The 600A Transmitter uses two Collins C200’s for CW or two Collins C300’s for CW and telephone. These tubes are capable of very high output and low distortion either as r-f amplifiers or as class B modulators. Price of C200, $24.50; of C300, $35.00. Data sheets supplied on request.

The 600A Transmitter is finding many applications in commercial services. Of course it is also a beautiful set for amateur work. The high CW output (700-800 watts) and the radiophone power in excess of 200 watts qualify it for difficult communication applications.

The 7M Speech Amplifier, developed specifically for use with the 600A, may be of interest to amateurs who are in need of a properly shielded, high quality speech amplifier to use with their present transmitter. Gain of the 7M is 83 db., undistorted output is 7 watts. The amplifier is entirely self-contained for mounting on the operating desk. A receptacle is provided for either sourcemicrophone. A single shielded cable connects the audio and push-to-talk circuits to the transmitter. Volume indicator is optional. Output connections may be supplied for either class B plate or grid modulation systems.

The 600A Transmitter uses two Collins C200’s for CW or two Collins C300’s for CW and telephone. These tubes are capable of very high output and low distortion either as r-f amplifiers or as class B modulators. Price of C200, $24.50; of C300, $35.00. Data sheets supplied on request.
The Super SKYRIDER is MODERN*

- Metal Tubes - Dovetail perfectly with our effort to improve signal to noise ratio - eliminate noisy tube shields - reduced interelectrode 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 - provides 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.
- Best Oscillator with continuous range.
- Modern Band Changing System - any desired band 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 19½" x 10" x 10".

When you install the Super Skyrdier you have every modern feature known to radio, plus the progressive engineering that keeps pace with the latest developments and trends in short wave reception.

Examine the marvelous 1936 Super Skyrdier. Compact, convenient, efficient, it's the embodiment of today's trends in radio engineering, and incorporates, too, the brilliant Hallcrafters engineering developments. It's orderly and workmanlike, different from the old-fashioned, loosely wired, separate parts that constituted the receiver of the past. Amateurs today want the compact convenience of the Super Skyrdier.

There are no cumbersome, inconvenient, plug-in coils used in the Skyrdier - modern receiver design and layout permit the use of a simple band switch that tunes in any band with a twist of the finger, while the Automatic Band Indicator shows it on the dial. Here's convenience to the Nth degree, obtained without sacrifice but with actual gain in efficiency.

The Super Skyrdier is engineered for the New Metal Tubes, radio's great advance for 1936. Completely shielded, with short leads and small interelectrode capacities, they provide the last link in Hallcrafters' efforts to build a stable, high gain set.

Sensitivity is brought to a still higher level with the new Iron Core I. F. Transformers, first used in the Super Skyrdier and now rapidly being adopted by the more progressive manufacturers.

It's modern features like these and a dozen others on the Super Skyrdier that make it what it is, America's outstanding short wave receiver.

But with all the advantages the Super Skyrdier is extremely reasonable in price making it first in value as well as efficiency. Don't delay, see it at your dealer's today, you won't be satisfied until you own this MODERN short wave receiver.
MARINE
270 B
350 WATT
PHONE AND C.W.
with
BUILT-IN CATHODE RAY
OSCILLOSCOPE

An outstanding transmitter designed
and constructed to the Marine high
standard of Quality. Users of this job
will attest to its extraordinary perform­
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Write for descriptive catalog and
photographic illustrations of this and
other Marine Transmitters. A com­
plete range of Marine Transmitters
are available from 20 watts upward.

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MARINE
RADIO COMPANY
60 Lispenard St. • New York, N. Y.
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Due to the wide range in operating conditions, of RF tubes in class C, a corresponding wide range of load impedances, reflected to the modulator stage, is effected.

Standard transformers for matching modulator tubes to an RF load, as available today, afford the use of 2 or 3 specific impedances on the secondary. The result is that frequently a transformer is purchased for this service with the thought that it is the "nearest thing" to the impedance desired.

This can only result in comparatively high distortion levels.

As a solution to this problem, UTC has developed its new line of Varimatch transformers, which, through proper design, permit a very wide range of impedance matching. (The chart on next page illustrates the impedances available on all Varimatch units. In addition to the values shown, units VM-4 and VM-5 also have higher impedance combinations to take care of the new high impedance tubes.)

The value of a VARIMATCH transformer for amateur work cannot be overemphasized from the angle of universal application. New tubes have been and are being brought out constantly (witness the 6L6 and 35T.)

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<td>VM-1</td>
<td>Will handle any power tubes to modulate a 20 to 60 watt Class C stage</td>
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<td>VM-2</td>
<td>Will handle any power tubes to modulate a 40 to 120 watt Class C stage</td>
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<td>VM-3</td>
<td>Will handle any power tubes to modulate a 100 to 250 watt Class C stage</td>
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<td>VM-4</td>
<td>Will handle any power tubes to modulate a 200 to 600 watt Class C stage</td>
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<td>VM-5</td>
<td>Will handle any power tubes to modulate a 450 watt to 1 KW plus, Class C stage</td>
<td>70.00</td>
<td>42.00</td>
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Secondaries of all Varimatch Transformers are designed to carry Class C plate current.

CONTEST CLOSES JULY 1st . . . See previous issues for details.
MAIL YOUR SUGGESTED NAME FOR THE UTC TRANSMITTER KITS . . . IMMEDIATELY.

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### TYPICAL APPLICATION EXAMPLES

**VM-1, Class B 6S-25 watts AF. P to P**

\[ Z=6000 \text{ ohms} \]

At 650 V and 77 MA-RF load impedance is 450 ohms. Corresponding to 6000 ohms in the left hand column we find the nearest available impedance in the other columns to be 3900 ohms giving an impedance match within 1.8%.

**VM-2, Class B 3S-1000 V-P to P**

\[ Z=10,000 \text{ ohms} \]

A 1050 V and 1070 MA-RF load impedance is 650 ohms. Corresponding to 10,000 ohms in the left hand column we find the nearest available impedance in the other columns to be 9000 ohms giving an impedance match within 1.2%.

**VM-3, Class B 35 T's-2500 V-P to P**

\[ Z=2000 \text{ ohms} \]

At 1000 volts and 230 MA-RF load impedance is 4320 ohms. Corresponding to 2000 ohms in the left hand column we find the nearest available impedance in the other columns to be 1950 ohms giving an impedance match within 1.6%.

**VM-4, Class B 203 A's-1250 V-P to P**

\[ Z=9000 \text{ ohms} \]

A 1250 V and 2150 MA-RF load impedance is 2780 ohms. Corresponding to 9000 ohms in the left hand column we find the nearest available impedance in the other columns to be 8000 ohms giving an impedance match within 2.7%.

---

**Prl. Ohms**

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*In some cases it is desired to match an RF load to the 50 ohm output of a PA amplifier. The terminal arrangement noted will take care of this application.

†These impedances are suitable for PA applications. If a monitor speaker is desired, proper distribution of power is obtained by operating this low impedance into the high impedance primary of the speaker transformer.
AGAIN HAMMARLUND presents a masterful engineering triumph — the HAMMARLUND "SUPER-PRO" CRYSTAL FILTER! Its outstanding features — features that have never appeared, heretofore, in any such unit set a new standard in crystal filter design.

The selectivity control is noteworthy. This control varies selectivity from the knife-like point desired for C.W. to the wider degree of selectivity required for practical phone reception.

Another original feature is the crystal transformer with its two impedance-matching windings and air-dielectric tuning capacitors. Placing the crystal between the two windings secures maximum crystal efficiency.

An accurately ground isolantite holder provides a precise and uniform air-gap. Carefully lapped, holder-plates insure absolute flatness. The wiping-motion switch is trouble-free and absolutely noiseless. Thus, dependable and effective results are positively guaranteed!

This crystal unit is but one of the many, many features of the HAMMARLUND "SUPER-PRO" RECEIVER. Send, today, for the complete "SUPER-PRO" story!

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Section Communications Managers of the A.R.R.L. Communications Department

All appointments in the League's field organization are made by the proper S.C.M., elected by members in each Section listed. Mail your S.C.M. (on the 16th of each month) a postal covering your radio activities for the previous 30 days. Tell him your DX, plans for experimenting, results in 'phone and traffic. He is interested, whether you are an A.R.R.L. member or not. In case you get your S.C.M. appointed to another district, he wants a report from every active ham. If interested and qualified for O.R.S., O.P.S., or other appointments he can tell you about them, too.

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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 worthwhile 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 prerequisites. Correspondence should be addressed to the Secretary.

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FROM where we sit, it seems to us that amateur 'phone is acquiring quite a bad name for causing interference to other services. We have the feeling that 'phone men ought to take better account of this situation than they apparently are, and undertake the necessary remedial steps. Of course c.w. stations cause interference too, particularly by means of their harmonics, but the resultant trouble isn't nearly so pronounced for the reasons that the average 'phone station uses more power, it is so much more readily identified, its carrier is on constantly, and its emission is broader.

The interference falls into two general classes: that with normal broadcasting and that with higher-frequency services. It is distressing to think that in this advanced day, when we have so thoroughly learned the lessons of cooperation, there should still be amateurs who insist upon their right to transmit uninterruptedly even under circumstances where they inevitably cause "general interference to the reception of broadcast programs with receivers of modern design."

Yet there seem to be. It may be argued that it is the duty of the communications administration to police these cases and impose quiet hours as a lawful measure of the required cooperation. Indeed it is, but we have not learned by tortured experience that it is vastly preferable for us individually to take the initiative, cure the troubles where we can, and be considerate? While fortunately these cases of aggravated interference are not common, still there are too many of them. It is not a good thing for amateur radio to have thoroughly outraged BCL's campaigning against us. Indicative of the feeling that can be generated in these cases, we quote the following from a letter shown us by one of the major broadcasting companies:

"I wish to bring to your attention a condition which is undoubtedly depriving you of thousands of listeners. I refer to the status of the amateur radio broadcaster. There is one in my apartment building. I hear his inane conversations throughout your broadcasts in the middle of Major Bowes' program, in the middle of your gorgeous General Motors program, and all of your programs are ruined for me through the intrusion of the raucous voice of this amateur calling his stations. I have complained to the Federal Communications Commission and find these people apathetic, in fact decidedly unsympathetic to my problem. They are all probably amateurs themselves down there. I am now discovering that this amateur is disturbing so many tenants in my building that I think we can organize a committee to persuade the landlord to silence this nuisance. But the condition remains—that is, these licensed radio amateurs are allowed by a friendly radio commission to destroy the radio reception of thousands of owners of radios. I am going to call this matter to the attention of my elected representatives in Congress but I think your company with its vast expenditures to make radio programs accessible to the public should be able to do something about such a shocking condition. If an intruder comes into one's home one can call the police. When we invite our radio guests (your programs) must we (your sponsors' potential customers) remain helpless when these intruders (the unrestrained amateurs) invade our homes?"

Of course the F.C.C. did not rush to the assistance of this complainant without investigating—we have our rights too. Perhaps the interference wasn't general and it is quite possible that the complainant's receiver was an ancient model not entitled to any protection. But it does us no good to have such people annoyed to the boiling point while we ignore their anguished wails. Not many amateurs pursue such a calloused view but our very point is that some do decline any cooperation or consideration—and in our observation it's generally a 'phone station. This, we say, is not a wise course.

The other fruitful cause of headaches is harmonic radiation. The biggest item in this category is third-harmonic interference with the so-called 25-meter broadcast band on which unnumbered people with all-wave receivers are now listening to foreign programs. Unfortunately, the third harmonic of most of the 3900–4000 'phone band fall squarely upon this broadcast band, which runs from 11.7 to 11.9 mc. Here the trouble in almost every case is definitely the amateur's fault for we should not radiate harmonics that cause interference of the order that has been observed. Commercial c.w. services also have been bothered, particularly between 7820 and 7960 kc., this time by the second harmonics of 'phones operating between 3910 and 3980 kc. 'Phones in the 1800–2000 region similarly distribute their second harmonics through the greater part of our 50-meter band, and their thirds through a variety of other services, sometimes with R8 signals, sometimes just with "hash." It seems to us that c.w. stations
Some amateurs bemoan the rate at which amateur radio is progressing technically, and particularly the fact that some of the newer devices are so complicated as almost to defy home construction. This is understandable when one contemplates that the price of avoiding obsolescence in station equipment in a rapidly-moving art is pretty high. This angle, we say, we can understand. But we do not think it justifies viewing with alarm the purchasing of ready-made equipment as the beginning of the end of the real amateur. In the earlier days it was certainly every ham’s ambition to own a Paragon or C.R.L. or Grebe receiver. Mighty few made their own transformers or condensers or gaps—not when they could scrape up the cash to buy one of the advertised varieties that the big stations used. The language and the technique change but human nature is just about the same as it was fifteen or twenty years ago. We still have those whose chief interest is in operating and those who possibly obtain an even greater satisfaction from building everything themselves.

But one does not to-day build apparatus in the 1923 manner nor even in the 1933 manner. Even our simple apparatus must be modern, described in modern language, using modern parts, and capable of modern performance. The early years of c.w. and of international DX were years of orienting ourselves, learning the new technique and discovering new operating worlds. The particular thrill that was a part of those pioneering days is to be regained now only by the workers in the ultra-high-frequency field. While we wouldn’t give up for anything our precious recollections of those earlier days, it seems to us that present-day ham radio is indescribably better and more interesting than the old game.

K. B. W.

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Illinois State Convention
(Central Division)
June 20th-21st

Place: Bloomington, III.
At: Illinois Hotel.
Time: Registration 2 p.m. Saturday.
Auspices of Central Illinois Radio Club.

Here’s a “believe it or not”: On January 6th W4VK had a three-way QSO on 75-meter ‘phone with W5DSW of Pine Bluff, Ark., and W4APK of Rome, Ga. On signing off, a few minutes later he found himself in another three-way with W5SI, also of Pine Bluff, and W4DAY, also of Rome! All without any premeditation or prearrangement. Oh yes, we almost forgot — W4VK’s QRA is Ripley, Tenn.!
A 50-Watt Audio Amplifier-Modulator With Beam Tube Output

Theory and Practical Operation of the New 6L6

By George Grammer,* WIDF

Apparently the idea of confining the electrons flowing in the evacuated space inside a tube to directed beams is not of such recent origin, but, as always, it remained for someone with a practical bent to make a good theory into a better tube. This has been done by O. H. Schade, of RCA Radiotron, and a beam power tube designed by him has been added to the metal-tube series, carrying the designation 6L6. Primarily, the tube was developed to meet the low-distortion and high-power-output requirements of high-fidelity home reproduction; incidentally, it also fits nicely into the amateur picture. Among the appealing characteristics of the 6L6 are audio-power outputs up to 60 watts from a pair of tubes with only 400 volts on the plate, plate efficiency comparable to that of a good Class-B system although the tubes actually are operated Class-AB, high-power sensitivity, and negligible distortion in suitable circuits.

Amateurs usually are more concerned with what a tube will do rather than why it does it, but aside from the intriguing idea of "beaming" the electrons, the 6L6 has some highly interesting design features. To put the thing in a nutshell, the new beam power tube, although a tetrode, represents an advance in design which approximates the ideal pentode—one with perfectly straight plate-voltage plate-current characteristics, permitting full utilization of the tube's capabilities before distortion of the output wave-shape becomes a factor. The 6L6 is free from secondary plate emission effects to an even greater extent than the suppressor-equipped pentode.

The element arrangement of the 6L6, as viewed from the top, is shown in Fig. 1. The inner (control) and outer (screen) grids are elliptical in shape. At the ends of the grids are metal plates, internally connected to the cathode, which act as deflectors. Since the deflector plates are at zero potential, electrons are not attracted to them but flow to the plate in two wedge-shaped beams. The semi-circular plate sections are the only parts of the plate to receive electrons; the remainder of the plate is useful only as a mechanical support and as a heat radiator. The concentration of electrons into two beams gives extremely high electron density in the space between the active portions of the plate and the other tube elements. The contour lines represent equipotential surfaces within the tube. It will be noticed that the deflector plates are placed so that their edges coincide with a zero-potential surface.

From the side, a cut-away section of the tube would look something like Fig. 2. The control and screen grids have the same number of turns per inch, the screen wires being lined up exactly behind the control-grid wires. "Lining-up" is an innovation in tube design; the reason for it can be explained by reference to Fig. 2. Assuming that the control grid is negative, electrons emitted

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* Assistant Technical Editor.

FIG. 1—A TOP VIEW OF THE ELEMENT ARRANGEMENT IN THE 6L6

METAL-TUBE SPEECH UNIT WITH PUSH-PULL 6L6 OUTPUT

This four-stage amplifier will deliver an audio output of approximately 50 watts with negligible distortion, in conjunction with the power supply shown in another photograph. The gain is sufficient for the popular diaphragm-type crystal microphone.

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from the cathode will be repelled by the negative grid, causing them to be compressed into sheets flowing between the grid wires. The velocity of the electrons carries them on through the screen mesh. Lining-up, plus critical spacing of screen with reference to control grid and plate, makes the screen an effective accelerator, but causes the screen current to be quite low, since comparatively few electrons strike the screen wires. The overall efficiency of the tube is therefore increased.

After passing through the screen the electrons spread out somewhat as indicated in Fig. 2. The high electron density resulting from beaming causes the formation of an electron barrier in the space between screen and plate, so that secondary electrons are repelled back into the plate. In effect, therefore, there is an electronic suppressor within the tube, its characteristics being such that it offers no impedance to the flow of primary electrons to the plate, but completely prevents secondary electrons from returning from plate to screen. An optical analogy would be a lighted room on a dark night—it is possible to see clearly into such a room from outside, but an observer on the inside looking out can see nothing.

The electronic suppressor, by eliminating the grid mesh of the usual wire suppressor, removes one cause of undesired curvature in tube characteristics. Beaming, in similarly eliminating the distorting effects of grid supporting rods, removes another.

### 6L6 Characteristics

The straight plate-voltage plate-current curves of the 6L6 make the output of the tube remarkably free from high-order harmonic distortion. In comparison with the ordinary pentode plate family, these curves, instead of bending gradually downward at low plate voltages, continue straight until a critical plate voltage is reached, whence they drop off suddenly. The fact that the drop occurs at very low plate voltage accounts for the increased efficiency of the 6L6 over conventional types, since for a given static plate voltage and plate current the tube can be swung over a greater range before distortion starts. The characteristics, however, are still those of a pentode-type tube, with the usual tailing-off of plate current as the grid bias is made more negative. For this reason the second-harmonic distortion is high in a single-tube amplifier, even though the third and higher-order harmonics are negligible. With push-pull, however, the second harmonic is eliminated, leaving an amplifier with substantially no distortion.

A wide range of selection of operating conditions is available to give different power outputs and various amounts of distortion. The single-tube ratings are probably of little interest to amateurs, since the second-harmonic distortion is high. This can be overcome by suitable amplifier design, but as we see it, for the present at least, the real field for this tube in amateur radio is as a modulator of moderate power or as a driver for high-power Class-B modulators. The operating data given below are therefore for two tubes in push-pull.

The heater of the 6L6 takes 0.9 amp. at 6.3 volts. Maximum rated plate voltage is 400; maximum screen voltage, 300. As a push-pull Class-A amplifier the following operating conditions are recommended:

<table>
<thead>
<tr>
<th>Fixed Bias</th>
<th>Self-Bias</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plate voltage</td>
<td>250</td>
</tr>
<tr>
<td>Screen voltage</td>
<td>250</td>
</tr>
<tr>
<td>Grid bias</td>
<td>-16</td>
</tr>
<tr>
<td>Zero-signal d.c. plate current</td>
<td>20</td>
</tr>
<tr>
<td>Max.-signal d.c. plate current</td>
<td>120</td>
</tr>
<tr>
<td>Max.-signal d.c. screen current</td>
<td>10</td>
</tr>
<tr>
<td>Load resistance (plate to plate)</td>
<td>5000</td>
</tr>
<tr>
<td>Max.-signal power output</td>
<td>14.5</td>
</tr>
<tr>
<td>Distortion: total</td>
<td>2</td>
</tr>
<tr>
<td>3rd harmonic</td>
<td>2</td>
</tr>
</tbody>
</table>

Several sets of operating conditions may be used with a pair of 6L6's in a Class-AB amplifier. These follow: for excitation without drawing grid current—in other words, no power is required from the preceding amplifier.

| Plate voltage | 400 | 400 volts |
| Screen voltage | 250 | 300 volts |
| Grid bias, fixed | -20 | -25 volts |
| Zero-signal d.c. plate current | 40 | 50 ma. |
| Max.-signal d.c. plate current | 125 | 150 ma. |
| Zero-signal d.c. screen current | 4 | 5 ma. |
| Max.-signal d.c. screen current | 9 | 12 ma. |
| Load resistance (plate-to-plate) | 6000 | 6000 ohms |
| Max.-signal power output | 20 | 25 watts |
| Distortion: total | 1 | 1.2 per cent |
| 3rd harmonic | 1 | 0.6 per cent |

If grid current is drawn, imposing the requirement that the driver stage be capable of supplying some power, the...
The 6L6's amounting only to about 2 per cent if driver distortion and the effects of resistance in series with the grid circuit are absent. For lowest distortion the effective driver impedance, as looked at from the following operating conditions are typical:

- **Plate voltage**: 400 volts
- **Screen voltage**: 200 volts
- **Grid bias, fixed**: -20 volts
- **Peak a.f. grid-to-grid voltage**: 57 volts
- **Zero-signal d.c. plate current**: 85 ma.
- **Zero-signal d.c. screen current**: 4 ma.
- **Max-signal d.c. screen current**: 15 ma.
- **Load resistance (plate-to-plate)**: 6000 ohms
- **Plate voltage**: 400 volts
- **Grid bias, fixed**: -20 volts
- **Peak grid input power**: 180 milliwatts
- **Max-signal power output**: 40 watts

Under these last sets of operating conditions, the distortion will depend primarily upon the driver stage, the distortion introduced by the 6L6's amounting only to about 2 per cent if driver distortion and the effects of resistance in series with the grid circuit are absent. For lowest distortion the effective driver impedance, as looked at from the 6L6 grids, should be low.

The wide range of operating methods makes the 6L6 adaptable to practically any application where audio power outputs upwards of ten watts are required. In fact, tube manufacturers feel that this tube will replace existing power-output tubes in almost all types of broadcast receivers. The high power-sensitivity, the fact that outputs up to 30-odd watts may be secured without grid current, and the triode-like characteristic of being quite tolerant of plate-loading, likewise make the tube an ideal one for amateur speech amplifiers and modulators.

**A PRACTICAL AMPLIFIER**

The 6L6 speech-amplifier unit and accompanying power supply shown in the photographs can be considered to be a general purpose affair, in that substitution of a suitable output transformer makes it adaptable both as a complete modulator and as a driver for Class-B units employing anything up to a pair of 204-A's. The voltage gain to the grids of the 6L6's is more than sufficient for crystal microphones of the diaphragm type, a peak input of about 0.005 volt being sufficient to drive the final tubes to full output. The input stage uses a 6J7 (equivalent to the 57 or 6C6) pentode; this tube is resistance-coupled to a 6C5 triode intermediate amplifier. The driver consists of a pair of 6C5's in push-pull, transformer-coupled to the preceding stage. The 6C5's are capable of delivering sufficient power for excitation of the 6L6 grids. The input transformer, $T_2$, is specially designed for the purpose. The 6L6 output transformer, $T_3$, also is a special job, arranged with a tapped secondary to work into loads of 2500, 5000 or 7500 ohms for modulation purposes; its turns ratio is such that the plate-to-plate load on the 6L6's is 3800 ohms.

The low-level speech-amplifier section needs no particular comment, since it is practically identical with several layouts described previously in QST. It occupies the left-hand section of the chassis; the bottom view indicates that the various resistors and condensers are placed in the most convenient locations. The design of the whole unit is, in fact, perfectly straightforward. The microphone jack is on the back of the chassis near the 6J7 tube; the first 6C5 is at the front left-hand corner, with the gain control conveniently situated. To its right is the single-tube push-pull coupling transformer; back of the coupling transformer are two electrolytic bypasses, $C_6$ and $C_7$, followed by the push-pull 6C5's. The input and output transformers, as well as the 6L6's, are readily identified. The jack for measuring 6L6 plate current is mounted on the back of the chassis, along with a stock two-terminal strip for the output.

Suitable power supply for the amplifier presents a few problems. Although the tubes operate at low voltage, the high-power output is not obtained for nothing—the plate current necessarily is high. Theoretically, it is necessary to have a plate supply for the 6L6's capable of delivering better than 200 ma. at 400 volts; furthermore, this supply should have good regulation if the voltage is to stay within safe limits for electrolytic filter condensers. Ordinary broadcast replacement transformers are out of the question. After some perusing of catalogs, it was decided to feed the outfit with two power supplies, one for the 6L6 plates and the other for everything else, including the 6L6 screens. This made possible the elimination of a voltage divider on the 400-volt supply, thus lightening its load. The final arrangement uses a broadcast transformer rated to give 300 volts at 55 ma., with all tubes except the 6L6's getting their filament power from this transformer; a second plate transformer rated to give 400 volts (with a choke-input filter) at 100 ma. continuously and 200 ma. intermittently; and a third transformer to heat the filament of the 6L6's and an 83 rectifier. An ordinary condenser-input filter with one choke (this choke is mounted underneath the power-supply chassis) is used on the 300-volt supply. The 400-volt supply has choke input, with the two sections of a double-8 electrolytic condenser in parallel across the output.

