wholly desirable for three reasons: the number of bands that can be covered is limited because of the losses introduced with shorting from a high-potential end, electrical symmetry of circuits cannot be maintained, and parallel d. c. feed becomes necessary. Furthermore, while this saves one shorting switch, it does not in the least simplify switching of the output coupling.

TAKING STOCK
All in all, shorting out coil sections for band changing does not seem to be the whole answer to the band-switching problem. In the final analysis, all that is saved is the difference in time required between the operations of turning a switch and plugging in a coil, plus the elimination of a stock of plug-in coils. The retuning operations, which usually consume much the greater proportion of the time required for band-changing, are whittled down not one bit by coil shorting. And, as a little thought will show, the more complicated the transmitter the less time, proportionately, is saved by coil shorting. Of course that is not the whole story. Coil switching may be decidedly convenient if the transmitter is built in the metal enclosures now available in several styles, since
Back and forth 1,250,000 times zipped the pointer of a G-E panel instrument—one moment hitting the stop below zero—the next, far above scale. The punishment was terrific—yet the instrument stood up. Every part was in good operating condition.

Your rig deserves panel instruments manufactured by General Electric. Their accuracy and sturdy construction will give you that extra performance so essential for the complete enjoyment of your transmitter.

Pictured is a standard panel instrument mounted in a portable stand. Have your dealer show you a 100-ma d-c instrument for vertical panel mounting. You'll like it.

Write to Department 6A-201, Schenectady, N. Y. for a free copy of Bulletin GEA-1239, "Small Panel Instruments."
Say You Saw It in QST — It Identifies You and Helps QST
TEN-YEAR-OLD RADIO DISTRIBUTOR ANNOUNCES THE OPENING OF A WELL-STOCKED AMATEUR DEPARTMENT.

24-HOUR SERVICE ON MAIL ORDERS

TWO INTRODUCTORY SPECIALS!

- Noise Silencer Kit (Feb. 1936 QST, page 11). Complete kit, all highest quality standard parts, exactly as specified in QST. All parts complete without tubes: $5.00. With three tubes: $8.00.


EITHER KIT SHIPPED POSTPAID

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TREAT YOUR XMITTER TO THE BEST! TRY THE FAMOUS SPRAGUE "600 LINE" OIL IMPREGNATED TRANSMITTING CONDENSERS - ALWAYS THE BEST AND NOW PRICED LOWER THAN EVER BEFORE.

... OR, FOR AN INEXPENSIVE AND IDEAL REPLACEMENT IN MANY CIRCUITS TRY SPRAGUE SHORT WAVE HIGH FREQUENCY OIL IMPREGNATED CONDENSERS.

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Specializes in Quality

Binding Posts
Tip Jacks
Male Plugs
Female Plugs
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A-C Switches
Tap Switches
Terminal Strips
Short Wave Switches
Moulded Sockets
Electric Eyes

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PHILADELPHIA, PENNA

ESICO

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- CRYSTAL SELECTION
- 50 WATTS CW
- 15 WATTS PHONE

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60-T FOR CW ONLY — 69.00

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DYNAMIC MICROPHONE

Over Other Types Is
Mainly in Its Sensitivity
No high gain preamplification required. No backdrop noise. No Power Supply. And the price...$30
SPECIAL PRICE TO AMATEURS......net $18
U.S. PATENTS PENDING

Send for Bulletin 3011
RADIO RECEPTOR CO., INC.
110 Seventh Ave., New York City

830-B and 834 Transmitting Tubes Announced

Two new tube types, known as the 830-B and 834 and corresponding quite closely to types previously available from other manufacturers, have been added to the RCA-Radiotron transmitting line. The 830-B is very similar to the well-known tube bearing the same number, but in addition to its audio ratings now also carries r.f. ratings for frequencies as high as 60 megacycles. Since the characteristics differ slightly from those of the old 830-B we list them below:

Tentative Characteristics, 830-B

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Filament voltage</td>
<td>10 volts</td>
</tr>
<tr>
<td>Filament current</td>
<td>2 amperes</td>
</tr>
<tr>
<td>Amplification factor</td>
<td>25</td>
</tr>
<tr>
<td>Direct interelectrode capacitances:</td>
<td></td>
</tr>
<tr>
<td>Grid-plate</td>
<td>11 µµfd.</td>
</tr>
<tr>
<td>Grid-filament</td>
<td>5 µµfd.</td>
</tr>
<tr>
<td>Plate-filament</td>
<td>1.8 µµfd.</td>
</tr>
<tr>
<td>Maximum ratings for frequencies as follows:</td>
<td></td>
</tr>
<tr>
<td>Plate voltage</td>
<td>1000 volts</td>
</tr>
<tr>
<td>Plate current</td>
<td>150 ma.</td>
</tr>
<tr>
<td>Plate dissipation</td>
<td>60 watts</td>
</tr>
</tbody>
</table>