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The fixed bias for the 6L6's is obtained from the 300-volt supply. Reference to Fig. 4 will show that there is no ground on the negative side of the 300-volt supply (outlet A). The total current from this supply is made to flow through the right hand section of R15 (Fig. 3) to ground; by means of the adjustable tap on R15 the bias voltage is set at 25 volts. R14 is a bleeder resistor to load the 300-volt transformer to full capacity. It is desirable to do this so that the current through R15 will be as heavy as possible, thus maintaining the bias fairly constant even though grid current flows. R13 drops the voltage to the proper value for the speech-amplifier plates.

The power terminals on both speech and power-supply units are four-prong tube sockets. Connections are made by means of four-wire cables with plugs at each end.

FIG. 2—VERTICAL SECTION OF THE 6L6, SHOWING THE FORMATION OF THE ELECTRONIC SUPPRESSOR

A few words about operation: Provided that the values given are followed, the only adjustment to be made is that of the bias on the 6L6's. Preferably, this should be done with the aid of a high-resistance voltmeter, with everything except the 400-volt plate transformer turned on. However, if no such voltmeter is available, a method which works about as well is to set the tap on R15 so that the plate current to the 6L6's is slightly over 100 ma. If this latter scheme is to work, however, it is essential that the screen voltage be exactly 300 volts, since the plate current is quite sensitive to changes in screen voltage—considerably more so than to changes in plate voltage.

With the values given in the circuit diagrams, the whole system is perfectly stable (a ground connection must be used, of course) and the hum level is negligible. Should the hum increase perceptibly when the microphone plug is inserted, it will be necessary to shield the grid cap of the 6J7.

Measured output of this combination at the point just below where perceptible distortion begins was approximately 45 watts. This represents a steady-state condition with a sine-wave signal, however, and thus puts a heavy load on the power supply, the output voltage of which dropped to between 350 and 375 volts. Power-supply regulation, together with the fact that

FIG. 3—WIRING DIAGRAM OF THE 6L6 SPEECH-AMPLIFIER-MODULATOR

C1—10 uf, 25 volt electrolytic.
C2, C3—20 uf, 200 volt electrolytic.
C4—0.1 uf, paper, 400 volt.
C5—0.5 uf, paper (or larger).
C6, C7—10 uf, 400 volt electrolytic.
C8—25 uf, paper, 400 volt.
C9—25 uf, electrolytic, 50 volt.
R1—5 megohm, 1/2 watt.
R2, R5—3500 ohms, 1/2 watt.
R3, R4—50,000 ohms, 1/2 watt.
R6, R7—0.25 megohm, 1/2 watt.
R8—0.5 megohm volume control.
R9—100,000 ohms, 1/2 watt.
R11—10,000 ohms, 1/2 watt.
R12—500 ohms, 1/2 watt.
R13—2500 ohms, 1 watt.
R14—12,000 ohms, 10 watt.
R15—1000 ohms, 10 watt.

The ratings in the tables previously given are for the tubes only and do not include unavoidable losses in the output transformer, probably accounts for the difference between actual measured output and the theoretical 60 watts which should be available. Observation with the aid of the oscilloscope showed that with voice input the average plate current rises only to about 130-140 milliamperes to give the same peak output. It is safe to say, therefore, that the output for voice work is in the vicinity of 50 watts; certainly there

QST for
is plenty of audio power to modulate a Class-C amplifier running with 100 watts plate input.

It is interesting to note that with the same 3800-ohm load impedance it is possible to secure about 20 watts of audio without running into grid current on the 6L6’s. The distortion under these conditions is less than 1 per cent. A pair of 6L6’s is thus about equivalent to a pair of 46’s in Class-B—but can be excited by a voltage amplifier, whereas the 46’s would require a driving source capable of delivering a watt or so to the grids.

FIG. 4—DIAGRAM OF THE POWER-SUPPLY UNIT

It is plenty of audio power to modulate a Class-C amplifier running with 100 watts plate input.

It is interesting to note that with the same 3800-ohm load impedance it is possible to secure about 20 watts of audio without running into grid current on the 6L6’s. The distortion under these conditions is less than 1 per cent. A pair of 6L6’s is thus about equivalent to a pair of 46’s in Class-B—but can be excited by a voltage amplifier, whereas the 46’s would require a driving source capable of delivering a watt or so to the grids.

And then they have some guy with long hair in from the outside to talk about “parasitic oscillations” or sumpn and he rambles on for another hour and a half over everybody’s head and nobody has the nerve to throw a chair at him. He finally exhausts himself, his subject and his audience and sets down and the club president reluctantly turns everybody loose. By that time it’s late, but you still can’t visit with nobody yet as you got the refreshments to eat, which is a winnie and a bottle of bellywash, and you can’t talk to nobody with your face full of winnie. So what? Wye, you gobble this puppy quick and shove off home and when you git there you git a growl from the ever loving OW for checking in later than you led her to believe you would, and you crawl into the hay and snooze off still wondering who was the strange hams at the meeting and promising yourself that some day soon you’ll try to get around to see some of the old friends you saw there and have a chat with them. You can’t do it at a radio club meeting. They take all the blame time with “old business” and “new business” and this guy “makes a motion” and that guy “makes a motion” and what they need is some big guy about seven feet high to git up and make a motion with a club and scatter these half dozen guys that’s going to run the club anyway and might as well do it some other time when they’re off by theirselves and not botherin’ nobody. Shucks. I got a blame good notion to git me up a radio club of my own and run it right. If I did I wouldn’t have no officers and no committees and no minits of the last meeting and rising votes of thanks and “the Chair recognizes the gentleman from McDaniel Street” and all such time-killing, ham-squelching tommyrot. I’d just lettum in and turnum loose. I betchy they’d like it.

—W4IR of the “Dixie Squinch Owl”

When you want to keep your schedules at a “borrowed” station while away from home traveling or visiting, why not take along your own crystal? It automatically puts you on the frequency known to your correspondent, right at the old pencil-mark on his dial. He won’t even have to know that you’re away from home; you have his ear when he hears himself called on the old familiar frequency at the appointed hour.

June, 1936
A High-Performance Three-Stage Transmitter  
With Improved Tri-Tet Exciter  

100- to 200-Watt Output on Four Bands with a Single Crystal  

By Byron H. Goodman,* W1JPE  

THE present-day crystal-controlled transmitter of medium power usually consists of three stages: oscillator, doubler or buffer, and final amplifier. With a 3.5-mc. crystal, good results can be obtained on 3.5 and 7 mc.; getting to 14 mc. involves a few tricks, and 28-mc. operation is almost out of the question unless a 7- or 14-mc. crystal is used. Obviously the weak link is in efficient frequency multiplying.

Looking over the many schemes for efficient frequency multiplying proposed in the past, the one that seemed to show the greatest possibilities was the regenerative frequency multiplier utilizing feedback to the screen grid of a pentode.1 Further consideration suggested the possibility of feeding out-of-phase energy back to the suppressor grid instead of the screen grid, since the suppressor requires much less voltage swing to modulate completely the electron stream. The idea looked like a good one, for by increasing the feedback to the point where the plate and suppressor grid portion of the tube oscillated, the excitation would probably lock the output frequency, and a simple form of locked oscillator would be had.

A hastily constructed breadboard arrangement was used to try the system. An RK25 was used as in Fig. 1, excited by another RK25 as a Tri-tet oscillator using a 3.5-mc. crystal, the plate being tuned to 7 mc. Quadrupling to 28 mc., the system showed promise but the output was inadequate to excite fully a pair of Eimac 35T's, the goal. Even adjusting the feedback to the point where the plate and suppressor grid portion of the tube oscillated by itself did not supply enough output, even though the frequency was stabilized perfectly by the 7-mc. excitation. So hopes for this particular short cut went bust.

Then another idea suggested itself. It was asking a little too much of a frequency quadrupler to furnish 12 watts or so on the fourth harmonic, when its fundamental output is ordinarily not more than 16 watts or so. But if it were possible to quadruple efficiently in the oscillator and obtain two or three watts of output, doubling in the second tube (a reasonable procedure) should furnish the necessary 28-mc. output. The regular Tri-tet circuit, shown in Fig. 2, was modified to include suppressor-grid feedback as shown in Fig. 3. The fourth harmonic output wasn't what had been expected, and again high hopes crashed with a dull thud. The thud woke up George Grammer, who had been working peacefully in the corner, and he was told of the scheme that looked fine on paper but wouldn't work as had been anticipated. He suggested that a higher capacity in the cathode tank circuit, to form a lower impedance return path for the harmonic energy, might help. A 250-µfd. fixed condenser was shunted across the cathode tuning condenser C1, and the coil pruned until the crystal again oscillated. Here was something! Output on the second harmonic was higher, and the fourth harmonic output was ample to drive the second RK25 as an effective doubler to 28 mc.

*Assistant Secretary, A.R.L.
1Keen, "An Effective Power-Type Frequency Multiplier," QST, March, 1932.
Further tests on the new circuit disclosed that it was quite tolerant as to the ratio of feedback turns to tank turns, one-third to one-fourth being about optimum. When using a 3.5-mc. crystal and quadrupling to 14 mc., the suppressor coil was brought directly to ground; but when a 7-mc. crystal was used quadrupling to 28 mc., an increase in output was obtained if the suppressor grid was made 30 or 40 volts positive by grounding the cold side of the feedback coil through a condenser and tapping on to a voltage divider.

Some may ask why tubes of the 59 class were not used, as with the early Tri-tet circuit. The answer is simple. When the Tri-tet was first developed no special transmitting type pentodes were obtainable; but with tubes of the RK25 and 802 type available, with their improved characteristics and increased power, full advantage may be taken of the capabilities of this oscillator circuit.

**A SIMPLE 150-WATT TRANSMITTER**

The average operator of to-day does not usually confine his operating to any one band but likes to switch from band to band, taking full advantage of conditions. Modern receivers are designed for quick band-changing, and the recent influx of band-switch transmitters definitely shows the trend. However, there are still many who steer clear of band-switching, feeling that possible loss in efficiency does not fully compensate for the facilitated band changing. Usually there is no objection to switching in the exciter unit, and many transmitters have been built using this scheme. Another method is to use condensers large enough to tune to two bands with one coil. The latter method is used in the transmitter to be described. It was first tried using 100-µfd. tank condensers, but the high input and output capacities of the pentodes made it impossible to tune to the extreme limits of any two bands, although a single

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**EXCITER COIL DATA**

<table>
<thead>
<tr>
<th>Final Frequency</th>
<th>L2</th>
<th>L3</th>
<th>L4</th>
<th>L5</th>
<th>L6</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.5 and 7 mc...</td>
<td>23 turns</td>
<td>shorted out</td>
<td>23 turns</td>
<td>23 turns</td>
<td>21 turns</td>
</tr>
<tr>
<td>7 and 14 mc...</td>
<td>8 turns</td>
<td>4 turns</td>
<td>9 turns</td>
<td>10 turns</td>
<td>9 turns</td>
</tr>
<tr>
<td>14 and 28 mc...</td>
<td>Same as above</td>
<td>Same as above</td>
<td>Same as above</td>
<td>4 turns</td>
<td>3½ turns</td>
</tr>
</tbody>
</table>

$L_4$ is 9 turns 1" long.

**FINAL TANK COIL DATA**

<table>
<thead>
<tr>
<th>L7</th>
<th>Turns</th>
<th>Wire</th>
<th>Diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.5 mc</td>
<td>32</td>
<td>No. 16</td>
<td>2½&quot;</td>
</tr>
<tr>
<td>7 mc</td>
<td>24</td>
<td>No. 16</td>
<td>2½&quot;</td>
</tr>
<tr>
<td>14 mc</td>
<td>12</td>
<td>No. 14</td>
<td>2½&quot;</td>
</tr>
<tr>
<td>28 mc</td>
<td>6</td>
<td>No. 12</td>
<td>2½&quot;</td>
</tr>
</tbody>
</table>

All coils 3" long.

**TUNING COMBINATIONS**

<table>
<thead>
<tr>
<th>Final Output</th>
<th>L2</th>
<th>L3</th>
<th>L4</th>
<th>L5</th>
<th>L7</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.5 mc*....</td>
<td>3.5 mc</td>
<td>3.5 mc</td>
<td>3.5 mc</td>
<td>3.5 mc</td>
<td>3.5 mc</td>
</tr>
<tr>
<td>7 mc......</td>
<td>3.5 mc</td>
<td>3.5 mc</td>
<td>7 mc</td>
<td>7 mc</td>
<td>7 mc</td>
</tr>
<tr>
<td>14 mc......</td>
<td>7 mc</td>
<td>7 mc</td>
<td>14 mc</td>
<td>14 mc</td>
<td>14 mc</td>
</tr>
<tr>
<td>28 mc......</td>
<td>14 mc</td>
<td>14 mc</td>
<td>28 mc</td>
<td>28 mc</td>
<td>28 mc</td>
</tr>
</tbody>
</table>

* For 3.5 mc, $L_4$ is shorted.
lower shelf; it consists of an RK25 or 802 regenerative Tri-tet oscillator link coupled to an RK25 or 802 doubler-buffer stage. The oscillator can work as a straight 3.5-mc. pentode oscillator by shorting the cathode condenser, or 7- or 14-mc. output can be obtained in the plate circuit when using the Tri-tet circuit. The second pentode can work as a straight-through amplifier on any of the three lower frequency bands, or as a doubler to 28 mc. With 550 volts on the plate of the buffer, adequate output is obtained on all bands to permit the final amplifier to be driven to full Class-C with 200 watts input, the nominal rating for full modulation. If c.w. operation is desired, 1500 volts at 200 milliamperes is no excessive burden for the two Eimac 35T's comprising the final amplifier.

THE EXCITER UNIT, BASED ON A NEW CIRCUIT

A regenerative Tri-tet oscillator on the right is link-coupled to the buffer-doubler stage on the left. By-pass condensers for the buffer tube are mounted at the socket. Each coil tunes to two bands, facilitating band changing. The switch to the left of the meter allows individual grid and plate currents to be read quickly.

Crystal and careful pruning of the coils would permit harmonic operation. With two crystals it is not possible. Consequently 140-µfd. condensers were used, which allowed full coverage with ease. The final tank coil was made plug-in, it being felt that this would make for best efficiency. A transmitter resulted that requires only one plug-in coil range when shifting from one band to an adjacent one.

As can be seen in the illustration of the complete transmitter, the construction is a modified form of open rack. The exciter unit occupies the parallel arrangement is offset by the split-stator final tank tuning condenser and link coupling to the antenna.

The base and panel material is crackle-finished tempered "Masonite," a convenient material because of the ease with which it can be worked and the pleasing effect the finished product presents. The panels are fastened securely to the bases by metal brackets, thus forming a complete

FIG. 4—COMPLETE WIRING DIAGRAM

C1—100-µfd. (National ST100), C2, C3, C4, C5—140-µfd. (National ST1100). C6—90-µfd. per section, 3000-volt (Cardwell XP-90-KD). C7—250-µfd. mica receiving condenser (Micamold). C8, C9, C11, C12—0.01-µfd. mica receiving (Sangamo).

unit that may be slid into place and quickly removed if a change is to be made. A solid front panel was not used because it would then have been an awkward process to reach around and plug in coils. The frame is built of 1-inch by 2-inch pine strips, fastened together with screws and finished with flat black paint. The dials are fastened to the panel with Duco cement.

The construction of the transmitter is conventional throughout. Radio frequency wiring is carried above the bases; power supply leads and by-pass condensers are mounted under the base except in the case of the buffer stage with its horizontally-mounted tube, in which case the by-pass condensers are mounted right at the socket. The cathode tuning condenser has a 250-µfd. condenser shunted across it, to add the requisite high capacity so essential to efficient operation.

The plug-in coils are wound on four-prong forms, except the plate coil of the oscillator, which is wound on a six-prong form. It will probably be found that a little juggling of coil turns will be necessary to hit the bands just right, but this procedure is followed in most cases anyway. An absorption-type wavemeter will be found invaluable in lining up the coils, since it is quite easy to mistake harmonics and find yourself operating on an odd frequency midway between two of the legitimate amateur bands.

The neutralizing condenser for the final amplifier is made from two pieces of aluminum mounted on small stand-off insulators. Once adjusted, it need not be touched. The coil for the final tank circuit can be whatever you are used to using; in this case one of the many excellent “air-wound” coils now available was used. It is plugged into two stand-off insulators equipped with suitable jacks. The radio frequency choke is mounted directly under the jack, and at right angles to the tank coil. A flexible lead from the center of the coil is plugged into a jack set in the base, feeding the plate power to the final tubes.

With the set constructed, and the coils wound and pruned to the proper value as checked by the wavemeter, 550 volts on the plate of the buffer tube should give 50 milliamperes or more grid current to the final. Properly loading the final stage so that it draws 200 milliamperes with a voltage of 1500, the plates of the tubes should show a slight cherry-red color, indicating normal operation. The tubes are designed to run showing a slight color at their normal rated dissipation of 35 watts each.² For ‘phone operation, the plate voltage should be reduced to 1000, with a plate current of 200 milliamperes.

²Operating notes on the 35T, QST, May, 1936.
The 6L6 Beam Power Tube as a High-Output Crystal Oscillator

By Frank W. Edmonds, W2DIY

The advent of a new tube always kindles the fire of conjecture as to its adaptability to transmitter oscillator design, even though it may have been intended for other uses. The new 6L6 "Beam" power tube, with its high-power sensitivity and high order of efficiency, appears to be exceptionally inviting. Experimental work with metal tubes as crystal oscillators have shown that the metal types were good oscillators. The new 6L6 seemed even more inviting than any of the pentode types which had originated for audio use and had been harnessed, with good results, as r.f. oscillators. Published data on the 6L6 tube indicate that it possesses many of the requisite qualifications for crystal oscillator service; namely, ease of excitation (high-power sensitivity), high efficiency, high-power output, and, most important of all, a high order of a second harmonic output. The first of these features means that high output can be obtained with a minimum amount of work on the part of the crystal. The second feature promises adequate excitation for succeeding power amplifier stages; and, since most harmonic operation of transmitters is accomplished by doubling, the third feature means that the excitation to a succeeding doubler stage should be rather good.

When put to the test of actual operation, the tube even exceeded expectations. As shown by the table, the efficiency over a wide range of applied voltages held close to 50% and the power output exceeded that of any of the smaller pentodes which have been used for this service. The results shown by this table are even more interesting when you consider the fact that they were obtained with a 40-meter crystal which was a notoriously poor performer in any of the conventional circuits. High-power output from crystal oscillators, on the fundamental and second harmonic, has always been very desirable from the standpoint of simplifying transmitter design. The 6L6 is very well adapted to meet the requirements of this type of service and is an extremely good performer. It will be noted, from a study of the table, that several features of the performance of this new tube stand out and set it in a class by itself among oscillators.

Now, let us consider the circuit and a few precautions to be taken, in order to realize the full possibilities of this new tube. Because of the effect of the screen voltage on the power output and the power-handling capabilities of the tube, it will pay to use a power supply of good regulation and ample current capacity. It is always best not to supply other stages from this power supply.

Referring to Fig. 1 it will be noticed that the screen voltage is taken directly from the power supply.
supply bleeder, instead of through the usual dropping resistor. This arrangement permits keying of the oscillator for break-in c.w. opera-

![Circuit Diagram](image)

**FIG. 2—CIRCUIT OF THE EXPERIMENTAL 200-WATT TRANSMITTER USING THE 6L6 CRYSTAL OSCILLATOR TO DRIVE A HF 200 POWER AMPLIFIER AT 7 MC.**

tion, "push-to-talk" for 'phone operation and also provides a very useful means of adjusting the power output of the oscillator over a wide range. By this time you are probably wondering about the effect of the metal shell on the performance of the tube. The writer worried a little about that point also, but found that it did not interfere with the tube's performance if it was left floating. The tube will work with the shield grounded in the usual manner, but is more stable and gives more power output if the shield is left ungrounded. It was used, in one laboratory set-up, as a coupling condenser to excite a succeeding pentode buffer stage, thus doing away with the usual coupling condenser. It is best, however, to link-couple the plate tank to the next stage in order to realize the maximum output from the oscillator.

![Diagram](image)

**FIG. 3—DIAGRAM OF THE R.F. POWER MEASURING CIRCUIT**

Fig. 2 and the accompanying photograph illustrate an experimental set-up indicating the possibilities of this new tube. The 6L6 oscillator is shown driving an HF 200 at 7 mc. The results were very gratifying. With only 1600 volts on the plate of the HF 200, an output of over 200 watts was obtained in a dummy antenna. This two-stage set-up would be a nice rig for c.w. work. For a 'phone transmitter a buffer stage should be incorporated to minimize the effect on the oscillator of load variations in the modulated stage.

**CRYSTAL OSCILLATOR PERFORMANCE DATA**

<table>
<thead>
<tr>
<th>Plate</th>
<th>Screen</th>
<th>Plate</th>
<th>Plate</th>
<th>Plate</th>
<th>Plate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volts</td>
<td>Volts</td>
<td>Current</td>
<td>Input</td>
<td>Watts</td>
<td>R. F. Power</td>
</tr>
<tr>
<td>300</td>
<td>160</td>
<td>50 ma.</td>
<td>15</td>
<td>8</td>
<td>53.3%</td>
</tr>
<tr>
<td>350</td>
<td>180</td>
<td>65</td>
<td>24.7</td>
<td>11.5</td>
<td>46.6</td>
</tr>
<tr>
<td>380</td>
<td>200</td>
<td>75</td>
<td>28.5</td>
<td>13.5</td>
<td>47.3</td>
</tr>
<tr>
<td>385</td>
<td>240</td>
<td>80</td>
<td>30.8</td>
<td>16.5</td>
<td>53.5</td>
</tr>
<tr>
<td>387</td>
<td>260</td>
<td>120</td>
<td>46.2</td>
<td>22</td>
<td>47.7</td>
</tr>
<tr>
<td>425</td>
<td>285</td>
<td>165</td>
<td>70.1</td>
<td>38.2</td>
<td>51.6</td>
</tr>
</tbody>
</table>

Since this new tube has proven to be such a good performer, the way seems open to the design of compact metal tube transmitters of high efficiency and high-power output with low voltages. It seems especially desirable for portable transmitter use, as well as for a compact high-power exciter for larger transmitters.

June, 1936
Fourth Annual A.R.R.L. Field Day Contest
to Test Portables

June 6th-7th

IN communication emergencies operating ability is a necessity. It is developed by practice at times before emergencies develop! To “be prepared” also requires that the equipment be at hand, and the operator know what he will do when the power goes off. Effective arrangements are generally developed beforehand. In fact the A.R.R.L. Emergency Corps is dedicated to the fulfillment of a preparedness program. The Annual Field Day is open to every W/VE amateur, and is, in turn, dedicated to the setting up and testing in actual operation apparatus that will function in a reliable manner if and whenever needful.

The Field Day is also the annual event which combines an outing, with the opening of the season for outdoor radio activities. Starting Saturday, June 6th (4 p.m. local time) and ending Sunday, June 7th (7 p.m. local time) all U.S.A. and Canadian station owners are invited to schedule field radio-operating activities. The operation of portable transmitters and receivers afield is enjoyable; in addition it facilitates operator preparation to render constructive service in time of emergency; it encourages the development of equipment suitable for operation independent of interruptions of commercial power sources suitable for emergencies. Only portable stations, actually operated in the field (away from the “home” address) are eligible to submit field-day scores.

The object is for each “portable” station to work as many other amateur stations as possible—each different station counting one point toward a score. But one contact per station counts, of course. These stations may be locals, fixed stations, other portables, or foreign amateur stations. Any or all amateur frequency bands may be used, voice or c.w. telegraph likewise. The general call: (c.w.) “CQ FD” or (phone) “CQ FIELD DAY.” Advance entry is not required to take part in the Field Day.

All points must be made in the contest period given above. The log of operation, claimed score, and data on power and frequency band used for each contact should be sent in promptly at the conclusion of the test. Please note what was used as a source of plate and filament power, along with the “watts input” to final stage, too.

Special credits: Scores may be multiplied by 2 if either receiver or transmitter is independent of commercial power supply, by 3 if both transmitter and receiver are supplied from an independent local source rather than from public mains. The following additional score multiplier will be used to give all stations an equal chance. If the power input to the final stage (plate current times plate voltage—$E \times I$) is:

(a) Up to and including 20 watts—multiply score by 3.

(b) Over 20, and up to 60 watts—multiply score by 2.

(c) Over 60 watts—multiply score by 1.

To comply with F.C.C. regulations for portable station operation, licensees in the U.S.A. have only to observe the instructions of pars. 337 and 384 as respects advance notification of the locations in which the portable will be operated to the Inspector-in-Charge of the district, and as regards proper station identification. In the U.S.A. not only 28- and 50-mc. band portable work is permissible, but operation in any amateur band. In Canada the regulations permit portable sets to be operated only for 28-30 mc., 56-60 mc., or 400-401 mc. unless application to the Department of the Marine to secure the special permission necessary for portable work in other bands is made.

The League’s affiliated radio clubs are all invited to encourage their members to build portables, and to arrange special Field Day activities for June 6th and 7th. Get together with your local ham club in plans for work with portables on these dates if you can. Every amateur is invited to take part, whether or not able to participate in club plans. Your portable transmitter can be a source of great pleasure for the whole summer season. Get it working now. Test it in the Field Day plans and let us have your report. Take it to the mountains or seashore later and make your summer complete. Keep an operative portable at hand all the year, so it will be where you can put it to work promptly in the event of disaster or public emergency. Don’t forget to send your results for the report in QST—a postal card or letter will be most welcome, and please add any suggestions for the next Field Day. Ask for the application forms for membership in A.R.R.L.’s Emergency Corps at any time, if qualified and interested.

—F. E. H.
Amateurs Carry On

More Emergency Work Finds Hams On the Job

By Clinton B. DeSoto*

DURING the hectic months of March and April, 1936, amateur radio added as many leaves to its laurel crown as in many a year before. Hundreds of amateurs in seventeen states participated directly in the primary emergency work created by flood and tornado; other thousands in all parts of the country assimilated their traffic, making deliveries with an unusually high order of accuracy and reliability.

The bulk of that story was told in the May issue of QST. Since that issue was "put to bed" in the first week of April, however, other disasters have occurred and additional reports on those then past or in progress have arrived. In consequence, there is a big and impressive sequel to the May story to be told in this issue.

THE MOOSE RIVER MINE

Inverting chronology for the sake of current-events interest, the first piece of work to be recorded is that of the Canadian radio amateurs who, according to CP and the Ottawa Evening Citizen, "PLAYED GREAT PART IN GETTING MOOSE RIVER NEWS TO OUTSIDE WORLD." Operating for the Halifax bureau of the Canadian Press, a group of Nova Scotian amateurs went with little sleep and food for four days and nights to transmit news from the Moose River mine concerning the three men entrapped there. Telephone service being unavailable, before daylight Sunday a car manned by Art Crowell, VE1DQ, Bill Horne, VE1GL, and Trevor Burton, VE1CP, left Halifax carrying portable battery-operated equipment. One hour after arrival at Moose River communication was established with Cliff Shortt, VE1AW, who acted as receiving center. QRM was found to be bad, so the cooperation of the Canadian Radio Commission was solicited and an announcement requesting amateurs to refrain from using the low-frequency end of the 3500-kc. band was broadcast. Other amateurs on 3550 kc. and above took up the plea—among them John McGrail, Jr., VE2BP, W. F. Hammond, VE2GH, and J. Miles Whittaker, VE3MB—and soon the lower channels were practically clear of local QRM. The Canadian Press paid extensive credit to the amateur work performed in its behalf.

THE TUPELO TORNADO

From Nova Scotia the scene shifts 'way down to Mississippi. On April 9th the terrible tornado struck Tupelo and ravished the entire city. Coast Guard headquarters in Washington wired A.R.R.L. headquarters in West Hartford stating that an emergency communications truck operating under the call NRSA on 4050 kc. had been dispatched to Tupelo to assist in locating injured and missing persons, and requesting amateur contacts. Within ten minutes after this request was relayed, B. G. L. Smith, W4DEP, was QSO NRSA. Continuous watch was maintained from W4DEP from 4:20 p.m. until midnight; at 8 a.m. Lloyd J. Carlson, W4LN, took over the schedules, relieved later by Ned G. Cantrell, W4AEP. Elmer W. Palmer, W5CRG, of Okolona, where

THE GAINESVILLE TORNADO

Monday morning, April 6th, at 8:34 a.m., the tornado struck Gainesville with a velocity estimated by U. S. meteorological experts as more than five hundred miles per hour. Everything went before it—brick buildings, stone buildings, roofs, garages. Not one of the Gainesville hams was killed or injured. W4ACH was living in the Dixie Hunt Hotel, which was completely wrecked—half of it blowing down (the other half!). W4TL lived just on the outer rim of the storm area; his home escaped serious damage. W4CWE

* Assistant Secretary, A.R.R.L.
was on his way from Cornelia to Gainesville when the storm struck; when he arrived, he found the radio shop at which he worked a wreck. W4BBV ("The Parson") was in the direct path of the frantic monster; seeing one of the twin twisters coming, bringing with it a hen coop or some other large object at least one hundred feet in the air, he warned the family, held the back door against the wind, saw his church lifted up, carried a few feet, then torn apart—a building 140 feet long by 35 feet wide—and then the roof of the house, swept away into the roar of the monster.

As soon as possible W4BBV (the Rev. Geoffrey C. Hinshelwood, to whom thanks for much of this report), who is the A.A.R.S. Radio Aide for Georgia, commandeered a Bell Telephone Truck and loaded up his gear in the pelting rain to be transported to the sub-station, the only place where there might be power. George B. Stoffregen, Jr., W4CWE, had the same idea. But high-tension QRM was too tough. The town was a shambles and two large business houses were on fire. But by evening the Federal Building had emergency power and W4BBV and W4BBV, Jr., hauled the rig up four flights, commandeered a beautiful oak table and four or five comfortable armchairs from the Federal Judge’s chambers, and went to work. Meantime, a group of hams with battery-powered equipment had arrived from Athens, led by Vernon J. Cheek, W4ADN, with a group of N.C.R. members. Setting up in the third floor of the ruins of the Princeton Hotel, they were the first to contact the outside world; Eugene Black, Jr., W2ESO, a student at Carnegie Tech., later took over the operation of this rig. The third station to be set up was portable W4CDH, from Atlanta, manned by the owner, Howard W. Stephens, and Irving S. Miller, manager of the Wholesale Radio store in Atlanta, who provided the equipment which was powered by a converter.

June, 1936
three was homeless. Property damage ran into millions. Five thousand telephones were out of order for a period of weeks. During the flood crisis two amateur stations were on continuously—W8HD-WH1F, operated by C. S. Hoffman, Jr., and W8HWT, Louis M. Kline—and N8DOB, A. B. Creighton, was on for two days handling U.S.N.R. traffic between NDE, Norfolk, and Cincinnati. W8HD, of course, worked into the Army net, scheduling W2ZG and W3CXL, as well as W8KWA and state A.A.R.S. stations, half-hourly. The Red Cross dispatched news of the disaster to Washington through this station and requested boats; in response, a fleet of a dozen Coast Guard boats arrived from Chicago. W8HWT was fortunate in having a telephone circuit, useful both in originating and delivering traffic. Through W8EG he arranged a two-way program between broadcast stations WWVA and WMMM, which stimulated public interest in Red Cross donations so that truck load after truck load of food, medical supplies, milk, etc., poured into Wheeling, all checked and OK'ed back through W8HWT. Both W8HWT and W8HD were on for nearly 100 hours during the flood crisis when no other communications were available, and more than 250 messages were handled.

Below Wheeling at Shadyside, Ohio, Fred Baker, W8JDJ, was the key point in a 160-meter 'phone net which included W8OIG, W8FN, W8JW, W8OIL and others. As the flood crisis moved down the river this net moved its activities with it. Information concerning conditions was secured for WWVA and a system of broadcast delivery of messages devised. In the midst of this activity there came a request for an amateur station to be sent to Powhatan, Ohio, a small town then completely isolated. Harold S. Davis, W8EOY, with great difficulty carried his 40-meter rig to the region and tied in with the 160-meter net, handling traffic for the Red Cross, police, etc. Phil L. Reilly, W8TOY, and C. R. Glaser, W8DGO, served as relief operators at W8JDJ. About 125 official messages were logged over a period of 100 hours with many more private messages not recorded.

Down the river the flood waters spread out, and conditions were less severe. The community of Paden City, West Virginia, was isolated for a time, however, and Virgil Henthorn, W8JWL, was the sole means of communication. Down farther still, at Huntington, Edwin L. Murrill, W8OK-WLHF, was active with emergency traffic. All up and down the river, of course, dozens of amateurs cooperated in dispatching the traffic from the more seriously-devastated areas.

RE MARCH FLOOD ACCOUNT

A large quantity of material concerning amateur work during the March flood emergency has come in subsequent to the completion of the account appearing in the May issue of QST, some repetitious, some new. The gist of the new reports has been abstracted in the following paragraphs.

Pennsylvania: A corrected list of the operators at W8NKKI, Pittsburgh, shows Alex Speyer, W8DML; Phil Morrison, W8FIS; Bob Long, W8JFM; Tommy Patterson, W5CEN, and Walt Coss, W8NEJ. Alexander H. Lindsay, W8CAX, L. G. Fabian, W8GJM, both of Pittsburgh, and a mobile station relayed traffic from the East Liberty Armory to Sharpsburg on 56 mc. for the National Guard; W8CAX was also on 3500 kc. J. H. Zigelinski, W8OLM, Natrona, called QRR on 160-meter 'phone, his house flooded and neighbors endangered; W8IRY answered, sent boats to the rescue. Wm. A. Shafer, W8NRL, West View, 160-meter 'phone, originated some 200 messages with his mother handling the land line.

F. J. O’Brien, W8DIG, Sayre, although himself forced to use portable equipment and three different power sources, handled traffic on conditions in the Susquehanna Valley, press for UP from Williamsport, railroad dispatches where wires were down, and maintained an A.A.R.S. watch on the Williamsport and Wilkes-Barre areas. C. C. Kahn, W8BF, although in flooded Towanda, had little traffic, so, although keeping constant watch for two days, he stayed off the air to reduce QRM; some other stations should have followed his example.

At Emporium, Pa., R. N. Palmer, W8OYK, kept the city in contact with the outside world for a period of four days. W. P. Mueller, W8OYQ, took over a part of the Emporium traffic for two days. A network including W3QPB, W3QEP, W3CB, W2CTW, W2BLU and W3NF handled ice reports and warnings along the Delaware River between Port Jervis, N. Y., and Easton, Pa.

(Continued on page 74)
To all members of the American Radio Relay League residing in the Atlantic and New England Divisions:

You are hereby notified that, in accordance with the constitution, an election is about to be held in each of the above-mentioned divisions to elect a member of the A.R.R.L. Board of Directors, the recent directors thereof having been elected president and vice-president, respectively, of the League and consequently resigning their offices as division directors, as required by By-Law 22. In the case of the Atlantic Division the election is to choose a director for the remainder of the 1936-1937 term. In the case of the New England Division, the election is to choose a director for the remainder of the 1935-1936 term. Your attention is invited to Sec. 1 of Article IV of the constitution, providing for the government of A.R.R.L. by the Board of Directors; Sec. 2 of Article IV, defining their eligibility; By-Laws 11 to 22, providing for the nomination and election of division directors. Copy of the constitution and by-laws will be mailed any member upon request.

Voting will take place between July 6, 1936, and August 3, 1936, on ballots which will be mailed from the headquarters office in the first week of July.

Nomination is by petition. Nominating petitions are hereby solicited. Ten or more A.R.R.L. members residing in either of the above-named divisions have the right to nominate any member thereof as a candidate for director therefrom. The following form is suggested:

(Place and date)

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

Gentlemen:

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

(Signatures and addresses)

The signers must be League members in good standing. The nominee must be a League member in good standing and must be without commercial radio connections; he may not be commercially engaged in the manufacture, selling or renting of radio apparatus or literature. His complete name and address should be given. All such petitions must be filed at the headquarters office of the League in West Hartford, Conn., by noon of the 6th day of July, 1936. There is no limit to the number of petitions that may be filed, but no member may append his signature to more than one such petition. To be valid, each petition must have the signatures of at least ten members in good standing.

These elections provide the constitutional opportunity for members to put the direction of their association in the hands of representatives of their own choosing. Members are urged to take the initiative and file nominating petitions immediately.

For the Board of Directors:

K. B. Warner,
Secretary.

May 11, 1936.

The Board

Eugene C. Woodruff, Ph.D., WSCMP, senior director of the A.R.R.L., was elected president of the League, and George W. Bailey, W1KH, was elected vice-president, at the annual meeting of the Board of Directors held in Hartford on May 8th and 9th. In an unexpected move the Board voted to request the F.C.C. to increase the 75-meter 'phone assignment to 3850-4000 kc. but declined to recommend any change in 14-mc. 'phone. Cairo plans were studied, arrangements made for the representation of amateur radio at the June hearings of the F.C.C., personnel chosen for the G.C.I.R. meeting. The Investigating Committee’s report was examined, ordered printed for members, and the authority of the Executive Committee revised. A committee was appointed to study the desirability of moving headquarters. Funds were authorized for a new headquarters station, as a memorial to Founder Maxim, at a location yet to be selected, and memorials were adopted on the massing of the late Messrs. Maxim and Stewart. The publication of a history of amateur radio was authorized. The F.C.C. was requested to increase the code speed requirement in amateur examinations to 12½ words a minute.

These were the highlights in a 19-hour meeting of the Board at Hartford, at which every division of the League was represented. In the few minutes that we have to write this report, while the presses wait so that it may reach you in June QST, there is not time to write an exhaustive account of the meeting. The minutes of the meet-
ing, which are appended, will give the full details. Nor shall we, in this limited time, endeavor to make any fuller presentation this month of our new officers. Indeed, they do not need it, for they are probably the two best-known directors. Dr. Woodruff, for many years the representative of the Atlantic Division, has visited every section of the nation. He is the chairman of the Cairo Committee, Mr. Bailey, for some years the New England Division's Director, was the chairman of the Investigating Committee. That they are admirably fitted to carry on in the Maxim-Stewart tradition there can be no doubt.

Morning, afternoon and night for two days the Board met, recessing only to have its meals in an adjoining room. It seems to us that, while secretaries were out lead-pencils points at an amazing rate, every problem of the League that any director could think of was taken up and dissected, new orders issued.

The Board assembled without a chairman, both Mr. Maxim and Mr. Stewart having passed on late in the winter. Although the election of new officers did not occur until the end of the meeting, Dr. Woodruff was immediately put in the Chair by unanimous acclamation and presided throughout the meeting. The Board received reports from its officers and committees, examined the work of the Executive Committee and its own informal actions in the past year, then heard detailed reports from every director present, and thus perfect the background against which it made its subsequent examination of a large number of League matters.

OPERATING MATTERS

The old familiar question of 'phone frequencies was again very much in the front rank at this year's meeting. Lengthy consideration was given the question of 14-mc. 'phone and five different motions were before the Board on this subject, four of them having for their purpose a widening of the 'phone allocation. Perhaps largely because no method was visible for securing uniformity in 'phone assignments with Canada, none of these motions passed. However, in a move that to us seemed to be as much a surprise to the victors as to the opponents, the Board voted to request the Commission to give 75-meter 'phone another 50 kc.: 3850–4000.

There was the general feeling that the code speed in examinations is too low; 15 words per minute was discussed but the decision was to ask F.C.C. to raise the ante to 12½. Plans were made to improve still further the communication service rendered by amateurs in emergencies, by making available necessary expense money for S.C.M.'s and by arranging for a special small manual on amateur emergency communication. F.C.C. was implored to do something about the bootlegging of calls and to be more energetic in their monitoring of bad notes and overmodulation. Opposition was expressed to participation by amateurs in contests on the air staged as advertising stunts by commercial companies. The Board did not regard the Griffin Plan as feasible and abandoned it, and did not regard favorably a somewhat similar international plan being discussed in I.A.R.U. circles. They similarly thought it inadvisable to attempt to force North & South American uniformity in 'phone assignments by international treaties. A proposal to request the registering of transmitting apparatus was turned down, as were suggestions to extend the R-S-T System to 'phone and to get up a special code of abbreviations for amateurs beginning with the letter X.

INVESTIGATING COMMITTEE

The report of the Investigating Committee was examined. Pursuant thereto, amendments were made to the constitution regarding the authority of the Executive Committee and the calling of special meetings, and to the by-laws dealing with ballots for director. The report was ordered published and made available to members upon request. The Board rejected a proposal to set up half a dozen permanent committees to have administrative supervision of all the activities of the League. The salaries of the secretary and treasurer were reviewed and reaffirmed.

ADMINISTRATIVE MATTERS

A committee with Professor Caveness as its chairman and Directors Adams and Reid as its other members was appointed to examine the advantages and disadvantages of moving League headquarters to a more nearly central location, to report to the Board in four months. The erection of the new headquarters station awaits that decision. The publication of Clinton B. deSoto's history of amateur radio was authorized, and it will be made available as soon as possible. Funds were appropriated for the administrative expenses of directors within their divisions. By-Law 48, regarding conventions, was amended to accord with an earlier resolution of the Board. Field contact plans were discussed. Mr. Segal was continued as the League's General Counsel. Amongst the proposals examined by the Board but rejected were the contemplated splitting of the Central Division into two divisions, establishment of life membership, issuance of membership cards, reorganization of the League in terms of local chapters, and the pairing of candidates for director and alternate in the fashion of political slates.

INTERNATIONAL MATTERS

Naturally the making of plans for the international representation and protection of the amateur occupied a considerable portion of the Board's time. As factual background for this
study it had a report from its Cairo Committee and heard an informative address by Mr. Gerald C. Gross, chief of the international division of the F.C.C. Certain data and forms were ordered prepared for future use. The League's offer to send its representatives to the meeting of the C.G.I.R. at Bucharest in the name of and on behalf of the I.A.R.U. having been accepted by the latter, on an expense-sharing basis, the Board selected as its representatives John C. Stadler, Jr., VE2AP, and James J. Lamb, the technical editor of QST, also appropriating funds for the job. A proposal from the director of the Pacific Division to apply for the right to use commercial frequencies during the hours they are not in commercial use was thought unfeasible.

This journal has already reported that the F.C.C. is to have public hearings in the month of June on frequency allocations. These hearings are regarded as the keystone of the whole amateur case at Cairo. The procedure requires that one have counsel to present witnesses to adduce testimony, introduce exhibits, and so on. It will be a big job, doubtless requiring the services of many members of the headquarters staff, perhaps those of the Cairo Committee, and certainly a thorough study of the data accumulated by the F.C.C. is to have public hearings in the month of June on frequency allocations. These hearings are regarded as the keystone of the whole amateur case at Cairo. The procedure requires that one have counsel to present witnesses to adduce testimony, introduce exhibits, and so on. It will be a big job, doubtless requiring the services of many members of the headquarters staff, perhaps those of the Cairo Committee, and certainly a thorough study of the data accumulated by the latter. After a considerable discussion of the personnel best qualified for this undertaking, the Board engaged General Counsel Segal to be our counsel for the purpose and put the preparation of our case in his hands and those of Secretary Warner, with the right to call into service anyone else they need. The Board also discussed at very considerable length the choice of representatives to send to the Cairo meeting in 1938 and, although no definite appointments for this purpose were made, it was the general feeling that this difficult task should be entrusted to Secretary Warner, who was so recommended by all the members of the Cairo Committee.

A large number of smaller items were acted upon by the Board and a comparable additional number of subjects discussed even when no actions were taken to report in the minutes. If one can imagine fifteen good amateurs and true, each having prepared himself for this meeting over the past several months and then assembling for several days and nights with his similars, it will be apparent that there was not much in our affairs that didn't have a thorough going over. The Board appropriated $16,700.00 for different purposes and it must be said that much constructive work is under way. With its new president and vice-president, with many knotty problems out of the way and with new instructions issued for the new questions of the day, the members of the Board dispersed to their respective homes and the headquarters staff commences the job of putting into effect the numerous instructions issued.

This account must end right here if it is to get into June QST. Details are to be found in the minutes themselves:

Minutes of 1936 Annual Meeting of Board of Directors, American Radio Relay League

May 8 and 9, 1936

In compliance with the constitution and responsive to due notice, the Board of Directors of the American Radio Relay League, Inc., convened in regular annual meeting at The Hartford Club, Hartford, Conn., on May 8, 1936. The meeting was called to order by Dr. Eugene C. Woodruff, senior director, at 10:07 a.m., d.s.t. The roll was called, showing the following directors present:

- Bennett H. Adams, Jr., Southeastern Division
- Russell J. Andrews, Rocky Mountain Division
- E. Ray Arledge, Delta Division
- George W. Bailey, New England Division
- H. L. Caveness, Roanoke Division
- Ralph J. Gibbons, Northwestern Division
- Wayland M. Groves, West Gulf Division
- Kenneth T. Hill, Hudson Division
- E. L. McCargar, Alternate, Pacific Division
- Floyd E. Norwine, Midwest Division
- Alex Reid, Canadian General Manager
- Edward A. Roberta, Central Division
- Eugene C. Woodruff, Atlantic Division

Absent: Charles E. Blalack, Southwestern Division, and Carl L. Jabs, Dakota Division. Mr. Woodruff stated that S. G. Culver, Director, Pacific Division, was unable to attend the meeting and that his alternate, E. L. McCargar, was present in his stead under the authorization provided in the by-laws, with full powers of the director of the Pacific Division. There were also present Secretary R. B. Warner, Treasurer A. A. Hebert, Communications Manager F. E. Handy, Assistant Secretary A. L. Budlong and Technical Editor J. J. Lamb. At the invitation of the Board there were also in attendance, as non-participating observers, Alternate Directors S. J. Bayne, Southeastern Division, and Roy C. Corderman, Atlantic Division.

On motion of Mr. Roberts, by unanimous acclamation Mr. Woodruff was elected Chairman. By unanimous consent the meeting recessed a few minutes to pose for a photograph, during which recess Mr. Blalack joined the meeting, at 10:13 a.m., and Mr. Jabs at 10:15 a.m.

Without dissenting voice the minutes of the previous meeting were approved in the form in which they were issued by the Secretary. Messrs. Norwine and McCargar requested to be recorded as not voting because they had not been present at the previous meeting.

On motion of Mr. Hill, unanimously VOTED that the annual reports of the officials to the Board of Directors are accepted and the same placed on file.

On motion of Mr. Caveness, after discussion, VOTED that the election of president and vice-president is placed as the last item on the agenda for this meeting.

On motion of Mr. Hill, after discussion, VOTED that all acts performed and all things done by the Executive Committee since the last meeting of the Board, and by it reported to the Board, are ratified and confirmed by the Board as the actions of the Board.

On motion of Mr. Gibbons, unanimously VOTED that the Board, having considered its mail vote with reference to offering to send its representatives on behalf of and in the name of the International Amateur Radio Union, to the Fourth Meeting of the C.G.I.R. at Bucharest and underwriting the expense thereof, provided other member-societies of the I.A.R.U. will pay their proportionate share of the expenses, and having examined the same, now ratifies the vote taken and decides to take this action as of June 24, 1935.

On motion of Mr. Andrews, unanimously VOTED that...
the Board, having considered its mail vote with reference to calling upon the Chairman of the Investigating Committee to supply each director with a report of that committee's activities at its annual meeting, and having examined the same, now ratifies the vote taken and decides to take this action as of December 30, 1935.

On motion of Mr. Groves, unanimously VOTED that the Board, having considered its mail vote with reference to inviting alternate directors to attend the 1936 meeting of the Board of Directors as non-participating observers at their own expense, and having examined the same, now ratifies the vote taken and decides to take this action as of April 27, 1936.

Investigating Committee Report Available

The Board of Directors has decided to make available to the membership the report of its Investigating Committee. Any member wishing a copy of this report may obtain it by writing to the Secretary.

On motion of Mr. Gibbons, unanimously VOTED that the Board, having considered its mail vote with reference to inviting the Chief of the International Division of the Federal Communications Commission to address the Board briefly on international matters at its annual meeting, and having examined the same, now ratifies the vote taken and decides to take this action as of May 6, 1936. It was thereupon ORDERED that the representative of the Federal Communications Commission is to be heard upon the reconvening of the meeting on the morrow, May 9th.

On motion of Mr. Caveness, unanimously VOTED that the Board of Directors of the Investigating Committee of the A.R.R.L. Board and of the Cairo Committee of the A.R.R.L. Board are accepted and the same placed on file.

Mr. Reid presented his report as Canadian General Manager. In turn, every Division Director rendered a report on conditions in his division, Mr. McCargar presenting the report of the International Division of the League. The reports of the committee and of the Cairo Committee of the Investigating Committee for certain modifications in the constitution of the League. After discussion, moved, by Mr. Blalack, that Section 10 of Article IV of the constitution be amended to read as follows:

"10. There shall be an Executive Committee consisting of the officers of the League which shall meet from time to time to conduct the affairs of the League within its jurisdiction. The Committee shall keep a record of its meetings and actions, and shall report to the Board of Directors for its approval."

After further discussion, on motion of Mr. Gibbons, unanimously VOTED to amend the motion by substituting the following suggested text:

"10. There shall be an Executive Committee consisting of the officers of the League. This committee shall act in the place and stead of the Board of Directors during the intervals between meetings of the Board. Any action taken under this section shall be promptly reported to the Board and shall be subject to the approval of the Board at its next subsequent meeting."

The question being on the adoption of the amended motion, the ayes and nays were ordered and the said question was decided in the affirmative: Whole number of votes cast, 15. Necessary for adoption, 10. Yeas, 15; Nays, 0. Every director voted in the affirmative. So Sec. 10 of Article IV was amended.