Typical operating conditions:

As Class-B Modulator (2 tubes)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plate voltage</td>
<td>1000 volts</td>
</tr>
<tr>
<td>Grid voltage</td>
<td>-35 volts</td>
</tr>
<tr>
<td>Peak r.f. grid voltage</td>
<td>270 volts</td>
</tr>
<tr>
<td>Zero SIGNAL plate current</td>
<td>20 ma.</td>
</tr>
<tr>
<td>Max.-signal plate current (sine wave)</td>
<td>280 ma.</td>
</tr>
<tr>
<td>Load resistance (plate-to-plate)</td>
<td>7600 ohms</td>
</tr>
<tr>
<td>Driving power, approx.</td>
<td>6 watts</td>
</tr>
<tr>
<td>Power output, approx.</td>
<td>175 watts</td>
</tr>
</tbody>
</table>

As Class-B R.F. Amplifier

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plate voltage</td>
<td>1000 volts</td>
</tr>
<tr>
<td>Grid voltage</td>
<td>-35 volts</td>
</tr>
<tr>
<td>Peak r.f. grid voltage</td>
<td>85 volts</td>
</tr>
<tr>
<td>Plate current</td>
<td>86 ma.</td>
</tr>
<tr>
<td>Grid current</td>
<td>6 ma.</td>
</tr>
<tr>
<td>Driving power, approx.</td>
<td>6 watts</td>
</tr>
<tr>
<td>Power output</td>
<td>20 watts</td>
</tr>
</tbody>
</table>

As Plate-Modulated Class-C Amplifier

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plate voltage</td>
<td>800 volts</td>
</tr>
<tr>
<td>Grid voltage</td>
<td>-150 volts</td>
</tr>
<tr>
<td>Peak r.f. grid voltage</td>
<td>260 volts</td>
</tr>
<tr>
<td>Plate current</td>
<td>96 ma.</td>
</tr>
<tr>
<td>Grid current</td>
<td>20 ma.</td>
</tr>
<tr>
<td>Driving power, approx.</td>
<td>5 watts</td>
</tr>
<tr>
<td>Power output</td>
<td>50 watts</td>
</tr>
</tbody>
</table>

As C.W. Power Amplifier or Oscillator

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plate voltage</td>
<td>1000 volts</td>
</tr>
<tr>
<td>Grid voltage</td>
<td>-110 volts</td>
</tr>
<tr>
<td>Peak r.f. grid voltage</td>
<td>250 volts</td>
</tr>
<tr>
<td>Plate current</td>
<td>140 ma.</td>
</tr>
<tr>
<td>Grid current</td>
<td>30 ma.</td>
</tr>
<tr>
<td>Driving power, approx.</td>
<td>7 watts</td>
</tr>
<tr>
<td>Power output</td>
<td>90 watts</td>
</tr>
</tbody>
</table>

The operating data for modulated service are for carrier conditions, based on 100% modulation capability. Recommended grid-leak resistance for r.f. service is 5000 ohms. The tube may be operated at full ratings at frequencies up to 15 mc. At 30 mc. both plate voltage and plate input should be reduced to 75% of the ratings in the tables above; at 60 mc. the reduction factor should be 50%. The tube resembles the previous 830-B physically, having graphite-plate construction with the plate connection to a top cap, with grid and filament leads brought out to a medium 4-prong base.