After further examination of the proposals of the committee, moved, by Mr. Arledge, Section 9 of Article IV of the constitution be amended to read:

"9. Special meetings of the Board of Directors may be called by the President at least every three months, by written notice stating the specific object or objects thereof, mailed to each director at least three weeks prior to the date of said meeting."

On motion of Mr. McCargar it was unanimously VOTED to amend the motion by substituting the following text:

"9. Special meetings of the Board of Directors may be called by the President or by written notice stating the specific object or objects thereof, mailed to each director at least three weeks prior to the date of said meeting."

The question being on the adoption of the amended motion, the ayes and nays were ordered and the said question was decided in the affirmative: Whole number of votes cast, 15. Necessary for adoption, 10. Yeas, 15; Nays, 0. Every director voted in the affirmative. So Sec. 9 of Article IV was amended.

On the matter of new business introduced by directors, the Chair ruled that such matters shall come up for consideration after the consideration of the items listed in the previously-agendaed program of the meeting.

On the question of requests to the Federal Communications Commission to amend the amateur regulations concerning the frequencies in the 14-mc. band to be open to phone operation:

Moved, by Mr. Groves, that the Board instruct the Secretary to request the F.C.C. to expand the 14,150-14,250 kc. Class-A "phone assignment to read 14,100-14,300 kc. Mr. Groves requested a record vote. After discussion, the ayes and nays being ordered, the said question was decided in the affirmative: Yeas, 5; Nays, 9. Those who voted in the affirmative are Messrs. Adams, Gibbons, Groves, Hill and Norwine; those who voted opposed are Messrs. Andrews, Arledge, Bailey, Blalack, Caveness, Jabs, McCargar, Roberts and Woodruff; Mr. Reid did not vote. So the motion was rejected.

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Moved, by Mr. Andrews, that the Board instruct the Secretary to request the F.C.C. to expand the 14,150-14,250 kc. Class-A "phone assignment to read 14,100-14,300 kc. Mr. Groves requested a record vote. After discussion, the ayes and nays being ordered, the said question was decided in the affirmative: Yeas, 5; Nays, 9. Those who voted in the affirmative are Messrs. Adams, Gibbons, Groves, Hill and Norwine; those who voted opposed are Messrs. Andrews, Arledge, Bailey, Blalack, Caveness, Jabs, McCargar, Roberts and Woodruff; Mr. Reid did not vote. So the motion was rejected.
Class-A ‘phone assignment to read 14,300–14,400 kc. The yeas and nays again being ordered at the request of Mr. Andrews, the said question was decided in the negative: Yeas, 6; nays, 8. Those who voted in the affirmative are Messrs. Andrews, Gilborne, Groves, Hill, Jabs and Norwine; those who voted opposed are Messrs. Adams, Arledge, Bailey, Blalack, Caveness, McCarra, Roberts and Woodruff; abstentions, Mr. Reid. So the motion was rejected.

Moved, by Mr. Groves, that the Board instruct the Secretary to request the F.C.C. to request the 14,150–14,250 kc. Class-A ‘phone assignment to read 14,000–14,200 kc., effective January 1, 1937. But, after further discussion, the motion was rejected.

Moved, by Mr. Jabs, that the Board instruct the Secretary to request the F.C.C. to request the 100-kc. Class-A ‘phone assignment in the 14-me. band at 14,300–14,400 kc. But, after further discussion, the motion was rejected.

On the question of certain proposals in the Communications Manager’s annual report, moved by Mr. Groves, that the Secretary be directed to request the Federal Communications Commission to request the F.C.C. to expand the 14,150–14,250 kc. Class-A ‘phone assignment to read 14,300–14,400 kc., the said motion was ruled out of order by the Chair, in view of the previous decision to postpone the consideration of new proposals until after the consideration of the previously-distributed agenda.

On the question of revising the present Griffin Plan to include in its scope only the 7-megacycle band and permit the publication of this revised plan in QST at an early date, but, after further discussion, the said motion was rejected.

On the question of a better-planned use of the amateur bands, after discussion, moved, by Mr. Hill, that the Board give further consideration to revising the present Griffin Plan to include in its scope only the 7-megacycle band and permit the publication of this revised plan in QST at an early date. But, after further discussion, the said motion was rejected.

On the question of whether the League should present such matters through the Secretary, or whether the members of the League should present such matters through the Secretary, the motion was rejected.

On the question of certain proposals in the Communications Manager’s annual report, moved by Mr. Groves, that the Secretary be directed to request the Federal Communications Commission to raise the code speed in amateur license examinations from ten words per minute to twelve and one-half words per minute. Moved, by Mr. Jabs, that the figure be amended to fifteen words per minute; but the said amendment was rejected. The question being on the adoption of the said resolution, the said resolution was declared in the affirmative, So the Secretary was instructed to request the F.C.C. to raise the code speed to twelve and one-half words per minute.

On the question of the desirability of publishing a proposed history of amateur radio, after discussion, on motion of Mr. Groves, unanimously VOTED that the Secretary is authorized to publish “The Story of Amateur Radio,” by Clinton B. DeSoto, as outlined in Secretary’s Letter No. 297 to Directors.

On the question of the possible desirability of seeking uniformity throughout the Americas in ‘phone and c.w. allocations by means of regional treaties, after discussion, on motion of Mr. Norwine, unanimously VOTED that the question is laid on the table.

On the question of making a provision for life membership in the League, after discussion, on motion of Mr. Norwine, unanimously VOTED that this question is laid on the table.

On the Communications Manager’s proposals for increasing the effectiveness of amateur participation in communication emergencies: After discussion, on motion of Mr. Roberts, unanimously VOTED that the Communications Manager is authorized to permit the incurring of necessary expenses by Section Communications Managers during emergencies, up to a maximum of ten dollars ($10.00) per day each, for the purpose of establishing and organizing emergency communication between amateurs. On motion of Mr. Arledge, unanimously VOTED that the Communications Manager is authorized to publish a small instruction manual on amateur emergency communication, and that there is hereby appropriated from the surplus of the League, as of this date, the sum of two hundred dollars ($200.00) for defraying the expenses thereof, any unexpended remainder of said sum to be restored to surplus.

The Chair stated that there was present in the city a member possessing a petition which he desired to present before the Board in person; the Chair requested the Board’s decision in the matter. After discussion, the said motion was rejected.

On the question of whether the Board instruct the Secretary to request the Federal Communications Commission to restore to surplus the sum of two hundred dollars ($200.00) for defraying the expenses of the League, after discussion, on motion of Mr. Norwine, unanimously VOTED that the question is laid on the table.

On the question of amending By-Law 48 to eliminate an inconsistency with the resolution adopted the previous year, after extended discussion, moved, by Mr. Roberts, that By-Law 48 be amended to read as follows:

“48. Reform such a convention that the parties desiring to conduct the same shall obtain the approval of the Director of the division in which the convention is to be held, by an application setting forth the place

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and date of the proposed convention, the territory to be embraced, the particular purpose to be served thereby, the clubs, associations or groups who propose to sponsor it, and the names and addresses of the officers chosen to conduct it. When the Director is satisfied that the approval of such convention will be in the best interests of the League, he shall submit the application to the Executive Committee for its formal approval. Upon such approval, the headers shall notify the chairman or secretary of the convention group. The management, program and financial plans of every such convention shall be subject to the approval of the Director of the division in which the convention is to be held.

Moved, by Mr. Blalack, that the proposed text be amended by adding at the end thereof the words "and, at the conclusion of each such convention, there shall be submitted to the Director a record of the financial experience of the convention." But the said motion was rejected. The question then being on the adoption of the original motion, the yeas and nays were ordered and the said question was decided in the affirmative: Number of whole votes cast, 15. Necessary for adoption, 10. Yeas, 15; nays, 0. Those who voted in the affirmative are Messrs. Adams, Arledge, Bailey, Blalack, Caveness, Groves, Hill, Jabs, McCargar, Norwine, Reid, Roberts and Woodruff. Those who voted against was amended to read: "(1) A.R.R.L. message form of call sign, (2) the adoption of an A.R.R.L. amateur abbreviation code, on motion of Mr. Blalack, unanimously VOTED that the Q code shall be retained at least as the foundation of any abbreviation code used in the League; (3) the motion of Mr. Hill, unanimously VOTED that there shall be no attempt made to extend the R-S-T System to phone operation.

On motion of Mr. Norwine, the Board, by unanimous vote, extended a cordial expression of its thanks and appreciation to the QSL Managers and to the Standard Frequency Stations for their splendid services to amateur radio.

On the question of the possible desirability of purchasing the present headquarters premises, on motion of Mr. Groves, unanimously VOTED that the question is laid on the table.

At the request of the Board, the Communications Manager outlined possible plans for a new headquarters station to be erected as a memorial to the founder of the League, Mr. Hiram Percy Maxim. During this discussion Director Andrews and General Counsel Segal entered the meeting, at 11:15 a.m. After discussion, moved, by Mr. Roberts, that the question be laid on the table; but the motion of Mr. Hill, unanimously VOTED that there be no attempt made to extend the R-S-T System to phone operation.

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pointing the technical editor of QST an officer of the League was examined but that the same was thought inadvisable, the members of the Cairo Committee: Upon motion of Mr. Black, unanimously VOTED that a collection of emergency data shall be made, and members may use it for their educational work in correspondence with members of Congress, merely filling in a few blanks, this proposal also embracing the preceding one that a collection of emergency data be made.

On motion of Mr. Jabs, after discussion, unanimously VOTED that the representatives to be sent by the League to the Fourth Meeting of the C.C.L.R. at Bucharest on behalf of and in the name of the International Amateur Radio Union shall be John C. Stidler, Jr., of Montreal, and Technical Editor James J. Lamb.

Continuing the discussion of personnel for the various missions of the League, there occurred a lengthy discussion in which it became evident that it was the sentiment of the Board that General Counsel Segal was the best-qualified person to act as counsel for the League at the June hearings and that Secretary Warner should be entrusted with the task of representing the League at the Cairo conference. After lengthy debate, the motion of Dr. Segal was unanimously VOTED that the matter of the League's representation at the June hearings of the F.C.C. shall be left in the hands of Messrs. Warner and Segal and that they shall be permitted to call in as witnesses any persons there necessary.

Mr. Roberts discussed the desirability of splitting the Central Division. After discussion, moved, by Mr. Roberts, that the division be divided into two divisions to be known as the Central Division and the Great Lakes Division, the Central Division to include the states of Indiana, Kentucky, and Ohio, the Great Lakes Division to include the states of Michigan, Illinois and Wisconsin. But, after further discussion, the said motion was rejected.

The Board recessed for dinner at 6:43 p.m., reconvening at 8:13 p.m. with all personnel hereinbefore mentioned in attendance.

On motion of Mr. Bailey, unanimously VOTED that there is hereby allocated to each division director of the League and to the Canadian General Manager the sum of two hundred dollars ($200.00) for legitimate A.R.R.L. expenses in his area; and that there is hereby appropriated from the surplus of the League, as of this date, the sum of three thousand dollars ($3,000.00) for the purpose of defraying this expense, any unexpended remainder of this fund on the date of the next annual Board meeting to be restored to surplus.

Moved, by Mr. Norwine, that the publication of the booklet, "How to Become a Radio Amateur," be discontinued. But, after discussion, with unanimous consent Mr. Norwine withdrew the motion.

Moved, by Mr. Black, that the League issue small membership cards as well as membership certificates. But there was no second, so the motion was lost.

Moved, by Mr. McCargar, that the American Radio Relay League adopt as fundamental, that the operation of transmitters by private citizens, under reasonable regulation, is a constitutional right and further that the General Counsel be requested to draw up a resolution embodying this idea for action by this Board, and that copies of the resolution be forwarded to the Federal Communications Commission. But there was no second, so the motion was lost.

Moved, by Mr. McCargar, that membership in the American Radio Relay League be made available to all licensed amateur radio operators, regardless of whether they subscribe to QST or not, and that the cost of such membership be set at some amount not to exceed the cost of administration. But there was no second, so the motion was lost.

Moved, by Mr. McCargar, that the membership of the League be organized into local chapters and that a commit-
lee be appointed from among the present Board to work out details of such organization. But, after discussion, the said motion was defeated.

Moved, by Mr. McCargar, that the A.R.R.L. go on record as favoring a change in the method of allocating frequencies by international agreement, that existing frequency allotments be made permanent as to nations, and that each nation then have the right to assign frequencies to any type of station, consideration being given only to the matter of interference. But there was no second, so the motion was lost.

Moved, by Mr. McCargar, that the A.R.R.L. petition the Federal Communications Commission to permit use by amateurs of frequencies assigned to commercial interests defeated.

Moved and seconded, that the names of candidates for the声道 and alternate director be paired, both in nominations and elections. But, after discussion, the said motion was defeated.

On motion of Mr. McCargar, unanimously VOTED that the Secretary is instructed to send to the alternate directors all information that is normally sent to directors. On motion of Mr. Jabs, after discussion, unanimously VOTED that the Secretary is instructed to send copies of Secretary's Letters direct to the assistant directors when so requested by the director, provided that this shall not apply to Secretary's Letters marked as confidential.

Moved, by Mr. McCargar, that the Board of Directors suggest to the Federal Communications Commission that all assembled transmitters sold to the public be registered in the name of the purchaser, this information to be kept on file by the Commission. But, after discussion, the said motion was rejected.

On motion of Mr. Adams, after discussion, VOTED that the field contact work of the headquarters staff shall be divided equally between the communications, technical and secretarial groups. Moved, by Mr. Adams, that field contact schedules be set up so as to insure having a headquarters man in attendance at every divisional convention. But, after discussion, with unanimous consent Mr. Adams withdrew the motion.

Moved, by Mr. Arledge, that the Board take the proper steps necessary to prevent the recurrence of certain commercial radio concerns from using the already overcrowded amateur bands to further their private advertising schemes. But, after discussion, with unanimous consent Mr. Arledge withdrew the motion. On further motion of Mr. Arledge, unanimously VOTED that it is the sense of this Board that it opposes amateur participation on the air in contests sponsored by commercial companies.

On the question of retaining the services of Mr. Segal, on motion of Mr. Roberts, after discussion, unanimously VOTED that Paul M. Segal is retained as general counsel of the League at a retainer of $1,000 per year.

Moved, by Mr. Hill, that a copy of the officers' reports be sent to each alternate director free of charge, following each meeting of the Board. But, discussion showing that Mr. McCargar's previous motion had already so provided, with unanimous consent Mr. Hill withdrew the motion.

On motion of Mr. Gibbons, ORDERED that the Board proceed now to the election of president and vice-president. On motion of Mr. Reid, two-thirds concurring, Special Rule A was suspended. By unanimous consent Mr. Groves read a letter from former director Frank M. Corlett volunteering his services to the League as president or vice-president.

Nominations for president being in order, Mr. Hill nominated Mr. Bailey; Mr. Blalack nominated Mr. Woodruff; Mr. Gibbons nominated Dr. Burton T. Simpson of Buffalo; Mr. Newline nominated Mr. Roberts, filing a petition by which he had been so requested. On motion of Mr. Blalack, the nominations were closed. The Chair appointed Alternate Directors Bayne and Corderman as tellers.

The vote having been taken, the result of the ballot was announced by the tellers as follows:

Whole number of votes cast, 15.
Necessary for election, 8.
For Mr. Bailey, 7.
For Mr. Woodruff, 8.
For Mr. Bailey, 6.
For Mr. Simpson, 1.
For Mr. Frank M. Corlett, 1.
Mr. Woodruff, having received a majority of the votes cast, was therefore declared elected president of the League for a term of two years, which announcement was greeted with applause.

Nominations for vice-president being in order, Mr. Blalack nominated Mr. Bailey; Mr. Groves nominated Mr. Cavernees; Mr. Reid nominated Mr. Roberts; Mr. Cavernees nominated Mr. Corderman; Mr. Gibbons nominated Mr. Herbert Hoover, jr. Mr. Cavernees withdrew his name. On motion of Mr. Jabs, the nominations were closed. Mr. Corderman being a candidate, the Chair relieved him as a teller, appointing Mr. Segal in his stead.

The vote having been taken, the result of the first ballot was announced by the tellers as follows:

Whole number of votes cast, 15.
Necessary for election, 6.
For Mr. Bailey, 8.
For Mr. Cavernees, 4.
For Mr. Roberts, 1.
For S. G. Culver, 1.

No candidate having received a majority, a second ballot was ordered, the result of which was announced as follows:

Whole number of votes cast, 15.
Necessary for election, 7.
For Mr. Bailey, 10.
For Mr. Corderman, 4.
For Mr. Cavernees, 1.

Mr. Bailey, having received a majority of the votes cast, was therefore declared elected vice-president of the League for a term of two years, which announcement was greeted with applause.

On motion of Mr. Cavernees, the Board adjourned, sine die, at 10:25 p.m.

(In the course of its deliberations the Board also discussed, without formal action, the question of a permanent Washington representative, the League's relations with official Washington, the amateur position with respect to other services, the status of international treaties, preparation of technical studies for the C.C.I.R., the desirable type of apparatus for WIMR, "Operating News" in QST, QST advertising policy, Cairo surveys. Total time in session, 18 hours, 48 minutes. Total appropriations, $16,700.)

Secretary
The fact that automatic gain control is now standard on practically all the newer models of amateur-band superhet receivers, probably signifies nothing more or less than that amateurs who buy these receivers want a.v.c. for 'phone reception. If we assume that this is the case, then undoubtedly there are many owners of older non-a.v.c. receivers who would like to have it too. The advantages are obvious enough—the r.f. gain is always high for weak-signal reception, while in tuning across a band the loud fellows are kept from tearing the speaker loose from its moorings. Automatic compensation for fading also is something worth having.

Automatic volume control, as probably everyone knows by this time, is simply a method by which the rectified and filtered carrier voltage is utilized to reduce the gain of r.f. stages preceding the rectifier, usually by application of this d.c. voltage to the control grids of variable-µ tubes. An ideal a.v.c. system would have little or no effect on the amplification of signals below the desired level, but would prevent stronger signals from rising above that level. The relatively simple system described here does not give completely ideal results, but is certainly satisfactory for practical operation. It does a good job in preventing blasting, and will hold a wide range of carrier strengths at a level constant enough so that there is comparatively little observed difference in the strength of practically all except the weaker signals.

Automatic volume control is most easily applied to sets in which the second detector can be replaced by another tube without introducing complications in the operation of the receiver. For example, receivers such as the Comet Pro and FB7A or FBX-A are relatively easy to change over, since the second detector tube has only one function to perform. In some sets, a combination tube such as the 2A7, 6A7 or 6F7 is used both as the second detector and beat oscillator, in which case the tube cannot readily be replaced without installing a separate beat oscillator tube. The chassis layout may not permit this. The receiver should have a fair amount of r.f. gain—preferably two i.f. stages, for instance—for the control to be effective. If there is a pre-selector as well so much the better, since this tube also may be controlled with a resulting increase in overall effectiveness.

The typical circuit changes necessary are shown in Fig. 1. The existing second detector tube should be replaced by a 2A6 or 75, depending upon whether the receiver uses 2.5- or 6.3-volt tubes. A new socket will be required if the present one is other than six-prong. Control of the i.f. stages is shown in Fig. 1, with control of the pre-selector stage, if the receiver has one, indicated by the dotted connection. In sets using a 2A7 or similar type as the mixer, the control voltage also may be applied to the input grid, although this is not recommended when the tube is used as a combination oscillator-mixer because varying grid bias is likely to cause a corresponding variation in oscillator frequency. In such case the a.v.c. action tends to throw the receiver out of tune with the desired signal.

The first step in installing the system is to disconnect the grid return leads of the i.f. grid coils. These leads are easily identified because they come out of the i.f. transformer cans through the chassis and connect directly to ground. They

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*Assistant Technical Editor.
should be by-passed to ground by condensers $C_5$ and $C_6$, using connections as short as possible, so that the tuning of the i.f. circuits will not be disturbed. The two transformer returns are connected together through $R_3$, a decoupling resistor, and to the a.v.c. diode plate (the lower one in Fig. 1) through $R_4$. $R_5$ in combination with $C_5$ and $C_6$ sets the time constant of the a.v.c. circuit. Larger values of $R_5$, $C_5$ and $C_4$ will increase the time constant so that the a.v.c. does not operate as rapidly. A large time constant is not desirable for high-frequency work because it prevents the a.v.c. from keeping up with rapid fading. A too-small time constant would tend to "wash out" modulation. The values shown have been found to be satisfactory in operation. $R_7$ is the a.v.c. diode load resistor; its value is not critical so long as it is at least a few megohms. The a.v.c. diode plate gets its carrier voltage from the audio diode plate through the coupling condenser $C_3$, which is connected between the appropriate tube-socket prongs.

In the second-detector circuit, the i.f. transformer secondary return also should be opened. The audio diode load consists of $R_2$ and $R_1$ in series. The load condenser is split into two sections, $C_1$ and $C_2$, to aid in filtering r.f. from the lead which goes through the audio coupling condenser, $C_7$, to $R_6$, the audio volume control, thence to the grid of the triode section of the tube. $C_4$ and $R_4$ comprise a decoupling circuit for keeping r.f. out of the cathode resistor, $R_4$. $C_5$ is the usual high-capacity by-pass across the cathode resistor. The grid end of the i.f. transformer winding should be connected to the audio diode plate. Incidentally, it does not matter which of the two diode plates is selected for audio and which for a.v.c. The reason for separating the two is to permit the audio diode return to be made directly to the cathode and the a.v.c. diode return to ground. This method of connection places negative bias on the a.v.c. diode equal to the d.c. drop through the cathode resistor (a matter of a volt or two) and thus delays the application of a.v.c. voltage to the amplifier grids, since no rectification takes place in the a.v.c. diode circuit until the carrier amplitude is large enough to overcome the bias. Without this delay, the a.v.c. would start working even with a very small signal, which is undesirable because the full amplification of the receiver then cannot be realized on weak signals. In the audio diode circuit this fixed bias must be avoided, hence the return is made directly to the cathode.

The method of coupling the beat oscillator will depend upon the particular receiver used. In the FB7A and FBXA the b.o. is coupled to the grid of the 56 detector; when the 2A6 is installed the coupling lead should simply be shifted to the audio diode socket prong, as indicated by the dotted lines in the diagram. In the Hammarlund Pro, the b.o. is coupled to the plate of the second i.f. tube and hence need not be touched.

The triode section of the 2A6 or 75 is used as an audio amplifier, resistance coupling being used on both input and output circuits. $R_5$ is the audio volume control, $R_6$ the plate load resistor. $C_5$ is a mica by-pass which short-circuits any r.f. which may have slipped by the filter in the diode circuit.

A few words about the changes necessary in individual receivers. In the FB7A and 2A6 it is necessary, of course, to replace the existing 5-prong socket by a 6-prong. The r.f. filter in the 56 plate circuit (on top of the chassis behind the second detector socket) should be removed; the grid lead for the 2A6 can then be fed through one of the chassis holes thus made available. This lead should be shielded. The audio volume control, $R_6$, can be mounted on the side of the cabinet below the chassis and alongside the 2A6 socket. The control then comes out the left side at the lower rear corner when the receiver is operating. If this is considered inconvenient, $R_6$ can be put on the front alongside the "B" switch, in which case shielded leads should be used for connections. The headphone jack arrangement need not be changed except to remake the connection broken with the removal of the plate r.f. filter and to substitute $R_5$ for the existing plate resistor. The various components can be put in wherever convenient, remembering that short leads are desirable in those parts of the circuit carrying r.f. In the FBXA it is necessary to open the grid-circuit ground return, which in the crystal-filter unit is a resistor connected between grid and ground inside the aluminum box. There are two ways to do this. One is to take out the filter unit (it is generally necessary to loosen the back and right side of the receiver cabinet to do this), unsolder the ground connection and connect a wire to the resistor, feeding this ground wire through with the plus B and plate wires. The second, which does not involve removal of the filter unit, is to put a condenser of about 0.001-µfd. capacity in the external grid lead to the tube and connect a new resistor (a megohm or so) from grid to the junction of $C_5$ and $R_5$ (Fig. 1). The a.v.c. on-off switch can be put on the front of the cabinet in any desired position; this circuit carries d.c. only and hence the lead lengths are of no consequence.

In the Comet Pro the detector socket need not be changed, although some of the connections must be rearranged. The plate connections may be left alone except to substitute $R_6$, the 250,000-ohm plate resistor, for the existing 100,000-ohm unit. Even this need not be replaced, although the higher value will give a bit more audio gain. The other connections should be made as shown in Fig. 1. Since the grid lead from the i.f. transformer comes out the top of the can, it will be necessary to run this lead through the chassis to reach the audio diode prong on the tube socket. The simplest way to do this is to unsolder the grid.
High-Frequency Radio Fadeouts Continue*

By J. H. Dellinger **

Since Dr. Dellinger initiated correlated study of the periodic short-time daylight fadeouts of radio signals, which phenomenon has been referred to as the "Dellinger Effect" in previous QST reports, scientific agencies observing solar and terrestrial effects have contributed valuable information extending the correlation of this peculiarity in radio-wave propagation with solar eruptions and terrestrial electrical variations. This correlation was particularly complete in the latest observed instance of the Dellinger Effect on April 8th, as described in this article.—EDITOR

THE last December issue of QST* reported the occurrence on a number of occasions of a sudden and complete fadeout of high-frequency radio signals, simultaneously over the illuminated half of the globe. The evidence indicated that these widespread general fadeouts occurred at intervals of approximately 54 days. In January QST** it was reported further that there was a visible eruption on the sun at the time of each of these fadeouts (insofar as solar observations had been made).

These occurrences have continued, and there is now considerably more knowledge regarding them. A number of persons and organizations have been recording the phenomena and reporting the results to me. The radio amateurs have been particularly helpful.

Sifting the data accumulated, a number of conclusions are indicated. In the first place, it now appears pretty certain that a general fadeout is caused by an eruption on the sun, which sends out radiation (probably ultraviolet) with the velocity of light, producing an immediate intense absorption of radio waves in the earth's iono-

* Publication Approved by the Director of the National Bureau of Standards of the U. S. Department of Commerce.
** National Bureau of Standards, Washington, D. C.
sphere. This occurs throughout the entire half of the earth which is illuminated by the sun. We are thus not concerned in this investigation with fadeouts which occur at night.

In the second place, minor or local fadeouts occasionally happen, which the individual observer cannot distinguish from a widespread general fadeout. This emphasizes the importance of cooperation among observers, as it is only by the comparison of results from a considerable number of places that it can be determined whether a fadeout was a local or a general one.

Confining attention to the general fadeouts, the ones that occur simultaneously over the sun-illuminated hemisphere, these have continued to show the approximate 54-day period, but with some peculiarities. Previous reports in QST dealt with the occurrences of March 20, May 12, July 6, August 30 and October 24, 1935. At the end of the usual period in December, not one but two fadeouts occurred, 6 days apart; and similarly in February there were three of the fadeouts within eight days. The December fadeouts occurred December 17th, at 1615 GT, and December 23rd, at 1740 GT. Visible eruptions occurred on the sun at each of these times.

In February, general fadeouts occurred February 6th at 1520 GT, February 8th at 0130 GT, February 14th at 1515 GT. There was a large amount of visible eruptive activity on the sun during this period, but it is not known whether eruptions occurred at the particular times of the radio fadeouts.

The fadeout of February 14th was an extraordinary occurrence. Many communication companies, amateurs, the Army, Navy, and others in North and South America and Europe, reported that all communication on high frequencies was wiped out instantaneously and completely at about 1515 GT. Reports from Japan and the Dutch East Indies showed definitely that the effect did not occur in the dark hemisphere. So thorough was the cancellation of all radio transmission in the sunlit hemisphere that not even “static” could be heard. It was an amazing experience to many operators to have signals not merely go to a very low value but go utterly “dead.” At the end of about 15 minutes, frequencies greater than about 10,000 kc. began to come in again, the lower frequencies coming in somewhat later, and completely normal intensities returning on the higher frequencies at about 1600 GT and on the lower frequencies at about 2000 GT. Broadcast frequencies were not known to be affected.

A general fadeout occurred April 8th that was very much like the one of February 14th in all respects. It began at 1655 GT. The higher frequencies began to return at 1645, and the lower frequencies at 1730. There was indication of a slight effect on broadcast frequencies. Besides the great suddenness of this fadeout, and its widespread occurrence, it was noteworthy because of the simultaneous occurrence of an exceptionally brilliant eruption on the sun. Mr. R. S. Richardson of Mt. Wilson Observatory wrote me that a hydrogen spectroheliogram which he took at 1647 GT revealed that a very bright eruption had just started.

The February 14th and April 8th fadeouts were of further interest in that sharp changes in terrestrial magnetism occurred at the precise times of the fadeouts. On February 14th there was a sharp dip in the horizontal and vertical magnetic intensities at 1515 GT, lasting about 15 minutes. On April 8th there was a sharp dip in the horizontal magnetic intensity at 1645 GT lasting about 20 minutes, and at the same time in the vertical magnetic intensity lasting about 40 minutes.

Still further interest attached to the April 8th phenomenon by a report from RCA that their earth current recorder showed an abrupt change at about 1645 GT.

In conclusion, it has been demonstrated that the general fadeouts which occur simultaneously throughout the sun-illuminated hemisphere are at least in some cases simultaneous with an eruption on the sun, and it seems likely that they are in all cases caused by absorption in the ionosphere caused in turn by electromagnetic waves (probably ultra-optical) from a solar eruption. They are sometimes also accompanied by sharp changes in terrestrial magnetism and in earth currents. There is great need of careful observation of all these effects in connection with future fadeouts, in order to establish the causes more definitely and to determine the relations between terrestrial magnetism and the solar and radio phenomena.

Local fadeouts occur which the individual observer cannot distinguish from the general type. They are probably associated with local magnetic disturbances, depending on the more or less turbulent processes of redistribution of the electric charges in the ionosphere. When these local fadeouts occur in the daytime they may easily be mistaken for the general type, and their nature can be determined only by comparison of data from a considerable number of places. It is therefore worth while to continue the reporting of sudden fadeouts occurring in the daytime. Amateurs who are interested in the subject are requested to send in their reports to the American Radio Relay League.3

3 Reports should be addressed to the American Radio Relay League, 38 LaSalle Road, West Hartford, Conn.—Errone.

W5CVO nominates W9BTB as the U.S. ham having the longest surname—Carl Ahrenhoersterbaerner. Just call him Carl!
HINTS and KINKS for the Experimenter

Tuning the Receiving Antenna

Most of the modern receivers have so much sensitivity that we don't worry about an antenna, but just hang any old wire on the antenna post and forget it. Some of us, of course, use a doublet with a low-impedance line for receiving, and, finding that it also works well on bands other than that for which it was cut, forget about the probable poor transfer efficiency.

Many of the latest type superheterodyne receivers are equipped for low-impedance input, and are working quite efficiently when a doublet is used on its fundamental frequency. A worthwhile improvement can result, however, by matching things up a little better on the harmonics. Then, too, there is the case of the fellow who wants to use his transmitting Zepp or single-wire-fed Hertz for receiving also. He runs a wire over to the receiver and opens it with a switch when the transmitter is running. But he probably does not get maximum signal transfer, merely an improvement because the transmitting antenna was given first choice of location.

A suggestion that works is shown in the sketch, Fig. 1. It merely consists of a tuning system, readily adaptable to the type antenna being used, coupled to the receiver through a low-impedance line. Provision is made so that by plugging in the proper coil either series or parallel tuning may be used. In the case of a single-wire-fed Hertz, no provision for series tuning is necessary.

To prevent the tubes in the receiver from burning up when the transmitter is running (high grid currents can be drawn even though the plate voltage is off) provision can be made for shorting the input of the receiver. The transmitting antenna, if used for receiving, should be switched from the coupler to the transmitter. The switching can of course be done by relays, greatly simplifying changeover.

—Byron Goodman, W1JPE

Antenna-Rotating Device

The essentials of an electrical method for rotating a beam antenna used by F. G. Southworth, W5EOW, are shown in Fig. 2. Rotation is in sixteen steps, which is more than sufficiently fine in graduation to utilize fully the directional properties of a simple beam antenna. W5EOW writes: "The antenna is copied after Mims' at Texarkana a la December 1935 QST. However, it was impossible for me to rotate the antenna from the operating table by mechanical means, therefore the birth of the attached brainstorm.

"Briefly, the antenna is turned by an electric fan motor in one direction only through a 250 to 1 pinion and gear combination. Mounted on the antenna drive shaft is a rotary switch with 16 contacts. One of these contacts points directly north. The selector bar strikes one contact at a time.

"Now on the operating table there is also a 16-contact switch, each contact being labeled a direction; i.e., $N$, $NNE$, $NE$, $ENE$, $E$, etc. On this switch there are 15 selector bars, closing all but one contact at each setting. Mounted alongside this switch is a red pilot light. The hookup is simple; the contact on the switch at the antenna end which points directly north is connected to the contact on the operating table switch tap marked $N$ and so on through all sixteen contacts. One side of the motor is wired to 110 volts and the other side to the center contact on the antenna switch. The other side of the 110-volt line goes to the selector.
FIG. 2—AN ELECTRICAL METHOD FOR ROTATING A BEAM ANTENNA

It utilizes a small motor with a pair of sixteen-contact switches, the antenna automatically moving to the direction at which the operating table switch is set.

The antenna is set on the operating table switch. The pilot light is wired in parallel with the motor. The operation is simple. Set the operating table switch for any desired direction, which is the direction of the open contact. The pilot light immediately goes on and the motor slowly turns the antenna and the selector switch. When the selector bar reaches the tap corresponding in direction to the open tap on the operating switch, the power is broken and due to the pinion drive the antenna immediately ceases turning. The pilot light also is doused, informing the operator that the antenna is correctly pointed.

Parasitics and Interference

H ere’s a new angle on the ever-present key-click problem: the relation between key clicks (and ’phone interference as well) and parasitic oscillations. The following letter from B. P. Hansen, W9KNZ, tells the story:

“The new transmitter here has a pair of W.E. 242-A’s in push-pull in the final, running up around 750 watts on c.w. and about 400 input on ’phone. Keying is accomplished by a d.p.s.t. Dunco a.c. relay. One pair of contacts closes the oscillator center tap. A split second later, the other one closes all high-voltage primaries. Thus the make click is taken care of by straight primary keying, since the primaries are closed with full load. On the break, the primary contacts break first, making elimination of this click easy also. Straight primary keying would give tails, but this is licked by the oscillator center-tap contacts opening a fraction of a second after the primary contacts have opened, thus cutting off the tails before they get a start.

“Now then, I’ve used this same relay, along with the same customary click filters, for a couple of years on a half-dozen rigs, including the bread-board version of the present one, and never had a squawk on clicks unless the margining of the relay got out of whack due to contact wear. This could always be corrected by re-margining the relay. But when I put this new rig into its steel cabinet and built the parts up on metal chassis, there were the clicks. There was also a nice batch of ’phone QRM to the BCL sets around the neighborhood. Bias to the final is obtained through a 10,000-ohm grid leak only—no fixed bias. One day, was re-neutralizing the thing after having made some changes and happened to put the plate voltage on the final with no excitation on it. The darn thing went right to town, oscillating merrily although the neutralization was perfect. Parasitics, of course. Slapped on a little fixed bias just to see, and sure enough, it took just a little fixed bias to make the final as stable as a rock. Well, a choke made of four turns of hookup wire, wound around a pencil and stuck in the socket grid lead, ahead of neutralizing condensers and everything else, cured that trouble completely. But, to my great surprise, it also cured the key-click trouble, every trace of it. And a hurried test on ’phone showed a remarkable improvement there. Many of the neighborhood cases simply cleared themselves, although of course there are still a few antiques that have some QRM. But, whereas wave traps had no effect before, they now effectively cleaned up the last trace of trouble.

“As it looks to me, it took a split second for the oscillator to start when the key closed. During the interval, there was no bias on the final because there was no excitation and the parasitic had a good chance to get going and put in a few dirty clicks. Then, the oscillator got under way, excitation came through, bias resulted, and the thing may or may not have stopped. Probably didn’t, because there was always trouble when I modulated. That parasitic may have had a half dozen or more different frequency components—it certainly had a honey in the five-meter band. This could give the effect of a transient resulting from the more common causes of clicks. I’m satisfied that it did.

“Then the hash from the 866’s. After I got the clicks cleaned up I called W9KI who lives exactly across the alley from me. He gave me a clean slate on the clicks and the ’phone QRM but said there was some hash at several spots where he picked up my sigs. I closed the steel door of the

(Continued on page 66)
Devoted to the interests and activities of the
INTERNATIONAL AMATEUR RADIO UNION
Headquarters Society: THE AMERICAN RADIO RELAY LEAGUE, West Hartford, Conn.

MEMBER SOCIETIES

- American Radio Relay League
- Asociación Radiotécnica Italiana
- Canadian section, A.R.E.L.
- Círculo de Amantes de Radio Vyalad
- Deutscher Amateur Send-und-Empfangs Verein
- Dienstab
- Experimenterende Danske Radioamatorer
- Irish Radio Transmitters Society
- Japanese Amateur Radio League
- Ligue Mexicaine de Radio Experimentateurs
- Nederlandse Vereeniging voor Internationale Radiamaateters
- Nederlandstalige Hervormde Vereeniging voor Internationale Radiamaateters
- New Zealand Association of Radio Transmitters
- Norrköping Radio Rejls Sällskap
- Österreichischer Versuchsfunferband
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- Reine du Skimmetes Français
- South African Radio Relay League
- Suomen Radioamateurillitto ry.
- Svenska Radiamaatetersförbundet
- Unión de Radiodifusores Españoles
- Union Schweizer Kurzwellen Amateure
- Wireless Institute of Australia

Conducted by Clinton B. DeSoto

TBTOC:

Novelty is a virtue. However, the time always comes when novelty merges into the commonplace.

That time, it seems, has come to the TBTOC classification. When the requirements for QST mention of multi-band DX performance—QSO’s between two stations, separated by an ocean, on three bands—were set up, the 28-mc. band was used almost not at all for international communication. To work TBTOC then meant use of 20, 40 and 80—a recognizably difficult accomplishment. Now, using 10, 20 and 40, it is something that a great many amateurs can do with relative ease.

There’s no point in having just another commonplace classification in amateur radio. There are enough of them now. TBTOC was originally meant to indicate outstanding DX performance on the principal useful bands. It no longer does that. Consequently, the only logical thing to do—is to extend the requirements to include the factor which was not originally contemplated and which has knocked the exclusiveness of the award into the garbage can—the 28-mc. band.

Henceforth, then—and due notice is hereby served on all to whom it may mean anything—QST mention will be made only of those who have four-band QSO’s with another station across one of the seven seas—TBTOC—Four-Band Trans-Atlantic Contact. And here’s a mark to shoot at, right at the start:

D4BIU and W1TS accomplished a transatlantic FBTOC in the elapsed time of 11 hours on April 12th last, going from 28 mc. to 3.5 mc. with stops at the intermediate bands between 12:30 p.m. and 11:30 p.m., E.S.T. Signal strengths were good, and one call sufficed to locate each station on schedule on each band. Who’s going to be the first to do it in five hours, now?

What is believed to be the first W9 FBTOC has been grabbed off by W9MIN, working with D4ARR. VE2EE believes he has the first for Canada, chalkup both EA4AO and K4KD on four bands. VE1EA was not much later. W1AF adds D4AAR and FASBG to the FB list. W1WV and W1KH have both turned the trick. OK2AK and W2DC made the grade.

Final TBTOC’ers to be recorded are W1DGG with EA4AO, W8ZKO with G5LA, and—here’s a good one—W8BYM with ZS2A.

The mutually-financed TBTOC (now FBTOC) certificate idea has been reluctantly discarded. Only a handful seem to want it—not enough to make the idea feasible. Seems that the average

ANNUAL MEETING OF THE I.A.R.A.C., SHANGHAI

Left to right: R. P. Roberts, XU8RR; G. Ogledoff, XUSGC; C. J. da Silva, XU8SS; K. W. Johnstone, XUSKW; A. Guillabert, XUSAG; E. W. Brambleby, XUSCB; W. H. Wood, XU8HI; J. Tachikawa, XUS4R; and L. Syberg, XUSLS. This was a sukiyaki dinner; the ashtrays merely denote that it was over when the picture was made!
DX man is not much of a certificate hound—which is probably just as well!

QSL:
The following modifications should be made to the QSL Bureau list published last month:

Cuba: Owing to pressure of other activities, Dr. Pedro Madiedo, CM2WD, who has done such good work in the past, has been forced to relinquish QSL activities to Adolfo Dominguez, Jr., CM2AD, who should be addressed at Milagros 37, Vibora, Habana.

Rumania: Dr. Alex Savopol advises that the correct QSL address for YR cards is in care of Victor Cantuniaari, YR5VC, Str. Matei Rasarab, 3 bis, Bucaresti IV.

Newfoundland: Cards for VO stations should be sent to the Newfoundland Amateur Radio Association, P. O. Box 650, St. John’s.

General:
The ban on amateur transmission has been lifted in Brazil, and PY stations are again active, reports PY1AW . . . . . . It looks like Greece will soon become one of the countries regularly on the air . . . . C. Tavaniotis, SV1KE, is quite active—QSL via SX3A or to 17-a Bucharest St., Athens—and a radio club is now in process of organization in Athens . . . . . . W9GDH sends along a new W9 WAC record, having worked CPlAC, VQ8AB, U9ML, K7UA and VK4LW between 7:30 p.m. and 11:00 p.m. C.S.T.—3½ hours . . . . . . The QRA of U9MF is as follows: Box 48, Sverdlovsk, U.S.S.R. . . . . . . SU1RO wants a WAC7 award including Central America, having finally after two years worked due west to K5AC and FM8A—says “it would be nice for USA and me!” . . . . . . First WAC in Mauritius goes to VQ8AC, whose correct address is Supreme Court, Port Louis, Mauritius; first in Rumania is Anatol Poruznik, YR5AP . . . . . . A W9 WAC record is claimed by W8BE, with VK2FG, FASBG, J2LL, G2IS, CE2II and CM2GA worked in that order between 6:35 and 8:05 a.m. on April 13th, 14 mc.—conservatively, 1 hour and 35 minutes . . . . . . Things have been coming along on 28 mc., with G6CJ WAC in 3 hours and 45 minutes, OKIA W and FSVS both WAC on ten, and G6DH achieving the first European 28-mc. phone WAC back on March 1st . . . . . . Byron Goodman, W1JPE—ex-W6CAL, who pulled a Winchell on us while pinch-hitting in this column last month, worked WAC and 48 countries in two-and-one-half months on coming to New England from the West Coast . . . . . . Incidentally, this pillar

THREE ARGENTINE HAMS
Left to right: K. M. Sen, LU4AJ: Jose A. Viveres, LU1EP: and Jaime Testorelli, LU9EA.

found holding an informal DX session over s.w. b.c. station W1XK at the Boston convention on April 18th a lot more fun than holding forth monthly in this department . . . . . Especially

(Continued on page BB)
The Annual A.R.R.L. Field Day is scheduled for the week end of June 6th-7th. Time to drag out the old portable, or indeed to revamp and build anew! No need to forego summer pleasures when the junk box probably contains most of the necessary components for inexpensive field sets of the practical and knock about variety. There are constructional and power supply suggestions in the account of last years’ Field Day successes (September 1935 QST, pages 34-35). The tube line-up may be a 41 driving a 79 as per July 1935 QST, a lone 42 or 42-42 combination, the familiar 47-46, a 47-10 rig, 71A’s, or any one of a dozen other satisfactory combinations. Over half the field work reported last season was on the 3.5-mc. band; a third of all contacts were made on 7-mc., and some 12% were 56-mc. contacts. Although any amateur frequency may be used for the Field Day station entered for the event, we suppose these three bands will still be the popular choice. Portable and portable-mobile rigs offer utility and pleasure during the whole season, whether used week ends or for extensive vacation periods.

Skill, judgment, and training meet the most severe test when communication emergencies develop. The purpose behind the Field Day is to test equipment suitable for the job by an actual operating set-up, and attempts to establish communication with different points from the temporary field location. A high degree of interest is assured from the number of advance inquiries. Both clubs and individuals have requested advance information on the dates set for this year’s outing to test portables. It has been suggested that “manufactured” contacts between the several transmitters of one gang entering a station are unethical. Only contacts between this station and the outside should count of course. Additional rulings on these points will be made next season if desired and necessary.

Many things are developed under field operating conditions that cannot be learned from any amount of arm chair experimenting. Field Days inevitably discriminate, showing what are the worthwhile features in arrangement, which the weak points, and enabling sets to be modified by practice as well as theory. Then too it is sometimes shown that the chap who is ordinarily very quiet at the club is after all the fellow who is on the job in putting up antennas and bringing home the bacon, literally and otherwise. On the other hand, onlookers show up who accomplish nil except to hold down a camp chair. But Field Days naturally develop the knowledge and operating “savvy” of all who enter. Whatever one puts into organization effort comes back to him in proportion to the efforts made.

The Field Day gives opportunity for all to get acquainted, to cooperate in establishing a communicating station, as well as to work out incidental arrangements about food and transportation. Besides adding to our store of practical knowledge, if your experience is anything like ours, you are assured of happy and lasting recollections of the experiences shared with others. A camera added to the equipment insures a record of the history-making expedition which can be used for comparison with other A.R.R.L. Field Days. With us these trips to different points each year stand out as high spots in interest.

Even though the communication achievements of the station you enter in the F.D. may be modest, each set-up that leads to success in establishing communication with amateurs at a distance may well cause you to thrill with the pride of actual accomplishment . . . for having done it once, it becomes easier to set up and get going in less time, and operate with greater efficiency should actual emergency ever require! Amateur radio is a many-sided hobby. If used only as a plaything, ham radio addicts may find their hobby uninteresting. Novelty seekers find that thrills wear off in accordance with the old saw, that familiarity breeds contempt. But by using our competitions to build our ability in different constructive unselfish fields it is not necessary to allow our work to make us sophisticated or permit our hobby to pall. The confirmed and successful brother in our fraternity of amateur radio finds new experiences through new attempts and daily results. New services to perform for others, latent abilities in operating and building to develop, new messages, new contacts, new friends, new circuits, new DX . . . these represent the fullness of amateur radio. There is solid and lasting satisfaction to be found in amateur radio where the operator aims not to
operate on the "formula" plan but to tie his construction and brass pounding performance to something definitely useful to others. We commend the Field Day to your attention as one of our League-sponsored activities which has not one but several interesting and valuable objectives.

The fun of an outing is combined with the idea of an annual testing of portables, training operators for readiness in communication emergencies. Fraternalism and good feeling prevails. See what you can do. Few folks know their capabilities until they try. Take part with your local club, make up a group of local hams, or go by yourself. Anyway drop us a line as to your experience or results in the F.D., whether large or small. Here's luck in the Field Day. Remember, if you make one bona fide field contact you win... over the chap who didn't try! — F. E. H.

The article by Mr. Robinson, W6FVD wins C.D. and article contest prize this month. Mr. Robinson's contest article is entitled "Commercial transmitters have dead fronts, with live circuits of over 750 volts unless he is assisted by another operator for readiness in communication emergencies."

Recent months indicate that many fail to consider the nature of amateur operating or communication activity (DX, phone, traffic, race-calling, clubs, fraternalism, etc.) which adds constructively to amateur organization work. Prize winners may select a 1936 Handbook, six read blanks, or equivalent credit toward A.R.R.L. supplies. Send your contribution today.

Paradise Postponed
By James M. Robinson, W6FVD

Each ham will one day depart this troubled world for eternal happiness in the World Beyond. Although the future beckons brightly, most of us choose to defer our departure. We wish to enjoy completely this life before taking the road to the sky. With this thought in mind let's consider some hazards around our ham shack which may cut short our earthly lives. Recent months have brought prices of high-power tubes and apparatus to levels within the reach of hams of moderate means. Increasing accidents in recent months indicate that many fail to consider the nature of high voltage, and neglect to treat it with due respect.

A young boy was recently heard to remark something about putting 3000 volts on the "52's. Contrast his non­technical ideas toward other A.R.R.L. supplies. Send your contribution today.

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O.R.S. Trophy for ‘36-’37 Competition

To be Donated by Winston-Salem Club

The Winston-Salem Amateur Radio Club has long been ably represented by W4JFT, WABA, and W4QG in these activities, and all club members take a well-deserved pride in the performance of station W4NC in all regular and special A.R.R.L. activities. At the Club meeting, February 14th, it was decided to try for a future O.R.S. competition, this to be known as the "W4NC Trophy." In addition to this, all O.R.S. will be pleased to note the final plans worked up for a new competition year in which it is expected that the above Trophy will be awarded in addition to official A.R.R.L. recognition through official A.R.R.L. activities. At the Club meeting, February 14th, it was decided to donate a silver trophy for a future competition, this to be known as the "W4NC Trophy."" In addition to this, all O.R.S. will be pleased to note the final plans worked up for a new competition year in which it is expected that the above Trophy will be awarded in addition to official A.R.R.L. recognition through official A.R.R.L. activities.

Line-up for O.R.S. Now

Invitation to all traffic men: you will find the new plans of vital interest to you, and we should be glad to have you an O.R.S. Regular bulletin cover the things you are interested in. O.R.S. are known to all hams as the most efficient reliable stations there are, with operators always ready for any emergency job, and A.R.R.L. reach the tradition of amateur radio in every respect. The plans for the future gives even more point to these features which you will want to support for the constructive aspects and good example to all amateur operators.

An amateur transmitter was in operation at the Automobile Show in Wildwood, N. J., April 10th–13th, inclusive. A total of 480 messages were handled. The transmitter, built by W3DKY, employed a Federal 175-watt tube in the final. Those responsible for this demonstration amateur radio were W3CKW, W3BVR, W3DKO, W3DAU, W3DLZ, W3BNT, Mrs. W3DAU and E. Ward.