THE 834

The 834 is closely equivalent to the W.E.
## Where to buy it

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

### ASTATIC

**Crystal Microphones and Pickups**

ASTATIC MICROPHONE LABORATORY, INC., YOUNGSTOWN, OHIO. 
Pioneer Manufacturers of Quality Crystal Products

<table>
<thead>
<tr>
<th>City</th>
<th>Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHICAGO, ILL.</td>
<td>833 West Jackson Blvd.</td>
</tr>
<tr>
<td></td>
<td>Allied Radio Corporation</td>
</tr>
<tr>
<td>CHICAGO, ILL.</td>
<td>601 W. Randolph St.</td>
</tr>
<tr>
<td></td>
<td>Pioneer Automotive Supply Co.</td>
</tr>
<tr>
<td>CHICAGO, ILL.</td>
<td>1331 So. Michigan Ave.</td>
</tr>
<tr>
<td></td>
<td>Federated Purchaser, Inc.</td>
</tr>
<tr>
<td>CHICAGO, ILLINOIS</td>
<td>Mid-West Radio Mart</td>
</tr>
<tr>
<td></td>
<td>520 S. State Street</td>
</tr>
<tr>
<td>CHICAGO, ILLINOIS</td>
<td>926 W. Madison Street</td>
</tr>
<tr>
<td></td>
<td>Newark Electric Company</td>
</tr>
<tr>
<td>CHICAGO, ILL.</td>
<td>901–911 W. Jackson Blvd.</td>
</tr>
<tr>
<td></td>
<td>Wholesale Radio Service Company, Inc.</td>
</tr>
<tr>
<td>KANSAS CITY, MO.</td>
<td>1012–14 McGee St.</td>
</tr>
<tr>
<td></td>
<td>Burstein-Applebee Company</td>
</tr>
</tbody>
</table>

### Super SKYRIDER

the hallicrafters

<table>
<thead>
<tr>
<th>City</th>
<th>Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHICAGO, ILL.</td>
<td>841 E. 63rd St.</td>
</tr>
<tr>
<td></td>
<td>Arey-Wilcox Radio Co.</td>
</tr>
<tr>
<td>CHICAGO, ILL.</td>
<td>833 W. Jackson Blvd.</td>
</tr>
<tr>
<td></td>
<td>Allied Radio Corp.</td>
</tr>
<tr>
<td>CHICAGO, ILLINOIS</td>
<td>415 S. Dearborn Street</td>
</tr>
<tr>
<td></td>
<td>Chicago Radio Apparatus Company</td>
</tr>
<tr>
<td>CHICAGO, ILLINOIS</td>
<td>19 S. Wells St.</td>
</tr>
<tr>
<td></td>
<td>Hinds &amp; Edgerton</td>
</tr>
<tr>
<td>CHICAGO, ILLINOIS</td>
<td>520 S. State Street</td>
</tr>
<tr>
<td></td>
<td>Midwest Radio Mart</td>
</tr>
<tr>
<td>CHICAGO, ILLINOIS</td>
<td>926 W. Madison Street</td>
</tr>
<tr>
<td></td>
<td>Newark Electric Company</td>
</tr>
</tbody>
</table>

**Listings on this page do not necessarily imply endorsement by QST of the dealers or of other equipment sold by them.**
<table>
<thead>
<tr>
<th>City</th>
<th>Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detroit, Mich.</td>
<td>171 E. Jefferson Ave.</td>
</tr>
<tr>
<td>Flint, Mich.</td>
<td>203 W. Kearsley St.</td>
</tr>
<tr>
<td>Kansas City, Mo.</td>
<td>1012 McGee St.</td>
</tr>
<tr>
<td>Peoria, Ill.</td>
<td>707 Main St.</td>
</tr>
<tr>
<td>Toronto, Can.</td>
<td>1137 Bay St.</td>
</tr>
</tbody>
</table>