June, 1936
BRASS POUNDERS' LEAGUE

(March 16th-April 15th)

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<th>Call</th>
<th>Orig.</th>
<th>Det.</th>
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<td>2221</td>
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<tr>
<td>W8BNT</td>
<td>238</td>
<td>1137</td>
<td>1365</td>
</tr>
<tr>
<td>K5YF</td>
<td>620</td>
<td>246</td>
<td>866</td>
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<tr>
<td>W6BFY</td>
<td>198</td>
<td>566</td>
<td>762</td>
</tr>
<tr>
<td>W4BGM</td>
<td>44</td>
<td>480</td>
<td>524</td>
</tr>
<tr>
<td>W6MV</td>
<td>13</td>
<td>287</td>
<td>400</td>
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<tr>
<td>W6FBM</td>
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<td>666</td>
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<tr>
<td>W6FHY</td>
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<td>483</td>
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<tr>
<td>W6VY</td>
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<tr>
<td>W6GR</td>
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<td>735</td>
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<tr>
<td>W4BW</td>
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<td>188</td>
<td>203</td>
</tr>
<tr>
<td>W4BF</td>
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<td>108</td>
<td>266</td>
</tr>
<tr>
<td>W6H2</td>
<td>12</td>
<td>322</td>
<td>434</td>
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More-than-one-operator stations

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A.A.R.S. stations

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<tr>
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<td>341</td>
</tr>
<tr>
<td>W6GXM</td>
<td>196</td>
<td>242</td>
<td>438</td>
</tr>
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</table>

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.

Summary, 1.75-mc. Transatlantic Tests

This summary of W/VE results in the 1936 1.75-mc. Transatlantic Tests, covering sixteen different tests between January 5th and March 15th, has been compiled by Stewart S. Perry, W1BB, leading W participant. Contacts made by each station (figures after the calls indicate number of contacts made on that test): By W1BB: G2DQ-1, G2II-11, G2IN-2, G6PF-2, G6YQ-1, G6CL-1, FASBG-1, E44AO-1, W4QF: G2DQ-2, G2II-1.

The phenomenon first observed in the 1935 tests and noted in QST by G2II, that is, the rapid increase in signal strength of signals at about sunrise time, was again noted this year by many stations. Several of the G's worked by W1BB and not heard or worked by other W/VE's were tabbed on the crest of this wave. It was extremely interesting to hear a weak signal come from behind the background suddenly increase to RST 449 peak and then fade out again suddenly. The duration of the peak was usually from five to twenty-five minutes. W2UQ, G6WQ-1, and W6YQ, G6WQ-2, have made a schedule for 1.75-mc. contact, which resulted in the first W. Africa 1.75-mc. QSO on record W1BB hooked FASBG the following night. Cooperation was generally splendid throughout the tests and all in all things went off smoothly. Also a printed copy of the results compiled by W1BB and containing more details is available from him for cost of printing and mailing.

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The Festival of States

The St. Petersburg (Florida) Amateur Radio Club, in cooperation with the Junior Chamber of Commerce, handled over 5000 messages for visitors to the annual Festival of States, the week of March 28th-April 4th. A station was set up in a central location with a suitable sign across the front of the building housing the equipment. The apparatus consisted of a Skyrider receiver loaned by W4DBC, a 5-mc., transmitter and receiver loaned by W4QCD, R.M., and a rack and panel 'phone-o.w. loaned by W4BCZ, S.C.M. W4QCD managed the traffic activities and did a fine job of it. W4AFU, Director, Southeastern Division A.R.R.L., handled W. Florida traffic from the Festival. A special DX message for Australia was handled direct to its destination by W4AN. Many visiting hams were welcomed at the station and special credit is due W5XMI for assistance in operating when club members were unable to be present. The effect of the exhibit was to give the public a new conception of what amateur radio really is—other than "the pest next door who call8ea all the QRM".

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DX Notes

FROM W0HU and Wiotela comes the information that ex-CTZ8K is now on the air in Bolivia signing CI2K, he will be found in his old CT2BK spot, "right on the edge," 14,000 kc. or on 14,450 kc. A unique four-leg 'phone schedule for 1.75-mc. contact, which resulted in the great peak, and then fade out again smoothly. A blue printed copy of QST for the January 5th and March 15th, has been compiled by Stewart S. Perry, W1BB, leading W participant. Contacts made by each station (figures after the calls indicate number of contacts made on that test): By W1BB: G2DQ-1, G2II-11, G2IN-2, G6PF-2, G6YQ-1, G6CL-1, FASBG-1, E44AO-1, W4QF: G2DQ-2, G2II-1.
San Francisco Emergency Plans

The San Francisco Radio Club, the Associated Radio Amateur League, and the Disaster Relief Committee and has set up an excellent plan of communications whereby emergency power will be supplied from a mobile gasoline driven 60-cycle alternator for contacts outside the city. Within the city the 56-mc. mobile and portable rigs will provide a city-wide network to feed the main station and to tie in relief agencies and concentration points with the central committee.

An unusual four-way hook-up was in operation on 14-mc. o.w. from 10:00 to 11:15 p.m. one night recently. The stations concerned were DA4RR, LUIEP, ZL1DV and W6JPW.

On April 7th, the day of the crash of the T.W.A. Sun Racer, Mayor Ellenstein of Newark, N. J., phoned W2GYN and W2HNP to inquire if they could get any information regarding his wife, who was aboard the plane. W2GYN made contact with a W3 in Ohio and W2HNP with WSMUQ Elmiria, N. Y. From these follows it was ascertained that Mrs. Ellenstein was one of the two passengers saved. Later, in conjunction with the A.A.R.L., W2BCE, W2GMN and WSMOT were able to get additional information.

An amateur station exhibit was conducted on April 23rd at the Mission Covenant Church in Austin, Chicago, under the supervision of W9FLQ and the auspices of the Northwest Radio Club of Illinois. The exhibit was the greatest attraction in a "Men's Hobby" show. More than 800 visitors viewed the station. Operation was on 14-mc. phone under the call W9ONB.

Oklahoma Police Net

Organization of a Police Net is being completed in Oklahoma. The following stations and towns are working in the net through schedules on different frequencies and contacting by the schedule method rather than in a direct net. W5AMT, Duncan; W5EZX, Wynnewood; W5FX, Paul Valley; W5CSI, Tulsa; W5DZU, Edmond; W5ERM, Prague; W5EHM, Ponca City. W5CEZ, Oklahoma S.C.M., would like to hear from other states having a police net working. W9FLQ, Kansas S.C.M., is working on a Police Net in his state.

W5FWY writes concerning the "Kansas Cyclone Network": "First, the meaning of the name. A cyclone is a lot of hot air going around and around. When this bunch gets together on 1.75-mc. phone almost any noon, the average cyclone becomes a mere zephyr by comparison. There are no regular scheduled meetings, no officers, no dues. Any active amateur can become a member, although most of the stations at present operate on 1.75-mc. phone. One 14-mc. phone is active in the group, W5ERK, Manhattan, Kansas, who is relayed onto 1.75 mc. by W5FWY. Some of the network members and their "monickers": W5FOC, The Old Man with the Long Grey Beard; W6UWN, The Village Barber; W5DSH, The Greenleaf Greasemonkey; W5GQA, The Kansas Windjammer; W5AEF, The Lonesome Farmer; W5TT, The Whacky Plumber; W5RJX, The Brass Voted Tenor; W5FWY, The Terrible Swede.

"Ten per cent of the fun in traffic handling comes from serving the public. Ninety per cent of the thrill comes from watching your operating skill increase rapidly and surely due to the constant practice. O.R.S. and O.P.S. know that 'he who serves others, serves himself.' I am also trying to learn what the thrill comes from.

Attention, Pittsburgh Amateurs

Harmon W. Armstrong, W5BBV, assistant secretary of the Amateur Transmitters Association of Western Pennsylvania, suggests that amateurs in the Pittsburgh area organize a permanent "Emergency Communications Unit," such a unit to be so designed as to be the greatest possible assistance to all other organized emergency agencies. W5BBV suggests that the unit consists of amateurs who have fixed stations in favorable locations, those who have portable equipment, which could be used in the field, and amateurs who would act as operators. Arrangements would be made with local companies who have portable gasoline driven generators to loan them for emergency use. It is W5BBV's idea that the A.R. L. Field Day be used for "field-training period" for the unit. Many details must be worked out to get the unit in operation to think it over and let him have their views. He may be reached at any A.T.A. meeting, by mail care of U.S. Engineer Office, Post Office Building, Pittsburgh, or by telephone, Grant 0800, ext. 278.
Don't ever tell OA4J that hams don't QSL—he won't believe you. The first mail after the DX contest brought him 118 QSL cards ... and the second mail brought 124 more! Let’s move to Peru!

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Originating Traffic

Every so often a traffic man will be heard griping over the scarcity of traffic. This is natural, of course, since traffic is to the traffic handler what butter is to bread. However, I often wonder if it never occurred to these lads to originate traffic. That is one sure way to create something to handle! Why not each ham send as many messages as he can to friends, relatives, other hams, etc.? I don't mean originate any old kind of traffic—but originate good, non-rubber stamp messages. There must be plenty of hams who have never originated a single message. Just think of the amount of traffic there would be, if every active ham originated but one message per month! Being a traffic man myself, I can deplore lack of traffic, too, but before we wall too much, let's boost originations!

--- W5DNU, O.R.S.

Real Cooperation!

During the serious illness of W5UF's grandmother, which lasted for a period of some three weeks, it was desired that some of the family living in Shreveport, La., and Dallas, Texas, be kept posted daily as to her condition. W5UF, who is located in Waco, Texas, received the whole-hearted cooperation of W5DW, Shreveport, and W5DVB, Dallas, who maintained daily schedules with him at 2:00 and 4:00 p.m. respectively over the entire period. W5UF says, "These fellows were never late, even one minute, they handled messages both ways without a repeat or mistake daily, efficiently. . . I think the organization as a whole should know of their splendid work."

--- W1INF, O.R.S.

W1INF O.B.S. Schedules

These are sent from A.R.R.L. Hq., W1INF, as follows (all times EST): New broadcast starts each Thursday, 8:30 p.m. (13 w.p.m.); 10:30 p.m. (22 w.p.m.); Friday, 8:30 (22 w.p.m.); 10:30 (18 w.p.m.); Saturday, 8:30 (13 w.p.m.); 10:30 (22 w.p.m.); Sunday, 8:30 (13 w.p.m.); Tuesday, 8:30 (13 w.p.m.); Wednesday, 8:30 (22 w.p.m.); Thursday, 8:30 (18 w.p.m.). Frequencies used: Monday and Tuesday: 3575-ke; Sunday, Thursday and Friday: 3825-ke.

Florida 1.75-Mc. ‘Phone Emergency Net

This particular emergency net operation followed the November 4th hurricane, which almost completely flattened Miami and neighboring towns. Communication systems as usual were all down and amateur radio again solved the problem.

In addition to local telephone systems being out, the Fire Department was without any means of communication with the nine substations. The alarm, telephone and bell signal systems were all out of commission. This is a grave situation, especially following a hurricane when regular means of cooking and heating are temporarily disrupted and open fire used by many of the outlying districts. To cope with the constant danger of fire spreading before alarm could be spread the Chief called on Miami amateurs for aid.

W4CNA was authorized to operate portable, with substations at the various fire stations without telephone or alarm. Contact with sub-stations was made on the night of November 4th and the next day several other stations were set up until there were finally six stations in the net all working on 1.75-mc. ‘phone, some on emergency gas generator supplies, others on batteries. This work terminated on November 10th at 9:00 p.m. when telephone station was completed.


--- Geo. F. Klein, W4CNA, M.A.R.C.

The Réseau des Émetteurs Français invited the radio amateurs of the world to join with them on Arnetice Day, November 11, 1935, in observance of a "silent minute." At precisely 1100 GMT every amateur was urged to stop keying or modulating his transmitter for one minute, this period spent in homage to the heroes of the great war. This was the second year that R.E.F. observed this ceremony.

A unique message delivery service: W8LZE gave W6ITR an urgent death message for N.Y.C. "CQ Urgent NYC" was called and W2IAS, Jersey City, N. J., was raised. W2IAS then called his local police, who sent the message by Tele-type to the N.Y.C. Police. In less than ten minutes after W2IAS gave W6ITR the "OK," a New York police cruiser, having received the message by police radio from headquarters, delivered the message to the addresser!

Add to W9FO's "Radio Crew," one of the most important essentials: Tune, W8LZE.

W6MNC, Downey, Calif., is transmitting code practice on 1784 kea. each Monday, Wednesday, Thursday and Friday from 7:00 to 7:45 p.m. P.S.T. Transmissions for the first 15 minutes are at 5 words per minute, second 15 minutes at 8 w.p.m., third 15 minutes at 9 w.p.m., and fourth 15 minutes at 18 w.p.m.

Says W3QP, "In the case of the telephone company, the 'phone band' is the strap that goes around the operator's neck to hold the mouthpiece!"

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ELECTION NOTICES

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

In case where no valid nominating petitions have been received from A.R.R.L. Members residing in the different Sections, in response to our previous notices, the closing dates for receipt of nominating petitions are as follows, to be held on the dates given herewith. In the absence of nominating petitions from Members of a
Section

Closing Date

Present SCM

Present Term

Term Ending

Los Angeles
June 1, 1936

Howell C. Brown
June 14, 1936

June 1, 1936

Philadelphia
June 15, 1936

W. F. Sandle
July 15, 1936

June 15, 1936

Vienna
June 17, 1936

R. M. Vermeulen
July 17, 1936

June 17, 1936

New York
June 25, 1936

J. B. Hunt
July 25, 1936

June 25, 1936

Orlando
June 26, 1936

R. F. Badger
July 26, 1936

June 26, 1936

San Francisco
June 30, 1936

R. V. M. Kwok
July 30, 1936

June 30, 1936

Baltimore
July 2, 1936

W. T. Coombs, Jr.
July 2, 1936

July 2, 1936

Memphis
July 7, 1936

E. H. Hufnagle
July 7, 1936

July 7, 1936

Cincinnati
July 23, 1936

J. D. Smith
July 23, 1936

July 23, 1936

Detroit
July 28, 1936

J. H. Bumgartner
July 28, 1936

July 28, 1936

Section the Incumbent continues to hold his official position and if he is eligible in accordance with the provisions of Article III, Section 3, of the Constitution to continue in office for the term specified.
QUEBEC DIVISION

QUEBEC—SCM, Stan Comach, VE2EE—The old call EX is on the air again under new management. BP passed his Commercial and has been entertaining GM of old Quebec Society. He is interested in DX but very slow. AL, a ham from Hampstead to Mt. Royal Gardens and HK has a new neighbour. VESCA was recent visitor to the Metropolis. A few XYL’s have been inquiring whether Bill’s call is from Hampstead to Mt. Royal Gardena and HK has a new antenna in his shack. His com is all working Cuba. GT is getting out well on ‘phone. EP and KV have been covering more schedules than usual, and lack of DX has lowered the morale of some. Several fellows who were with us at the Eastern Division Convention have written to express their opinion of our convention. VE3CA was recent visitor to the Metropolis. A VE3CB was presented with a Bonnie YL at 3 a.m. recently, promptly went home and contacted a G to relay the glad tidings to his folks. His C, VE3DE, is going great with his new 100-watt rig. AM expects to make a hole in 7 me. with new 100-watt rig. KT is heard often with a potent 40-watt rig. BO is at present recuperating in the hospital after an operation. If flood get much higher. KJ does well on 7 me. BD and EL are both interested in 56 me.

Traffic: VE3QK 220 ABW 146 G11 108 WX 52
        VE6TH 40 VZ 43 PL 42 DU 30 TM 16 SG 14 AE 9 NC
        8 VD 4 YY-EM 2 BP-JK-QB 1.

PRAIRIE DIVISION

MONTABO—SCM, A. J. R. Simpson, VE4BG—The Trust Line key station AG turns in a good total. VG in an emergency on Good Friday gave a detailed weather report to VE4GO, always operator at Iford who needed a good report on the weather at Winnipeg before starting a plane off for Winnipeg. TV is operating for a lumber company at The Pas. SS is busy getting output on 14 mc. NI worked ‘03A and ‘04A on 14 mc. JK is now with a ‘phone DX rig and receiver and all run by batteries and motor generator, which operates on 3.5 mc. when not operating commercial C5ZV. TJ can be heard exploring the mysteries of 14 mc. ‘phone. RO keeps on working the DX. JO is on 14 mc. ‘phone again. IP works his ‘phone occasionally. MW has been copying commercials to get his speed up. QF has that old 7 mo. rig with P.P. tens. Lethbridge is going great with 40 watts input. EX-4JFI has that ‘phone again. IP works his ‘phone occasionally. MW has been copying commercials to get his speed up. QF has that old 7 mo. rig with P.P. tens. Lethbridge is going great with 40 watts input. EX-4JFI has that ‘phone again. IP works his ‘phone occasionally. MW has been copying commercials to get his speed up.

Traffic: VE4AG 123 NT 23 VG 33 SS 4.

SASKATCHEWAN—SCM, Wilfred Skafe, VE1SH—OC makes a 70 to power DX work with only 100 watts input. ES has been under the weather but is OK once more. UZ works nice DX with 40 watts input. ‘47’s and 56’s, VE15JR has just received the 3000-vo!t transformer to put his rig back to 7 mc. ‘10 do FB work DX with only 100 watts input. EX-4JFI has now 5V and generator at Queen Charlotte Islands, B.C. 4XH was SCM at the Convention. VE2MK and VE3JO are all interested in 56 me. W3COT is in Montreal with R.C.A.-Victor. Welcome, Bob. LJ has invested in an 802 generator, which operates on 3.5 me. when not operating commercial C5ZV. TJ can be heard exploring the mysteries of 14 mc. ‘phone. RO keeps on working the DX. JO is on 14 mc. ‘phone again. IP works his ‘phone occasionally. MW has been copying commercials to get his speed up. QF has that old 7 mo. rig with P.P. tens. Lethbridge is going great with 40 watts input. EX-4JFI has that ‘phone again. IP works his ‘phone occasionally. MW has been copying commercials to get his speed up. QF has that old 7 mo. rig with P.P. tens. Lethbridge is going great with 40 watts input. EX-4JFI has that ‘phone again. IP works his ‘phone occasionally. MW has been copying commercials to get his speed up. QF has that old 7 mo. rig with P.P. tens. Lethbridge is going great with 40 watts input. EX-4JFI has that ‘phone again. IP works his ‘phone occasionally. MW has been copying commercials to get his speed up. QF has that old 7 mo. rig with P.P. tens. Lethbridge is going great with 40 watts input. EX-4JFI has that ‘phone again. IP works his ‘phone occasionally. MW has been copying commercials to get his speed up. QF has that old 7 mo. rig with P.P. tens. Lethbridge is going great with 40 watts input. EX-4JFI has that ‘phone again. IP works his ‘phone occasionally. MW has been copying commercials to get his speed up. QF has that old 7 mo. rig with P.P. tens. Lethbridge is going great with 40 watts input. EX-4JFI has that ‘phone again. IP works his ‘phone occasionally. MW has been copying commercials to get his speed up. QF has that old 7 mo. rig with P.P. tens. Lethbridge is going great with 40 watts input. EX-4JFI has that ‘phone again. IP works his ‘phone occasionally. MW has been copying commercials to get his speed up. QF has that old 7 mo. rig with P.P. tens. Lethbridge is going great with 40 watts input. EX-4JFI has that ‘phone again. IP works his ‘phone occasionally. MW has been copying commercials to get his speed up. QF has that old 7 mo. rig with P.P. tens. Lethbridge is going great with 40 watts input. EX-4JFI
Correspondence

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

Stand By!

2035 West 111th St., Chicago, Ill.

Editor, QST:

At this writing, there exists, as you know, an emergency condition throughout the East occasioned by serious floods. Numerous cities and towns are entirely dependent upon amateur radio for communication with the outside world.

In emergencies such as this, it should be the duty of every operator to render all assistance possible, firstly by handling emergency traffic, and secondly, by remaining off the air until such time when the emergency has passed, or when no interference is caused to those stations actively engaged in handling emergency traffic.

On the evening of March 17th, various appeals were broadcast to have the channel from 3900 to 3910 kc. cleared for emergency communication from Johnstown, Pa., where W8FRC was doing a heroic job of attempting to relay information to and from his city. It seemed that every 'phone station in the east and west at once came on the air asking for information, and causing much QRM. Some of the operators of these stations became most indignant when asked to QRT, and as a result several verbal battles were waged on this channel, which, of course, added to the confusion. Any one of these stations could have gotten all the information desired by listening to W8FRC, W8DBC, etc., without putting their carrier on the air.

I would suggest that in future emergencies, the station at the scene of the disaster become the control station, and that all other stations remain silent unless called; much in the same manner as distress traffic is handled at sea. I think that it would be well to have such regulations adopted by the Federal Communications Commission as safety of life ashore is certainly just as important as at sea.

The present emergency, or rather the handling of the communications end of it, has certainly put a big feather in the cap of we amateurs; the selfish part of the organization notwithstanding. It is up to all of us to realize that such service justifies, all the more, our existence.

—E. A. Roberts, W9VDQ

QRR Channel?

4126–73rd St., Jackson Heights, N. Y.

Editor, QST:

I have just had an idea (whether it is original or not, I don't know) that a certain portion of the 3500 to 4000-kc. band should be set aside for emergency communication. Say about 20 kc. from 3890 to 3910 kc. 10 kc. for c.w. and 10 kc. for 'phone, to be used solely for emergency traffic. Amateurs desiring to render a really worthwhile service to those in distress would occasionally tune over to that portion of the band to listen for any QRR traffic. Those hams having crystal-controlled transmitters should keep crystals of that frequency on hand, especially the ones living in the flood and hurricane districts. Wonder what the rest of the ham fraternity think of this idea?

—Morton Slavin, W2IZX

“Ogglewobble”

4205 Chester Ave., Philadelphia, Penna.

Editor, QST:

Isn't it about time some strenuous efforts were made to clean up the 1.7-me. band? One cannot but be appalled by some of the drunken brawls and very questionable language encountered more than occasionally on this frequency.

To-night, for instance, I listened to one W3 who was obviously deep in the throes of a good “bender.” For about an hour this fine example of the amateur spirit polluted the ether with vivid comparisons of the biological merits of various YL's of his acquaintance, interspersed with some good, old-fashioned cuss-words.

The situation has about the same aspect as that of the drunken driver. I'm sure that most of us take a drink or two now and then, or bandy an occasional strong word, but the amateur bands are distinctly not the place for such pastimes. This is even more true in view of the ever-increasing number of all-wave receivers, and the presence of more than a few YL operators in our midst. The impression conveyed is, to say the least, a very poor one.

I think that, beside having a group of Cairo Observers for more frequencies, we might also have a society for better conduct to avoid losing what frequencies we do have.

I am working on a little device to be known as the "Ogglewobble" for the benefit of the decadent...
sentry who pollute our airways. It will be a device for neatly and expeditiously skewering out the tongue, and derives its name from the fact that "oggiewobbie" will be the closest they can come to calling "CQ" after the operation.  
— J. L. Brown, Jr., W4BBK/3

Curing Telephone QRM

5415 Giddings St., Chicago, Ill.

Editor, QST:

Having been employed by the Illinois Bell Telephone for the past ten years, I have had contacts with numerous cases of amateur radiotelephone interference on telephone lines. In the majority of cases the operator of the offending station did not know what to do and felt that he was in for trouble. Other operators have tried in various ways at their own expense to eliminate this trouble. Being hesitant about tampering with telephone circuits, some stayed off of the air during telephone hours. The following information I hope will clear up all difficulties in this matter.

All telephone companies operating under the American Telephone and Telegraph Company are governed by rules which will aid amateur radio operators in this way:

Any amateur radiotelephone operator whose carrier interferes with telephone conversation in the neighborhood should call the local "Repair Service," state to them what telephone number his station is interfering with, his station call letters, name, address and how the operator can be reached for a test.

The transmission department of the local telephone company, if an A. T. & T. company, will install on the affected telephone either a by-pass condenser or a choke or both if necessary. This is done free of charge to any one. The radiotelephone operator may be called upon for a short test to make sure all is OK.

I hope that this article may be of some service to our brother operators, and to further better relations between us and the A. T. & T., not to mention the public.

—George P. Pabst, WANYR

Tipping Off Frequencies

2804 Hilllaboro St., Raleigh, N. C.

Editor, QST:

Recently I read (in your "I.A.R.U. News," I think) where some ham gave the frequency of the rare ones at the end of the QSO so that any one hearing could find the same station. I thought it a swell idea, so to-night I ended a QSO with W5S—where "ES5— 14,300 kc. de W4EG." He came back and said he could not give my frequency, so I tried to explain what I meant. After the QSO, I heard him "CQ ES5— 14,300." Evidently I got him all mixed up. I was terribly sorry, but had to laugh just the same.

The purpose of this letter is to ask if it is possible for you to explain the idea in QST again to avoid others getting mixed up on its meaning. It's a swell idea, but should be used only on rare stations. It would be foolish to give a W frequency when anyone in the world should have no trouble hearing plenty of W stations.

—N. M. Patterson, W4EG

Privileged Few?

1801 Sharon St., Indianapolis, Ind.

Editor, QST:

The attitude of VE3GG's letter in the March issue is certainly not the true amateur spirit. I don't believe A.R.R.L. ever has or ever will intend for amateur radio to belong to a privileged few who are on "the in." It's not right and it isn't true fellowship. I know that some of our bands are crowded, that is unfortunate. Maybe we can get more frequencies—and I'm hoping with the rest—but it still can be said that there is plenty of room left on ten meters that isn't being used. There is and was a beginning in that line. Ham radio is no exception. Nobody owns it; every amateur at some time or another has been and must be, a beginner. Some fellows forget this fact; others don't. A.R.R.L. believes in the doubtful should read the "Amateur's Code" in the front of the Handbook. There is only one right way to go about overcoming the overcrowded condition and that is to make the fullest use of the frequencies now available and apply with every effort for additional space. A selfish and overbearing method of elimination is surely not the proper procedure.

—George E. Ross, W7PTI

Hams and Peace

150 Puritan Ave., Highland Park, Mich.

Editor, QST:

...I would like the following remarks to be seriously considered not only by hams but by all who indulge in the sacred art of communication via the ether waves—commercially as well as hams.

We being of a special type who have been granted the power and the conception to communicate and to make communications equipment wherever it be for pay or for pleasure, have a special duty that we should perform and that is not another mortal can. This particular duty should be foremost in our minds at all times. I am not one who likes to preach nor one who likes to listen to a sermon but I have a little lecture I would like to put forth to all ye who are in the radio field.

Have any of you by chance been readin' the papers? What is the foremost news? War, of course. Does this not mean anything to you? Are you who are given the power of communication so dumb that you can not see what war means? Does it not come to you that we cannot really be nationally inclined or minded? Doesn't the fact that we W.A.C. mean that we have brothers, no matter what race, color or religion, throughout the world? Shouldn't it be our sacred and solemn duty to help preserve the peace of mankind? We have no real place in any purely national set-up but we must adhere to international policy. Just because certain rulers whistle, should we go out and cut each other's throats? I am afraid that some of you would almost do that, forgetting the power of communication that has been given you; this point I gather from reading newspapers, journals, magazines and publications. Can't we forget our own troubles and petty jealousies and bring pressure on those who would like to throw everything into a chaotic mess called war? Without communication there couldn't be much war. Many of you would call me a pacifist—I am not, but I can't see giving up our sacred power to help a few childish so-called statesmen who get insulted and have their feelings hurt because some one has wronged them terribly by slapping them on the wrist. Here we really hold in our power a chance to help civilization and as far as I can see we are doing nothing...

Wouldn't you hate to enter another ham's house and destroy his equipment and eliminate him from this earth when he never did anything to you? Let's all do our best to keep our inferiors from slapping each other all over the map and prohibiting us from pursuing our natural course of life.

May I suggest one way to proceed (this is a very slow way)? Each one of us can attempt to interest three people in communication each year. Introduce those of the laity over the air to others at another station. Try and pick a station in another country if possible, or even across town will do some good and open someone's eyes. Let's make this international. Friends will never fight—argue, yes, but never fight.... I would like to see some editorials on such a subject. It should give all of us something to think about. We truly take our art too lightly, ... I remember a great deal of discussion that Clyde Darr, WSZZ, and I used to have about this same subject when he was alive. It was always his contention that a time would come that the ham

(Continued on page 54)
Un fortunately, an oscillatory circuit is quite complicated mathematically. Radio textbooks explain such calculations in detail, but amateurs can hardly be blamed for resorting to "rule-of-thumb." After all, amateur radio is a hobby, not a course of mathematics.

As a matter of fact, "rule-of-thumb" does very well when it is guided by experience and followed by skilful adjustment. Judging from the letters we receive, however, there is no general agreement as to the best type of circuit or the proper $\frac{L}{C}$ ratio. We do not wish to become involved in highly technical discussions or mathematics on this page, but we are going to try to clear up some of the confusion regarding the proper $\frac{L}{C}$ ratio in final amplifier plate tank circuits.

We are on safe ground in saying that the impedance of the plate circuit should be high, since this permits the tube to operate at highest efficiency. This impedance equals $\frac{L}{RC}$ approximately. Therefore, for any given coil efficiency ("Q"), we may conclude that the impedance increases as $L$ increases, and that the tank circuit having the lowest capacity has the highest efficiency.

The above statements apply particularly to unloaded circuits. When the circuit is loaded, another consideration enters, namely storage capacity (or flywheel effect, if you prefer). To make this clear, suppose a single tube, Class C, is driving a loaded parallel resonant circuit. Once each cycle, the tube will supply a short pulse of power to the oscillating circuit. The circuit, however, must supply power steadily to the load, throughout the entire cycle. Obviously then, the storage capacity must be large compared to the peak input per cycle, or poor waveform and unsatisfactory operation will result. As the tube bias is decreased, the driving impulses will become of longer duration and less storage is needed. When grid bias is decreased to Class B conditions, the input power will be supplied over an entire half cycle, and the $\frac{L}{C}$ ratio may be safely doubled as compared to Class C. Going one step further, push-pull Class A or B gives power over the entire cycle, and the $\frac{L}{C}$ ratio may be increased to perhaps eight times the Class C value.

Other things being equal, the power output is proportional to the plate current. Therefore if the plate current is doubled, the energy storage should be doubled, which means that the $\frac{L}{C}$ ratio should be $\frac{1}{4}$ as high. (Double capacity, one half inductance). Similarly, double plate voltage also requires double the energy storage. But since doubling the plate voltage doubles the oscillatory voltage, the storage capacity is automatically increased four times. Therefore doubling plate voltage permits using an $\frac{L}{C}$ ratio four times as high. (Double inductance, one half capacity).

It is a simple matter to summarize the foregoing principles, combining them in a formula which is based upon past experience

$$\frac{ma}{E \times \text{Freq.}} \times K = \text{Tank Condenser Capacity (mmf.)}$$

"$K$" will depend upon the type of transmitter, as follows:

- Single ended c.w. $K = 2600$
- Single ended Phone $K = 5200$
- Push-Pull c.w. $K = 650$
- Push-Pull Phone $K = 1300$

While we do not claim any great accuracy for this formula, we believe the information it gives will help the amateur in building a new transmitter, or in obtaining better performance from his present rig.

James Millen
...NEVER BEFORE HAS THERE BEEN SUCH A BOOK VALUE!...

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Please send to:
Name
Address

Correspondence Dept.
(Continued from page 88)
would be the one to hold the peace of the world. I believe it has.
—Fred V. Collins, WSQN

Short-Wave Anaesthesia
Healy's Point, Norway House P. O., Manitoba, Canada
Editor, QST:

... The Macuxy tribe in British Guiana claim to have a root which produces unconsciousness, or short-wave anaesthesia. I have met one of them who claimed the reception of messages while in this condition, and I must say it looked convincing. I could detect none, but I am confidently looking forward to great strides in this direction. Look at the value of such an anaesthetic during wartime when radio probably will be the handiest thing available, not to mention lowering the death rate by discarding chloroform and their dopey family. Then we may even be able to direct waves of this at our irresponsible members of parliament, and after rendering them unconscious get our own back by allegation laziness when we take them as the session finishes. We may even be able to tune other people's wavelengths when they are in a disagreeable mood. Look how useful this would be when that irate individual calls for the overdue installment on the piano. Coming back to the war question again, just imagine giving that sort of an anaesthetic to the opposing army and when everyone was asleep cutting their trousers suspenders like Charlie Chaplin used to do. What a victory—absolutely bloodless! You could even keep your mother-in-law under the influence all the time she stays with you by just concealing the apparatus. I tell you, we are only beginning to appreciate the valuable possibilities of this our latest addition to electricity.

One last suggestion: There is a certain American who calls himself an explorer and who writes and has written all sorts of "tripe" about his experiences in the unexplored parts of British Guiana while on an amateurish holiday of a few months duration thereabout. I spent nine years in this country, in the interior amongst the Macuxys, the Uapixanas, the Aturunus, the Akawias, the Caribs, the Arabas, and goodness knows how many more, and I'd like to tell the aforesaid gentleman that when he says the Macuxy tribe have the secret of tempering copper he is a confounded liar. They have aluminum or bauxite, in abundance. They have carbon, from the diamond to graphite or plum-bago. They have antimony, manganese, tin, gold, platinum, osmiridium, beryllium, jasper, garnet, tourmaline, mica, kaolin—but he could eat all the copper the place has without interfering with his digestion. Fellow like those give Americans a bad name. En passant, we have plenty of them ourselves, so perhaps we shouldn't grouse. I started to tell you about this explorer before I went "off the deep end" with the object of an application of a lethal dose for people like him. If ever you meet this gentleman you might read this letter and tell him I am perfectly willing to sit on the red-hot points of all the tempered copper he gets from there, or anywhere in British Guiana. Brasil...

—Edward Healy

RAC Notes
Co. 1502, CCC, Stearns, Ky.

Editor, QST:

This letter is prompted by several which have appeared in QST lately on the subject of r.a.c. notes, the latest by W6LHW in the April issue. The undersigned has been off the air for nearly a year but has kept up with ham radio fairly well by means of QST and occasional listening, and now that we contemplate a return to ham activities we have been listening quite a lot. I can absolutely confirm W6LHW's finding that most of the offenders are old timers! And about half of the r.a.c. notes appear to be intentional, to the other half carelessness. The same thing is true of frequency-modulated and overmodulated 'phones, which are in the same class. It is obvious that there is no place on the air for these stations; they are not ham but bogs, and it is directly up...
"We specified Delco-Remy Police Car Generators as equipment for our new 'cruisers' because our past experience has proved that they have ample capacity for police radio car requirements, and because the Delco-Remy Current and Voltage Regulators used with these generators cause no radio interference. Extremely low maintenance costs, as well as low initial cost, were also factors in our decision.

"It is a pleasure to recommend these generators to any police department where dependable service and clear signals are essential to the department's efficiency."

HENRY B. LEWIS, Chief of Police
Fort Worth, Texas

Like Chief Lewis, police chiefs in all sections of the country depend upon Delco-Remy Special Service Generators for adequate current output to meet radio and other electrical requirements. Amateur radio operators have also found that the same generators on their own cars provide for the extra current requirements of two-way radio and other equipment, in both low-speed and high-speed driving.

Any Branch or Electrical Service Station of United Motors Service can supply Delco-Remy high-output generators for special installations. Ask them to suggest a generator for your needs.

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Specify Scale Length

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

to the rest of us to see that they don't stay on the air! For one thing, they are directly violating the law!

Previous correspondents on this subject have not done much in the way of suggesting cures. It is the purpose of this letter to point out two ways to drive these birds off the air and to ask if we hams have the intestinal fortitude and the initiative to employ them.

One very effective way is to turn them in to the R. I., with sufficient proof, of course, to tie the can on them. This can best be handled by local clubs, possibly by means of a grievance committee. I would suggest that each offender be given three warnings, and the third time be turned in. The grievance committee should, of course, be authorized by the membership to use a certain amount of judgment in determining whether the offense was intentional or not, and if not further consideration might be merited. But whether you, as a ham, realize it or not, it is true that any person who hears one of these illegal signals and fails to turn him in has his own license suspended or revoked. In other words, it is our duty to turn them in! Do we have the courage (in plain language) "guts" and enough of the cooperative spirit to do this? We haven't had to date.

Another very effective and less drastic way to clean up these notes would be by means of a blacklist. Let everyone who hears this kind of signal report it and let the list be published periodically. It is safe to say that the hams (7) thus held up to scorn would not offend again. And possibly some of them would clean up before they were caught. And it would be helpful to the O.O.'s to have such a list published so as to determine just what stations were chronic offenders. And then let us all agree not, under any circumstances, to QSO a station on the blacklist for a period of three months or so.

I have set out above two methods of cleaning up the air which appear to be workable. Do we have the courage and the interest to try them? This is a challenge to the A.R.R.L. and the membership to use a certain amount of judgment in determining whether the offense was intentional or not, and if not further consideration might be merited. But whether you, as a ham, realize it or not, it is true that any person who hears one of these illegal signals and fails to turn him in can have his own license suspended or revoked. In other words, it is our duty to turn them in! Do we have the courage (in plain language) "guts" and enough of the cooperative spirit to do this? We haven't had to date.

I do a lot of listening on the ham bands and the only r.a.c. notes I hear come from a few foreign stations and very few at that.

I think it's about time W6LHW learns to distinguish the difference between a r.a.c. note and a resonant filter note. There is a whale of a difference between the two and I, for one, suggest that W6LHW learn the difference before doing any more writing.

The QRI's that emit from the W6 hams are, in my opinion, the most beautiful distinctive and piercing notes on the air and I cannot agree with W6LHW when he says "I believe that such a condition is interfering with amateur communication." Another resonant QRI is a wonderful improvement over a p.d.c. crystal QRI and causes less interference between stations and that's the reason, no doubt, W6LHW says "personally these notes don't hurt me by interfering." A resonant QRI, due to its particular audible characteristics, possesses a greater carrying range than a p.d.c. crystal QRI and is more easily copied at DX points and through QRN.

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J. R. Magee, W5NC

Enron's Note.—W5NC neglects to mention that the F.C.C. regulations state, "382. Licenses of amateur station users using frequencies below 30,000 kilocycles, shall use adequately filtered direct-current power supply for transmitting equipment, to minimize frequency modulation and to prevent the emission of broad signals." Frequency modulation, whatever the cause, is illegal.

Not New, But Still Bad

Editor, QST:

I am writing in regard to bootlegging calls—the old complaint to you, no doubt, but a new experience for me. Hi!

Imagine my embarrassment when, after trying for some time to hook a new station in Ohio, brother ham comes back with, "Sure glad to eu log, QM." I grab wildly for my log and thumb it through for proof of previous contact, trying to copy at the same time. Sum fun, eh wot? Then, too, the...
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APPLIANCE AND MERCHANDISE DEPARTMENT, GENERAL ELECTRIC COMPANY, BRIDGEPORT, CONN.
mailman is getting round-shouldered, bringing QSL’s that I can’t very well answer as I have never worked them. Do wish to thank friend (?) for modger for using QSL control, as it shows that he has some consideration for me at least. Perhaps he thinks that my puny thirty or forty contacts a week are not enough or maybe he is anxious about the other half of my shack which is not papered with QSL’s.

To those who have sent QSL cards and received none, I would like to have them know that I do answer all whom I have worked.

—“Doc” Marston, W1JX

### Stamps

410-12th St. B. North
Lehbridge, Alberta, Canada

Editor, QST:

In reply to the letter by VZ3HT in November QST, I would like to say that I am a stamp collector and have thought of doing the same thing—putting a letter in QST—but he must hit a nail on the head about the same as I have. I have hundreds of QSL cards that I happen to know about. They are EA3EG, SPIDU, FS0G, W5AX and W5IA. Some of this information was received by me from an Australian SWL, Mr. E. R. Seebie Victoria, who is also a collector.

I hope this may be of some value to the hams who collect stamps. I might say also that I would like to trade Canadian Jubilee’s for British Colonials or Spanish stamps.

—W. R. Savage, VE4BO

### ‘Phone Band Sub-Division

1521 N. Temple Ave., Indianapolis, Ind.

Editor, QST:

This letter is not written to satisfy an urge to gripe or to suggest a new way for the amateurs to cut each other’s throats, as the case may seem, but rather to offer a suggestion which would enable the high-power ‘phone men to get more benefit from their equipment.

While widening the band would help materially, the chances are that any channel chosen by a low-power man will also be occupied by a high-power man a large part of the time. My suggestion is simply that a portion of each ‘phone band, or at least the 3.9-mc. and 14-mc. hands, be turned over to the medium and low-powered men exclusively. This would make the high-powered stations fight it out among themselves, giving the low-powered men a chance to compete with similar stations.

Since most of the ‘phone stations are of the medium and low-powered variety, surely they would be entitled to half of the two popular ‘phone bands, namely, under the present set-up, 50 kc. around 14,200 kc. and 50 kc. around 3900 kc. It is my opinion that such low-power stations should include those with 50 watts or less carrier power, or better still, those whose peak power on modulation does not exceed 200 watts, thus putting the high-power voice-controlled ‘phone men to get more benefit from their equipment.

I have nothing at all against the high-power men, but should there not also be a spot in the spectrum where the low-power ‘phone man can operate without having to wait until the 1-kw. stations shut down? No doubt many hams will feel that there are enough restrictions already, but it seems to me that such a system as suggested above would permit many more stations to operate at once, and at the same time stop the tendency for all ‘phone men to try to use the maximum power.

What do other ‘phone men think about it?

—Curtis G. Springer, W6MR
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(Note: Each fitting is pictured three-fourths actual size)

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*Note: On account of low price, these fittings cannot be combined with other series of CANNON fittings to compute discounts. NEW ACCOUNTS shipped C. O. D. to conserve time pending receipt of banking and 3 commercial trade references. CREDIT TERMS: 2%, 10 days; Net 30 days.*

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<table>
<thead>
<tr>
<th>Receiver</th>
<th>Price</th>
<th>Down Payment</th>
<th>6 Months Payment</th>
<th>10 Months Payment</th>
<th>Payment Plan</th>
</tr>
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<tbody>
<tr>
<td>RCA-ACR -136</td>
<td>$199.50</td>
<td>$30.00</td>
<td>$46.25</td>
<td>$54.25</td>
<td>$69.00</td>
</tr>
<tr>
<td>NATIONAL BRO-</td>
<td>$139.50</td>
<td>$30.00</td>
<td>$46.25</td>
<td>$54.25</td>
<td>$69.00</td>
</tr>
<tr>
<td>NEWARK ELECTRIC CO.</td>
<td>$129.50</td>
<td>$30.00</td>
<td>$46.25</td>
<td>$54.25</td>
<td>$69.00</td>
</tr>
</tbody>
</table>

We have a few left of each capacity. Send in your order.

Full Details of Any Set Listed, Mailed Immediately on Request

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Our Special OIL IMPREGNATED-OIL FILLED CONDENSERS are guaranteed at rated voltages. All ratings are D.C. Volts. These are American made. We have a few left of each capacity. Send in your orders at once.

<table>
<thead>
<tr>
<th>Condenser</th>
<th>Voltage</th>
<th>Site</th>
<th>Weight</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Newark Paper Filter</td>
<td>1100 V. DC</td>
<td>5 x 34 x 1</td>
<td>1.3 lbs.</td>
<td>$1.25</td>
</tr>
<tr>
<td>Thorodson No. T6778 Plate and Filament Transformer</td>
<td>600-0-600 V. at 200 MA.</td>
<td>2 1/2 V. x 10 amp.</td>
<td>5 V. at 3 amp.</td>
<td>3 1/4 V. at 3 amp.</td>
</tr>
<tr>
<td>Thorodson No. T6777 Heavy Duty Choke, 13 henries at 250 MA.</td>
<td>13 amp.</td>
<td>$1.25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HIGH VOLTAGE TRANSFORMER. 1000-750-0-750</td>
<td>34 x 44 x 54 x 3</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

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FASTEST SERVICE—BEST BARGAINS

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(160-meter 'phone)

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w2b

(100-meter 'phone)

w6DRE, 80 W.

PROBLEMS

PROBLEM: HOW MANY TURNS ON A 1½" DIAMETER FORM 1/4" LONG MUST I USE WITH A 25-µH MF CONDENSER TO TUNE TO 4000 Kc ?

\[
L = \frac{10^8}{(2\pi f)^2} \text{ MICROHENRYS}
\]

\[
f = 4 \times 10^4
\]

\[
c = 25
\]

\[
L = \left(2.5 \times 10^5\right)^2 \times \frac{1}{25}
\]

\[
= 10^6
\]

\[
15776
\]

\[
10000000.0
\]

\[
42720
\]

\[
6340
\]

\[
2208
\]

\[
= 63.4 \text{ MICROHENRYS}
\]

\[
N = \sqrt{\frac{3A + 9B}{2.4^2}} \times L
\]

\[
A = 1.5
\]

\[
B = 0.5
\]

\[
L = 63.4
\]

\[
N = \sqrt{\frac{3(1.5) + 9(0.5)}{2.4^2}} \times 63.4
\]

\[
= 35 \text{ TURNS}
\]

EASY

LIGHTNING CALCULATORS

Six Types Solve 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.

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When *QST* readers write a *QST* contributor (who is not a member of the headquarters staff) to ask for further data on his article, won't they please enclose postage or an addressed envelope for their reply? It is a little thing, and the usual courtesy. It represents small expense to the sender, yet its omission increases the "national debt" for the author. One prominent *QST* contributor, praying us to urge the gang to send postage, says: "Seventeen letters and cards yesterday, asking for information on my last article, and 26 this morning. Please! I cannot afford it." Let's adopt it as a rule, when the other fellow is doing us a favor, to send postage for his reply.

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Inexpensive panels may be made using Prestwood, Masonite building board or similar material. A good crackle finish may be applied by giving the panel one coat of clear Duco or Tri-Seal and allowing it to dry over night. Then spray on a coat of Kem Art Metal Finish, or lay it on thickly with a brush, taking care that the brush marks do not show. Allow this to dry a couple of hours and then bake in a household oven at 225 degrees for 1½ hours. This will produce a regular commercial job. This finish, which comes in several colors, may also be used on metal panels. Both types are produced by the Sherwin-Williams Paint Co. and should be obtainable through any of their dealers.

---

Southwestern Division Convention

THE baptism by fire of the year-old Southwestern Division of the A.R.R.L. occurred last April 4th and 5th, and the newcomer was found to be a fine, healthy, upstanding specimen. On that date was held the Third Arizona Ham-fest, actually the First Annual Southwestern Division convention. The two-day program went off with the smoothness of greased lightning, and a goodly number of the 246 hams, servicemen, YL's and XYL's who lasted through to the banquet characterized it as the best-managed convention they had ever attended.

Events included a barbecue on SCM Day's magnificent "La Posta Quemada" ranch, a 5-meter hunt, theatre parties, "bull" sessions, dancing and entertainment, business meetings, stags, and a goodly number of speakers including O. L. Cypulter of RCA; W. S. Farrell and Joe Reeside of G. E.; Lieut. J. E. Waters, U.S.N.R., and Lieut. Roy Jackson, U.S.N., W6JIP, who
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As FIELD STRENGTH METER; shows relative power actually radiated, permitting perfect adjustment of antenna length, transmission line coupling, rig efficiency, etc. The only satisfactory way to get the whole rig perking "on the nose."

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Complete in
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Code incompetency? Yes.
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A major step toward making certain that you will not fail is thorough study of

THE RADIO AMATEUR'S LICENSE MANUAL

Includes:
- Corrected text of the amateur regulations up to date.
- Corrected answers to typical examination questions relating to regulations, where the same are changed by the amendments to regulations.
- Corrections in the text concerning permissible phone bands and portable privileges, under new regulations.
- Additions to the text about licensing, to incorporate the existing arrangements in Alaska, Puerto Rico and Hawaii, the right to have code tests administered by government radiotelegraph operators; and a similar paragraph extending to cripples the right to have their material dictated or typewritten.
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[No. 9 in the series entitled The Radio Amateur's Library]

THE AMERICAN RADIO RELAY LEAGUE

WEST HARTFORD, CONNECTICUT

BOOK REVIEW


The radio amateur's standing in his community almost inevitably causes him to receive a certain amount of b.c.l. service work. Of course, many amateurs are regularly engaged in professional service work. Both classes are doubtless already familiar with John F. Rider's unique aids to a knowledge of modern servicing, unquestionably the most useful and important of which are his series of "Perpetual Trouble Shooter's Manuals," in which are to be found schematic circuits, chassis layouts, voltage and current tables, and a variety of other specialized service information concerning almost every make and model of radio broadcast receiver ever manufactured. The new volume is an impressive addition to the series. Every variety of broadcast set appears to be shown, in addition to several strictly "communications-type" receivers. It is a wonderfully complete job.

-G. H. D.

Connecticut State Convention

THE 1936 Connecticut State Convention opened at 9 a.m. on April 4th with registration in the lobby of the Stratfield Hotel at Bridgeport. Early arrivals spent the morning in rag chewing and examining the fine equipment exhibit provided by manufacturers and dealers. The convention opened officially at 2 p.m. with an address of welcome by co-chairman Gilbert Williams, W1APA. Irving Strauss, RCA field engineer, followed with an interesting talk on the cathode-ray oscilloscope, demonstrating with an actual transmitter the many measurements that can be made. Some of the high scores in the DX Contest were given by Byron Goodman of A.R.R.L. headquarters, and an open discussion of DX conditions followed. James J. Lamb, technical editor of QST, was introduced and gave a comprehensive talk on recent developments in receivers. L. G. Burnell of U.T.C. told of transformer applications, and phone transmitters were discussed by G. W. Ray, W1ANN, and chief engineer of WICC.

The evening session opened with a real honest-to-goodness amateur "amateur hour" broadcast over WICC, conducted by Joe Lopez as master of ceremonies, and Phil Stern won with some excellent imitations of well-known entertainers. A liars' contest, a cracker eating and CQ contest, and a code speed (sending) contest conducted by the inimitable Ted McElroy were features of the evening meeting. A floor show, conducted by Joe Lopez through the courtesy of WICC, was followed by dancing until the early hours. At midnight, ambitious aspirants were initiated into the Royal Order of the Wouff Hong, to their immediate sorrow but subsequent pleasure.