Listings on this page do not necessarily imply endorsement by QST of the dealers or of other equipment sold by them.
<table>
<thead>
<tr>
<th>Location</th>
<th>Street Address</th>
<th>Business Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dayton, Ohio</td>
<td>140 E. 3rd Street</td>
<td>Burns Radio Company</td>
</tr>
<tr>
<td>Des Moines, Iowa</td>
<td>1212 Grand Avenue</td>
<td>Iowa Radio Corporation</td>
</tr>
<tr>
<td>Fargo, N. D.</td>
<td>123 Broadway</td>
<td>Dakota Electric Supply Co.</td>
</tr>
<tr>
<td>Peoria, Ill.</td>
<td>707 Main Street</td>
<td>Kleus Radio &amp; Electric Co.</td>
</tr>
<tr>
<td>Youngstown, Ohio</td>
<td>325 West Federal Street</td>
<td>Ross Radio Company</td>
</tr>
<tr>
<td>Chicago, Ill.</td>
<td>833 W. Jackson Blvd.</td>
<td>Allied Radio Corporation</td>
</tr>
<tr>
<td>Chicago, Ill.</td>
<td>226 W. Madison Street</td>
<td>Newark Electric Company</td>
</tr>
<tr>
<td>Chicago, Ill.</td>
<td>590 S. State Street</td>
<td>Midwest Radio Mart</td>
</tr>
<tr>
<td>Chicago, Ill.</td>
<td>901-911 W. Jackson Blvd.</td>
<td>Wholesale Radio Service Company, Inc.</td>
</tr>
<tr>
<td>Cincinnati, Ohio</td>
<td>633 Walnut Street</td>
<td>Steinberg's, Inc.</td>
</tr>
<tr>
<td>Cleveland, Ohio</td>
<td>610 Huron Road</td>
<td>Goldhamer, Inc.</td>
</tr>
<tr>
<td>Fargo, N. D.</td>
<td>123 Broadway</td>
<td>Dakota Electric Supply Co.</td>
</tr>
<tr>
<td>Toronto, Canada</td>
<td>1133-1137 Bay St.</td>
<td>Wholesale Radio Company, Ltd.</td>
</tr>
<tr>
<td>Cleveland, Ohio</td>
<td>610 Huron Road</td>
<td>Goldhamer, Inc.</td>
</tr>
<tr>
<td>Des Moines, Iowa</td>
<td>1212 Grand Ave.</td>
<td>Iowa Radio Corporation</td>
</tr>
</tbody>
</table>

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2035-49 W. Charleston Street
CHICAGO, ILL.

Dodge's Institute, Dav Street, Chicago, Ill.

Work. School established 1874. All expenses low. Catalog Cree.

Radio telegraphy and telephony taught thoroughly. Engineering course of nine months' duration equivalent to three years of college radio accounting taught thoroughly. Morse telegraphy and railway telephony taught thoroughly.

The New Master Teleplex

No Batteries No Winding

Why pay more, you cannot buy as good for less

Write for literature

Zero temp. coef. crystals for BROADCAST and COMMERCIAL use

HIPOWER CRYSTAL CO.

2035-49 W. Charleston Street

CHICAGO, ILL.

**HIPOWER** — HIPOWER — crystals

**LOW DRIFT—DEPENDABLE—ACTIVE**

Why pay more, you cannot buy as good for less

<table>
<thead>
<tr>
<th>Type</th>
<th>Frequency</th>
<th>Choice of Stock</th>
</tr>
</thead>
<tbody>
<tr>
<td>AH10</td>
<td>1700-3500 Kc.</td>
<td>$2.35</td>
</tr>
<tr>
<td>AH10</td>
<td>7000-7300 Kc.</td>
<td>$3.90</td>
</tr>
</tbody>
</table>

Hipower crystals are sold at your dealer, or order direct

Type M Holder $1.00

Molded Bakelite, plugs into tube socket.

FREE plug-in mounting

Write for literature

RADIO ENGINEERING

broadcasting, aviation and police radio, servicing, marine radio telegraphy and telephony. Morse telegraphy and railway telegraphy taught thoroughly. Engineering course of nine months' duration equivalent to three years of college radio work. School established 1874. All expenses low. Catalog free.

Dodge's Institute, Day Street, Valparaiso, Indiana

**At Last!**

**A New CODE TEACHER!**

**THE NEW MASTER TELEPLEX**

for beginners, experienced operators, and schoolroom

No Batteries No Winding

**ALL ELECTRIC**

JUST PLUG IN AND LET HER GO

The new easy way to learn code and speed up wpm. This new instrument will record your own sending on double row perforated paper and repeat it back to you at any speed. 10,000 words can be recorded on one tape.

This New Machine is Remarkable

It is the same in principle, and in operation for this purpose is equal to the Wheatstone Transmitter and Perforator, which would cost over $100.00

BUY IT OR RENT IT

Send for Folder Q, 3, which tells you how to get the use of this instrument without buying it. No obligation. We furnish complete course and personal instruction. Low cost, easy terms. Write today for information.

**TELEPLEX CO.**

72 Cotlandt Street
New York City

**THE NEW MASTER TELEPLEX**

"The Choice of Those Who Know"

---

304-A both in ratings and structure, having separate wire grid and plate leads brought out the top of the bulb, with filament leads through the medium 4-prong base. Tentative characteristics are as follows:

<table>
<thead>
<tr>
<th>834</th>
</tr>
</thead>
<tbody>
<tr>
<td>Filament voltage</td>
</tr>
<tr>
<td>Filament current</td>
</tr>
<tr>
<td>Amplification factor</td>
</tr>
<tr>
<td>Max. plate dissipation</td>
</tr>
<tr>
<td>Direct interelectrode capacitances</td>
</tr>
<tr>
<td>Grid-plate</td>
</tr>
<tr>
<td>Grid- filament</td>
</tr>
<tr>
<td>Plate- filament</td>
</tr>
</tbody>
</table>
| Maximum operating conditions, with typical ratings, are as follows:

<table>
<thead>
<tr>
<th>Class-B R.F. Amplifier</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plate voltage</td>
</tr>
<tr>
<td>Grid voltage</td>
</tr>
<tr>
<td>Peak r.f. grid voltage</td>
</tr>
<tr>
<td>Plate current</td>
</tr>
<tr>
<td>Grid current</td>
</tr>
<tr>
<td>Driving power, approx</td>
</tr>
<tr>
<td>Power output</td>
</tr>
</tbody>
</table>

Plate-Modulated Class-C Amplifier

| Plate voltage | 1250 volts |
| Grid voltage | 225 volts |
| Peak r.f. grid voltage | 330 volts |
| Plate current | 50 ma. |
| Grid current | 15 ma. |
| Driving power, approx | 4.5 watts |
| Power output | 75 watts |

Operating conditions for modulated service refer to carrier, for use with 100% modulation. The 834 may be used at full ratings up to 100 megacycles.

**Strays**

W4CDE, who lives kinda out in the country, sez he manufactures his own electricity. Sorta ohm talent, as it were! — W4ACB

Celebration, Pittsburgh, Pa.

The Amateur Transmitters Association of Western Pennsylvania is ten years old in February, 1938, and in celebration of the occasion is holding a banquet Saturday evening, February 29th, at the Hotel Mayfair, Penn Avenue, Pittsburgh, Pa. Tickets are $1.50. All amateurs are invited. Complete details may be obtained from the club secretary, R. M. Francis, 3577 Elmhurst Street, Pittsburgh.

According to W6ALO, W6LDJ lost a couple of nights sleep worrying about gas in a new bottle, only to find the cause was a blue QSL card tacked on the wall behind the rig!

**Neon Oscilloscope Tube, tested, low striking voltage, long life — mirror, complete in instructions** $1.75

**Neon R.F. Wand, tracks down R.F.** $8.50

**Neon R.F. Sniff, internal electrodes, very sensitive to R.F.,** $1.00

**Dress Up Your Station! Call letter in brilliant red or blue luminous tubing 3/4" high, with mounting bar letter** $1.00

**Postpaid, Decorative displays for ham stations, prices on request** Commercialite Laboratories, Box 47, Omaha, Nebr., W9AQQ

---

Say You Saw It in QST — It Identifies You and Helps QST
HAM-ADS

1. Advertising shall pertain to radio and shall be of
natural interest to radio amateurs or equipment
themselves in their pursuit of the art.

2. All items so advertised shall be advertised in a
character that will be accepted, nor can any
special typographical arrangement, such as all or
part capitalization, be used, which would tend to make one
advertisement stand out from the others.

3. Closing dates for HAM-ADS are the 25th of the
second month preceding the month of publication.

4. A special rate of 7c per word will apply to advertising
which is offered for sale in quantity for profit, even if by
an individual, is commercial and takes the 15c rate.
Provisions of paragraphs (1), (2), and (3) shall not
apply to advertising which is offered for sale in quantity
for profit, even if by an individual, is commercial and
takes the 15c rate. Provisions of paragraphs (1), (2),
and (3) shall not apply to advertising which is offered as
samples.

Quartz—direct importers from Brazil of best quality pure
quartz suitable for making piezo-electric crystals. Diamond

Ham radio engineering, broadcasting, aviation and police
radio service. Complete permanent installation, free.

Class B Transformers—Universal for two or four 46s, 210s,
80s, 40s, etc., $7.75 pair prepaid. 70 watts from 46s,
100 watts from 80s. Write for information. W3UJ,
W3UJ, Michigan.

Class B Transformers—Universal for two or four 46s, 210s,
80s, 40s, etc., $7.75 pair prepaid. 70 watts from 46s,
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New York City.

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New York City.
SELL or trade Waco 2000 volt motor-generator. W5KD
TRANSMITTING tubes—slightly used and new 203A’s, 211’s. 503A’s 212D’s and other types. $6. and up. Write for list. Mims Radio, Texasarkana, Ark.
GROSS CB100 transmitter complete everything $250. Mims Radio, Texasarkana, Ark.
W5KD
SELL, used 204A, sockets, perfect condition. Best offer. W5ROH
WANTED—high voltage generator and good battery receiver. W7IHF, Henry Langell, Eau Claire, Wis.
SELL two transceivers; also 50 watt rig complete—W9QSM
WANTED—Cathode Ray tube—WTEDR
QSL’s, QSL’s. Samples. Prices on request. W2AEY
CRYSTALS 1st Sq. X cut 80-100 meters $1.40, 40 meters $2.50. Within 3 Kc. of desired freq. Guaranteed the very best. The Ransom Lab., North Syracuse, N. Y.
Skeptical?—repeat orders and testimonials tell the story .. Fully side 3000 d.o. with choke input. Air cooled, mounted, new—exact frequency, postpaid. Now
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The Ransom Lab., North Syracuse, N. Y.
Your Nearest Dealer Is Your Best Friend

Your nearest dealer is entitled to your patronage. You can trust him. He is equipped with a knowledge and understanding of amateur radio. He is your logical and safe source of advice and counsel on what equipment you should buy. His stock is complete. He can supply your needs without delay. His prices are fair and consistent with the high quality of the goods he carries. He is responsible to you and interested in you.

Patronize the dealer nearest you — You can have confidence in him

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<tr>
<th>CHICAGO, ILLINOIS</th>
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</thead>
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<tr>
<td>Allied Radio Corporation</td>
<td>Burstein-Applebee Company</td>
</tr>
<tr>
<td>833 West Jackson Blvd.</td>
<td>1012-14 McGee Street</td>
</tr>
<tr>
<td>Complete standard lines always in stock—W9NRV—W9IBC—W9RZI</td>
<td>&quot;Specialists&quot; in supplies for the Amateur and Servicemen</td>
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<tr>
<td>CHICAGO, ILLINOIS</td>
<td>CHICAGO, ILLINOIS</td>
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<tr>
<td>Chicago Radio Apparatus Company</td>
<td>Lew Bonn Company</td>
</tr>
<tr>
<td>415 South Dearborn Street (Est. 1921)</td>
<td>1124 Harmon Place</td>
</tr>
<tr>
<td>W9RA and W9PST — Amateurs since 1909</td>
<td>Rex L. Munger, W9LIP, Sales Engineer</td>
</tr>
<tr>
<td>CHICAGO, ILLINOIS</td>
<td>MILWAUKEE, WISCONSIN</td>
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<tr>
<td>Mid-West Radio Mart</td>
<td>Radio Parts Company, Inc.</td>
</tr>
<tr>
<td>520 S. State Street</td>
<td>332 West State Street</td>
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<tr>
<td>All standard lines carried in stock</td>
<td>Complete stock Nationally Known products</td>
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<tr>
<td>DENVER, COLORADO</td>
<td>MINNEAPOLIS, MINNESOTA</td>
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<td>Inter-State Radio &amp; Supply Co.</td>
<td>Lew Bonn Company</td>
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<tr>
<td>1639 Tremont Place</td>
<td>1124 Harmon Place</td>
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<tr>
<td>Amateur Radio Headquarters in the Rocky Mountain Region</td>
<td>Rex L. Munger, W9LIP, Sales Engineer</td>
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<td>DETROIT, MICHIGAN</td>
<td>MINNEAPOLIS, MINNESOTA</td>
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<td>Radio Equipment Sales Co.</td>
<td>Lew Bonn Company</td>
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<tr>
<td>14036 Woodward Ave., Highland Park</td>
<td>1124 Harmon Place</td>
</tr>
<tr>
<td>A complete stock of amateur, shortwave and service parts</td>
<td>Rex L. Munger, W9LIP, Sales Engineer</td>
</tr>
<tr>
<td>DETROIT, MICHIGAN</td>
<td>MINNEAPOLIS, MINNESOTA</td>
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<td>Radio Specialties Company</td>
<td>Electric City</td>
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<td>171 E. Jefferson Avenue</td>
<td>1607 Hennepin Street</td>
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<tr>
<td>Ham Supplies — National &amp; Hammerlund Sets and Parts</td>
<td>Headquarters for standard lines of amateur and servicemen parts</td>
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<tr>
<td>DETROIT, MICHIGAN</td>
<td>SALT LAKE CITY, UTAH</td>
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<td>Rissi Brothers</td>
<td>Felt Radio Company</td>
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<td>5027-31 Hamilton Ave., at Warren</td>
<td>150 South Main Street</td>
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<tr>
<td>W8KKK Manager: Amateur Department</td>
<td>W6IAL, Intermountain Radio Headquarters W6GTQ</td>
</tr>
<tr>
<td>FRESNO, CALIFORNIA</td>
<td>SAN FRANCISCO, CALIFORNIA</td>
</tr>
<tr>
<td>Ports Manufacturing Co.</td>
<td>Offenbach Electric Company, Ltd.</td>
</tr>
<tr>
<td>3265 E. Belmont Ave.</td>
<td>1452 Market Street</td>
</tr>
<tr>
<td>Wholesale: RCA-Thordarson-Bliley, All Standard Lines</td>
<td>&quot;The House of a Million Radio Parts&quot;</td>
</tr>
<tr>
<td>TORONTO, CANADA</td>
<td>TORONTO, CANADA</td>
</tr>
<tr>
<td>101 Queen Street, West</td>
<td>3265 E. Belmont Ave.</td>
</tr>
<tr>
<td>Canada's foremost radio supply house</td>
<td>Wholesale: RCA-Thordarson-Bliley, All Standard Lines</td>
</tr>
</tbody>
</table>

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You Are Protected When You Buy From QST Advertisers

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

Quoted from QST's advertising rate card.

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

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- Triples Electrical Instrument Corp.
- Turner Company
- United Transformer Company
- Utah Radio Products
- Valsey Crystals
- Vinbroplex Company
- Ward Leonard Electric Company
- Wright-DeCoster, Inc.

Say You Saw It in QST — It Identifies You and Helps QST
INSTALL A GENERAL ELECTRIC "V-DOUBLET" ALL-WAVE ANTENNA FOR SUPERIOR RECEPTION

DIRECTIONAL CHARACTERISTICS
The "V-doublet" Antenna System is ideally suited to take full advantage of directional effects. When the antenna system is placed at right angles to the direction of the incoming signal, the signal will come through at maximum energy. When the antenna span points towards a known source of local interference, it decreases the pick-up of noise from that source.

EXCELLENT SENSITIVITY ON ALL SHORT-WAVE FREQUENCIES
The "V-doublet" is very broadly peaked in the short-wave band. The tapered "V" section couples the antenna to the transmission line in a manner that permits the transfer of signal energy over a wide frequency range, without favoring any particular short-wave frequency.

A specially constructed receiver-coupling transformer affords proper electrical matching for modern radio receivers equipped with antenna coils having a relatively large number of turns in the primary circuit.

BALANCED TRANSMISSION LINE
Short-wave signals intercepted by the "V-doublet" are fed to the receiver through a balanced, twisted-pair, transmission line. Since the transmission line serves only to transfer signals from the doublet to the receiver, it minimizes "man-made" static which originates from the house wiring system and external electrical apparatus, including even ignition systems of passing automobiles.

DOUBLET FOR SHORT-WAVE—T TYPE FOR BROADCAST
In the reception of standard broadcasts, the G-E "V-doublet" Antenna System is automatically converted from its "V-doublet" form to one approximating the conventional "T" type arrangement. This change-over is accomplished automatically by the special circuit employed in the receiver-coupling transformer.

EASY TO INSTALL
The "V-doublet" All-wave Antenna Kit, consisting of the doublet wires, glass strain insulators, and transmission line is assembled and packed ready for installation. It's easy to install, requiring only two points of suspension over a 50-foot span.

PRICE . . . Model KV-100 . . . $5.00
Available at your local General Electric Radio Dealer

GENERAL ELECTRIC
THE ORIGINAL METAL-TUBE RADIO
APPLIANCE AND MERCHANDISE DEPT.
GENERAL ELECTRIC COMPANY
BRIDGEPORT . . . CONNECTICUT

Say You Saw It in QST — It Identifies You and Helps QST
A Universal Modulation Output Choke for Every Purpose

The Answer to Your Audio Modulation Problem

Broadcast and phone men who want an output audio unit that will match all possible tube impedance combinations to the RF Stage cannot afford to be without the new UTC Universal Modulation Output Chokes.

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<thead>
<tr>
<th>TYPE OUTPUT CHOKE</th>
<th>CLASS B</th>
<th>A PRIME</th>
<th>RF TUBES</th>
<th>LIST PRICE</th>
<th>NET PRICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>HUC-20</td>
<td>46-59-53-6A6 etc...</td>
<td>45'-42' 5A3's</td>
<td>46'-210'-80'1's 211-501 etc...</td>
<td>$7.00</td>
<td>$4.20</td>
</tr>
<tr>
<td>HUC-50</td>
<td>210'-80'1's-830's 841's, etc...</td>
<td>P.P. Parallel 250'-45' 2A3's</td>
<td>RK 20-203 A-838-860 211-301 etc...</td>
<td>$12.50</td>
<td>$7.50</td>
</tr>
<tr>
<td>HUC-100</td>
<td>800'-211' E's 50 T's</td>
<td>845'-284' etc...</td>
<td>853-203 A-242 A-211 507-RK 18'-RK 20's 860'-282 A's etc...</td>
<td>$20.00</td>
<td>$12.00</td>
</tr>
<tr>
<td>HUC-200</td>
<td>203 A's-838's 50 T's etc...</td>
<td>P.P. Parallel 845'-284 A's 800'-etc...</td>
<td>903 A's-838's-50 T's 860'-803 etc... HF 200's</td>
<td>$32.50</td>
<td>$19.50</td>
</tr>
<tr>
<td>HUC-500</td>
<td>204 A's-150 T's HK 354'-HF 300's</td>
<td>849'-150' T's 212 D's</td>
<td>150 T's-204 A's-849' HF 200'-HF 300's</td>
<td>$80.00</td>
<td>$48.00</td>
</tr>
</tbody>
</table>

What This Universal Modulation Choke Will Do:

The choke may be used to match the output audio stage to an RF Pentode stage for screen plate modulation. It is tapped so that it can be used as an autotransformer coupler from Class B to Class C stages, various impedance taps are available, so that each choke will readily accommodate push pull Class A — Prime or Class B Modulators, single ended Class A Modulator with the DC adding, or single ended Class A Modulator with the DC bucking. The chokes are huskily constructed and air gaps are arranged to take care of the maximum currents. Included with each choke is our data sheet 112 which indicates the application of each unit for different tubes and circuits.

Balance Coils

The new UTC development which permits paralleling mercury vapor rectifier tubes with equal current distribution.

| PA 10B | Center tapped choke to equalize the load between two 80's, 81's, 82's, 833's, 89's, etc. | $5.00 | $3.00 |
| PA 11B | Center tapped choke to equalize the load between two 866's, 866A's | 10.00 | 6.00 |
| PA 12B | Center tapped choke to equalize the load between two 872's, 872 A's | 25.00 | 15.00 |
ANY night on the amateur bands you will hear a better advertisement of the Standard HRO than we could write. The unqualified enthusiasm of men who have spent years mastering the fine points of high frequency communication counts for more than a long list of unusual details, even though those details include such items as the PW Precision Condenser, calibrated band spread and a crystal filter as effective on phone as c.w. The demands of modern radio are rigorous, and the proof of the pudding is in the eating.

An illustrated folder describing both receivers will be mailed on request.

THE attractively priced HRO Junior is the Standard HRO stripped down to its straight superheterodyne circuit by omission of the calibrated S-meter (and associated circuit), the single-signal crystal filter, the extreme electrical band spread, and the engraved aluminum relay rack panel. The chassis, all other parts, and the fundamental circuit are identical. The general performance of the HRO Junior is in every way equal to the magnificent performance of the HRO. The crystal filter and the S-meter, may be added at any time.
RCA 834

The RCA 834 is designed primarily for use at ultra-high frequencies and can be operated with maximum rated input at frequencies up to 100 megacycles. With reduced input, this new RCA type may be operated at frequencies as high as 350 megacycles. Rated at 50 watts plate dissipation for Class C telegraph service, the RCA 834 is capable of real output in conventional circuits at ultra-high frequencies. Amateur's Net Price $12.50.

RCA 830-B

RCA 830-B is rated at 60 watts plate dissipation for Class C telegraph and Class D service. Maximum plate voltage is 1000 volts. This tube is particularly good as a Class E modulator: Two tubes will deliver 175 watts of audio power. The RCA 830-B is also useful as an r-f amplifier. Power output in Class C telegraph service is approximately 90 watts. Amateur's Net Price $10.00.

The RCA 834 and RCA 830-B are available for immediate delivery from your supplier.