Sunday morning saw mobile 56-mc. stations scouring the city in an effort to find the three hidden transmitters, and John Matthews, (Continued on page 74)
LO-LOSS INDUCTORS

The modern way to work all bands. Highly efficient inductances available from 160 to 10 Meters for Tank, Buffer, or Antenna and equipped with plugs (including centertap) on standard mounting centers for rapid band change. Coils are wound with transparent enamel coated copper wire, each turn being cemented in its own slot for accuracy and ruggedness. Supporting strips are Cellulose Acetate, an excellent dielectric material having low power factor.

"T" SERIES — 1KW Cap
Centertapped
Mtg. Centers — 7½"

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"B" SERIES — 200W. Cap
Mtg. Centers — 5½"

"BT" Series same but center-tapped at slight additional cost.

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See them at your dealer or write for descriptive bulletin. Usual discount applies to list prices:

COTO-COIL COMPANY, Inc.
PROVIDENCE, R. I.

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Highest quality crystals one-inch square, carefully ground for frequency stability and maximum output. Be sure of your transmitter frequency — use PRECISION CRYSTALS.

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Low frequency drift crystals (Type LTC) having a drift of less than 5 cycles per million per degree C. are supplied at the following prices: 1750 and 3500 kc. bands — $3.50 each; 7000 kc. band — $4.00 each. Holder $1.00.

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MAC KEY @ $7.95, finest speed key built; MAC OSC @ $3.95, ac/dc oscillator. Tone control; MAC CORD $1.00, navy spin speed key cord; MAC MARINE receiver $50–850 meters. r u intd? Few deluxe MAC KEYS @ $15.00 fm me dl. Wri me, T. K. McELROY, 23 Bayside St., Boston, Mass. If u hv Mac Key wri me for xmy ipt & durb inf.

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It is an ideal unit for that low power transmitter, amplifier, P.A. system, or test panel.

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BUD RADIO INC.
1937 E. 55th STREET
CLEVELAND, OHIO

Say You Saw It in QST — It Identifies You and Helps QST
STATION ACTIVITIES
(Continued from page 60)

HUDSON DIVISION

EASTERN NEW YORK—SCM, Robert E. Haight, W2LU—HGF continues holding the traffic crown. HYG is using a single 4" amp., 20 watts. LU sports new Club plaque. CGG continues dropping out and handling traffic. GOM contacts on 14 mc. GTR is on 14 mc. and QSO'd DADAG. FWC is increased power to 220 watts. CQA has 200 watts input power. CKB is the Radiophone Co. who contacted KIV. HLB took message for CC 1.4 BJ.A. 11 HOM 9 HCP-IYH 2. HLB left for Wash., D. C. IYH increased power to 220 watts. CQA has 200 watts input power. KIV reports for Kingston hams: 1 VS 326 IOP 11 CJX 8 DPA 6 IQM 5 HRN 4 (Feb.-Mar. 225X 1566-WLNF 750).

NEW YORK CITY AND LONG ISLAND—SCM, Ed. Baunach, W2AZV-APV is out for O.P.S. !OW is really finding out what the average ham means when he talks of QRM. ICM makes application for O.R.S. CJX worked his second QSO after ICM visited headquarters. GZG was working in the gas station. HTW schedules HFT through local net. HQL is looking for more Fort Monmouth traffic. HTW is working out more schedules. IAMZ transferred to Glenn Fall, N. Y., for the summer. HFL is contemplating S.O.S. in Ocean and Monmouth counties. GDF is doing i.f. work checking bad signals. JET is active on 3.5 mc. and QSO'd D4GAD. FWC reported for the field Radiophone Association. JCT joined the N.C.R. JLO is a newcomer in Brooklyn, N. Y., and is working on 14 mc. and QSO'd D4GAD. FWC is back on the air. GON worked plenty of DX on 14 mc. and QSO'd D4GAD. FWC is back on the air. GON worked plenty of DX on 14 mc. and QSO'd D4GAD. FWC is back on the air. GON worked plenty of DX on 14 mc. and QSO'd D4GAD. FWC is back on the air. GON worked plenty of DX on 14 mc. and QSO'd D4GAD.

CONNECTICUT—SCM, Frederick Ellis, Jr., W1OT—splitting the waves on 7 mc. JAB sticks firmly to his evening program. EUI and ING are working out on local net. HQL is looking for more Fort Monmouth traffic. HTW schedules HFT through local net. HQL is looking for more Fort Monmouth traffic. HTW is working out more schedules. IAMZ transferred to Glenn Fall, N. Y., for the summer. HFL is contemplating S.O.S. in Ocean and Monmouth counties. GDF is doing i.f. work checking bad signals. JET is active on 3.5 mc. and QSO'd D4GAD. FWC reported for the field Radiophone Association. JCT joined the N.C.R. JLO is a newcomer in Brooklyn, N. Y., and is working on 14 mc. and QSO'd D4GAD. FWC is back on the air. GON worked plenty of DX on 14 mc. and QSO'd D4GAD. FWC is back on the air. GON worked plenty of DX on 14 mc. and QSO'd D4GAD. FWC is back on the air. GON worked plenty of DX on 14 mc. and QSO'd D4GAD. FWC is back on the air. GON worked plenty of DX on 14 mc. and QSO'd D4GAD. FWC is back on the air. GON worked plenty of DX on 14 mc. and QSO'd D4GAD. FWC is back on the air. GON worked plenty of DX on 14 mc. and QSO'd D4GAD. FWC is back on the air. GON worked plenty of DX on 14 mc. and QSO'd D4GAD. FWC is back on the air. GON worked plenty of DX on 14 mc. and QSO'd D4GAD. FWC is back on the air. GON worked plenty of DX on 14 mc. and QSO'd D4GAD. FWC is back on the air. GON worked plenty of DX on 14 mc. and QSO'd D4GAD. FWC is back on the air. GON worked plenty of DX on 14 mc. and QSO'd D4GAD. FWC is back on the air. GON worked plenty of DX on 14 mc. and QSO'd D4GAD. FWC is back on the air. GON worked plenty of DX on 14 mc. and QSO'd D4GAD. FWC is back on the air. GON worked plenty of DX on 14 mc. and QSO'd D4GAD.
W.A.C. GTW had QRR schedule with LF-1. CJD is going on a trip to Calif. Best of luck, Gil, and hurry back. GKG reports formation of Trinity College Radio Club, LJDU. IYF is trying for W.A.S. DGZ worked 7 Europeans and 41 reported to N.E. Division Convention. LWD reviewed the Handbook and B.C.L. that his keying relay was being heard by ear. BVD yours truly during flood. DC was on 14 mc. for DX. The Bridgeport Amateur Radio Association held a very successful Hamfest in Bridgeport. The club met earlier this month. JFH is building a Jones exciter unit. JWH is on 30 mc. for DX. I have not heard from you in a long time. I'm bursting with pride over the showing this Section is making in the Cairo Survey Reports. How about it, you club members? Are you going to let S.W.L.'a show you the way? Take, tsk! Congratulations to those who, during the emergency, long before it came along, PB. The following stations were on the job during the flood: 1ST, lOM, IVY, AQW, VF, BWR, ALO, APX, CDX, BOR, AKT, ABQ, OR, COJ, DHF, FAP, INW, EEF, DOZ, FD, CPO, FJS, MT, JEE, LIG, SBS, JSH, FNW, IEE, APX, JOR, QDQ, DWB, BDY, 1UV and IIE. If your call isn't listed, give us the dope and we will see that you receive full credit in this column.

Traffic: W1HGH 241 AQW 168 INW 106 IEE 60 FAP 91 APX 25 DHJ 5 CDX 69 JFJ 4 BWR 107.

EASTERN MASSACHUSETTS—SCM, Albert N. Giddings, W1AGB—HIX's antenna blew down again. ABG attended convention and shook more fists than C.E.F. HWZ kept busy during emergency. 1WZ is still going great guns. EVJ visited ABG and IP. FRO paid her bet to the S.C.M. AIS worked plenty hard on New England Division convention. QW says a new crop of "young squirts" are coming along. KR is probably still drawing lucky numbers out of a box. 350 flood messages. HWE put in 77 hours on flood work. IRE and QF worked hard with the National Guard during the flood. IZL handled flood traffic at BWR. JJF has new emergency transmitter. BWR is rebuilding home 14 mc. rig which was ruined in flood. BNL has a five inch oscilloscope. ISN is busy in P.B.N. net. COI is having good luck with 14-mc. phone.

Traffic: W1BVR 311 (WLG 152) BKQ 202 BVG 134 (WLG 70) CGL 132 IOT 123 JAH 100 AJD 80 DDK 44 ASU 59 EOB 35 GUO 31 JEF 26 IPI 20 JBU 15 IYY 14 ATK-DIF 12 BAF 11 JNA 9 FXO 7 AYY 6 BNL-IBN 5 NS 4 DQG 3 CO1 2 JUR 500 AWB 516 ZB 18.

NEW HAMPSHIRE—SCM, Robert Byron, W1AV—AUY is the new President of the N.S.E.D.R.A. Congrats, Henry. EWF has made W.A.C. twice on 2mc. DUK is now an O.B.S. He is leading the state in the DX contest with HFT. Making him a good DXer. On the job at Pinkham Notch. JSW called his first Q2 and 8 answered and JSW was so surprised he pulled the switch. Instead of going back at him! BSF has gone and done it, got many more. 1US is on 5 bands; the other in charge of FFL. A very good score for the one day he was in the DX contest. IZK has Commercial tickets, last 'phone and 2nd telegraph. IEG has R.O.M. of New Hampshire, and TVR is the new President of the N.E.F.R.A. Congrats, boys. Noble, W1BVR—New appointments: AJD—R.M. of Hampden & Hampshire Counties; JAH—R.M. of Berkshire & Franklin Counties; TVE—R.M. of N.F.D.R.A. Congrats. FRO has new Super Pro. AQD has 56 mc. rig; some hams misused their facilities during flood. BMW has a new rig working very fine. IP reports traffic has dropped off and he has spring fever. EFE reports he has been converted by the flood; says he spent five days in church and has not got over it yet. EAK, reported as the Mayor of Derry, was busy with EFE during the flood. BCF is building a Jones exciters unit. With the appointment of HFT as Emergency Net Route Manager please address all your inquiries about any emergency net work to him. He will see that you get all the dope and advise in which net and on what frequency you will be placed. One net is in charge of the other, the other in charge of FPL. A very fine time was had in Boston at the convention and there was a large delegation of New Hampshire men. Do not forget the Hamfest in Manchester on the 23rd of May, bigger and better than ever. JIYU-EUS-IUQ 16 JSW 15 KK 13 CCL 12 EMG 7 AAU 6 AJD 80 DDK 44.


RHODE ISLAND—SCM, Clayton C. Gordon, W1HRC—IQ handled 12 flood messages during the emergency on 1.75-mc. phone, from the Hartford, and Johnstown, Pa., areas. JNO reports his rig working OK on 5 bands; his 56-mc. rig has been heard in New Hampshire. Newport seems to be hanging on 56 mc. with HLS, BW1, JFF, JIK and JNO as the gang. HIJ has new HRO which gave him good score for the one day he was in the DX contest. IZK has Commercial tickets, 1st 'phone and 2nd telegraph. IEG was "old reliable" as WLG during the flood and stoked up fire in Adcock's house. IQZ floated消息 from A.A.R.S. certificate as N.C.S. out of "ole Pl." GTN has the .59-e.c.-crystal exciter part of the appointment of BFT as Emergency Net Route Manager. He will see that you get all the dope and advise in which net and on what frequency you will be placed. One net is in charge of the other, the other in charge of FPL. A very fine time was had in Boston at the convention and there was a large delegation of New Hampshire men. Do not forget the Hamfest in Manchester on the 23rd of May, bigger and better than ever. JIYU-EUS-IUQ 16 JSW 15 KK 13 CCL 12 EMG 7 AAU 6 AJD 80 DDK 44.


WESTERN MASSACHUSETTS—SCM, Percy C.

(Continued on page 80)
POPULARITY
on the amateur bands
is no SOAP and GAR
GLE matter

It is HUMAN voices
and HUMAN ears with
which we are concerned

Nerve ragging grating, scraping little screeches
are obsolete

Give warm, pleasing, individualizing elements
in your voice a chance

Use a crystal microphone with the non-metallic
ACOUSTA-PHRAGHM

For detailed information ask your dealer, or write

THE TURNER COMPANY
CEDAR RAPIDS, IOWA
Licensed under patents of the Brush Development Co.

(Continued from page 70)

W1HHY, was winner with 14 out of a possible 15 points, an excellent record in view of the fact that over six parties passed one of the transmitters without determining its location. The U.S.N.R. meeting was conducted by Lieutenant Commander John Reinartz, W1QP, followed by an A.A.R.S. meeting led by Russell Bennett, W1GTN, and a communications meeting conducted by SCM Fred Els, Jr., W1CJT. Reinartz followed with an interesting discussion of crystal control on 56-mc. giving much useful data for workers on that band. Arthur Lynch, W2DKJ, told of the interesting 56-mc. work the Garden City Radio Club was doing in preparation for the yacht races to be held this summer. The open forum was conducted by Assistant Secretary Goodman of the A.R.R.L.

The banquet was held in the early afternoon, with 219 present. Director George W. Bailey, W1KH, was a splendid toastmaster, introducing the many speakers with a wit and sincerity appreciated by every one present. Short talks were given by State Senator John Taft, Club President Charles Wight, W1BRL, Irving Strauss, W1CJC, Co-chairman Rufol Fowler, W1ACV, ex-Mayor E. T. Buckingham, Dr. J. P. Vancheri, W8BWH of Punxsutawney, Pa., who did such splendid work during the Johnstown flood disaster, John Reinartz, W1QP, Ted McElroy, and Byron Goodman, W1JPE. Speendid tributes to the value of amateurs in emergency work were paid by Mrs. Ella G. Fleck, head of the Bridgeport Red Cross, and Miss Amelia Wendroth, executive secretary of the Red Cross in New England. Speed pilot Frank Hawks, W1IJI, entertained with some of his flying experiences. Four Canadian amateurs present were introduced, as well as HK1XAX of Colombia. The prize drawing was held, and many hearts made happy with the splendid prizes made available by the hard-working committee and the cooperation of the manufacturers and dealers.

The convention ended at 8 p.m., and every one left carrying with them the memory of a very enjoyable two days.

Special credit is due the Bridgeport Amateur Radio Association and the fine work of the committee, headed by Rufol Fowler and Gilbert Williams. The club of thirteen members did as fine a job as many organizations of much greater size.

—B. G.

(Continued from page 20)

Amateurs Carry On

Above Johnstown, at South Fork, J. M. Gates, W8GKU, operated consistently for a period of days. Operators I. L. Mericle and John H. Sefranek of WSMRI-WVH, at a C.C.C. camp near the Quehannah Dam above Johnstown kept the War Department advised as to the state of the Dam for 20 hours, exploding false rumors of its bursting spread by state and municipal authorities; they were commended by Secretary
You can always depend on the high activity of Bliley Crystal Units. They snap into action instantly and are ready for work as soon as the tubes are warmed up.

And when keying with a Bliley Crystal in your transmitter, there is no lag to spoil your note — it's always clean and sharp.

Sluggish crystals can often cause serious damage to other parts of your transmitter. Play safe and join the thousands of amateurs that rely on Bliley Crystal Units. Bliley Electric Co. Erie, Pa.

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Radio business is better than ever. A big year for Radio—but how big for YOU? CREI training gives everyone the opportunity to get ahead, by giving the necessary technical training, so important today. Take stock of yourself. If you’re not getting ahead, it’s your own fault. Why won’t you be a success NOW?

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(Patent applied for)

\( \text{GTC Amateur Plate Transformers are DUO-PRIMARY} \)

Off resonant currents get plenty high. Don’t damage expensive receivers or equipment when tuning with high power. Use GENERAL TRANSFORMERS with fingertip control—all switching done in the primary—at low power—safely, economically, practically.

Tune with safe Lo Power—Snap, and the “soup’s on!” Snap to Lo for those local QSO’s! Snap and you’re set for DX!

Switching power with G T C’s does not affect efficiency of the unit, whereas tremendous power would be wasted if resistors were used for Hi-Lo Power.

All controls on the front of the panel—you don’t reach behind and run the risk of tangling with high voltage. Changing power by switching high voltage terminals is dangerous—3,000 volts is no joy.

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An Unusual Value and ideally suited for use in the average Ham station. Weight 3 lbs., chrome finish.
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Tobe 1 Mfd-900V Condenser $1.70
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Type illustrated (1455 series) provides insulated mounting holes and insulated lugs, for handy stacking or individual use. Described in latest catalog, together with many other types of condensers and resistors. Copy on request.

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ASHEVILLE, N. C.

W8AAP, was on in Geneva, Ferris W. Wofinger, W8CNA, in Binghamton.

The New York National Guard Radio Net, composed of A.A.R.S. stations located in armories, functioned in a wide range of activities during the emergency period. Stations in this net are: W2CA and W28X, Brooklyn; W2BG, W2FTI and W2INE, New York; W800G, Albany; W2GGP, Troy; W8HJP, Syracuse; W8MMT and W8LJD, Buffalo; W8FCG, Binghamton; W2NY, Yonkers, and W8SELU, Saranac Lake.

Merrimack River Valley: At Lowell, Mass., C. F. Hutchinson, W1DBE, was the principal contact with outside. He was on for 36 hours, assisted by two National Guardsmen. AlGiddie, W1AGB, set up at Red Cross headquarters and operated on 56 and 3.5 mc. with the assistance of W1JRH. Rev. Arthur F. McQuaid, W1INM, Henry N. Molleur, W1IYT; J. R. Lizotte, W1BTW; John L. Greene, W1JYV, and P. E. Champagne, W1JJD, installed communications links for Company "H" of the National Guard between its headquarters and outposts. R. A. Hall, W1QF, and Wilmah M. Getchell, W1HRE, operated in National Guard units under the calls W1IHX and W1KU, respectively. Raymond S. Beale, W1CSU; Henry N. Molleur, W1IYT, and Samuel N. Mack, W1ORO, served as relay stations. R. O. Mulno, W1COX, R. G. Baxter, W1AKB; D. G. Hicks, W1GGB, and Leo F. Jarret, W1LJ, were also active. E. E. Taylor, W1BEEF, was out of commission—washed out.

At Lawrence, a combination network of the type that was found so effective in other instances—56 mc. for local work and 3500 kc. for outgoing traffic—was set up, with Clifton R. Wilkinson, W1CRW, H. J. Sevigny, W1GO, and Liaut. Wm. E. Burton, W1QU, handling the low-frequency end, and Joseph P. Moran, W1BUU/1, W1JNU; Walter B. Ingalls, W1JDK; Herbert W. Fieldhouse, W1IZE; Leo Charette, W1ABD; Manuel A. Vargas, W1LJD; Captain Thomas T. Barstow, W1HYT; F. J. Hickey, W11WM, and Paul Muller, W1HXE, using five meters. W1HXE operated a total of 146 hours continuously out of 168, making 464 contacts and handling 280 messages. George T. Byrne, W1FCR, and R. H. Gumb, W1FCU, served with National Guard units.

The principal outlet at Haverhill was Burt H. Taylor, W1KB. Three portable rigs came into the city, Vinson G. Blaisdell, W1KBE, at City Hall, W1HXB, and Arthur A. Stockellburg, W1SS. These stations, in addition to Albert F. Nash, W1BQR, and Carroll W. Still, Jr., W1CCF, made deliveries on the spot in the city during the flood and also acted as scout cars for the local police.

Connecticut River Valley: Contrary to the information at hand when the May QST report was prepared, amateur radio did serve in Brattleboro, Vt., although not on behalf of the utilities. Ray Flood—true to his name—took his transmitter to Police Headquarters and, operating with emergency power under his call, W1FPS, aided by Sgt. Carl B. Manley, W1BAS; Harold G.
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- Plug-in mounting.
- Flexible shaft drive for convenient panel control.
- Locking device for fixed-frequency operation.

National presents a new adjustable-gap crystal holder with front-of-panel control of frequency. It is designed particularly for use with special Hollister A-cut crystals, and when properly installed will provide a frequency range of 6 kc. at 3500 kc. nominal frequency. Frequency spread is proportionately greater when operating on harmonics, as for example 24 kc. in the 20 meter band. Crystals specially selected for this service should be used, as some A-cut crystals are wholly unsuitable for variable frequency use. Holders are sold either without the crystal, or with a genuine Hollister 80 meter crystal for doubling into the 20 meter band. Crystals for other bands will be available later.

NATIONAL COMPANY, INC., MALDEN, MASS.
Traffic: WIEG 223 (WJGK 95) 120 137 CTN 54 FYQ 12 LQ 4.

VERMONT—SCM, Forrest D. Drew, WDBP—Special credit is due those amateurs in Vermont who handled traffic during the recent flood, CBW, ATF, BD, AXN, AVP, A00, 3B5V, FFS, AEN, EBZ, QG7 and DQK are the headlines. BNS has his pistol's license now and is doing lots of flying. CNN is off the air due to the flood and is moving out of the flood area. AVP called at the S.C.M.'s for an evening. BIl has a fine traffic total on 3.5-mc. phone. FSV reports scheduled traffic; GAE and JFP are still back for schedules. ATF was QRX during the flood and handled some emergency traffic. GMM handled some traffic for the Central Vermont Railroad during the flood. GAE has schedules with FSV and GAZ, with his new superhet receiver. GAZ, AMO and O.S.R., and tops the traffic list this month; he is on 3579 kc. and invites QSO's with the gang. BJP is very busy this spring but handled a little flood traffic; visited BIC, ATF and CBW, and BFP 800. BFP believes the phone men should help the people in this flood area. A VP called at the S.C.M.'s for an evening. Bill, Bill, Bill. Official Observers constantly checking on our signals. CKC pays attention to the consistently good work done by O.R.S. and invites QSO's with the gang. BFP is on about 14,000-kc. two-way phone, also five VK's (WLQB 531) VE 55.

Traffic: WNBQ 4 A00 301 IQ 12 AVP 115 FSV 75 HOW 14 ATF 24 GAE 13 BFP 33.

ATLANTIC DIVISION

EASTERN PENNSYLVANIA—SCM, James M. Bruning, W3EZ—P.A.M.; 3E0Z, R.M.; 3AQB, 3AQN, 3EQP, SASW. Were YOU on the air last month? If so, what did you do? Traffic, experiments and CW ops are wanted for this month. Your accomplishment on record and to serve as an inspiration to others. Those who report each month for our Section News have PROVEN that they are not ashamed of their contribution to Amateur Radio. Are you contributing to our section? 3EGP, R.M.; and WDQZ, W.M. each have a new set of dishes, nice to know this flood work has aided the DX men. 3CQZ has a new station (OPS) rating. See how the boys are getting ready for the contest. 3CZS may use a pair of 801's in the final. Phone and c.w. transmitter, of course. AMO is on 40-foot masts. FJQ and LRR are making plans for summer rebuild. BUE has an emergency transmitter and power supply; he handled some QRP traffic during the recent flood emergency. CWE again reports fine work with his new QRP set and O.S.R. working with him. Traffic, experiments or DX results are wanted. BFP is back in the air with a fine phone and c.w. transmitter; he also has a new HRO receiver and an oscilloscope. FQJ and FGH are getting gray hairs trying to get monitors to work. BFJK worked VUXA, FHA and ECU got marooned in flood at Cumberland. BFP and 3E0Z are on the air with a receiver on 7-me. SLYF is going to 50 mc. GOL, a new ham, has a 10 in 1'-NT. RFCQ has 801 in final, EXY is rebuilding to an 801 final, CDS is putting in c.w. equipment, 8a 56 mc. equipment. BFP is back in the air with a fine phone; BFP and 3E0Z are on the air with a receiver on 7-me. 3E0Z and tops the traffic list this month; he is on 3579 kc., and invites QSO's with the gang. BFP is very busy this spring but handled a little flood traffic; visited BIC, ATF and CBW, and BFP believes the phone men should help the people in this flood area. A VP called at the S.C.M.'s for an evening. Bill, Bill, Bill. Official Observers constantly checking on our signals. CKC pays attention to the consistently good work done by O.R.S. and invites QSO's with the gang. BFP is on about 14,000-kc. two-way phone, also five VK's (WLQB 531) VE 55. BFP got marooned in flood at Cumberland. BFP and 3E0Z are on the air with a receiver on 7-me. SLYF is going to 50 mc. GOL, a new ham, has a 10 in 1'-NT. RFCQ has 801 in final, EXY is rebuilding to an 801 final, CDS is putting in c.w. equipment, 8a 56 mc. equipment.
rig on 1.75-me. phone. Broadcasting station WHDL, Olean, N. Y., with the corps of licensed amateurs on its staff, was experimenting with relayed flood traffic handling over two hundred personal messages. BWP and EZ are looking for U.S.N.R. prospects. DSS will receive applications for A.A.R.S. FCCG, LID, EUU and HJU handled the armory transmitters in their respective cities during the flood. BWP will apply for O.R.S. and O.P.S. respectively. Oneida Radio Club is working hard on plans for the big outing to be held at Panther Lake, Sunday, July 19th. Don't forget, W.N.Y. Section slogan contest closes in June. Let's have some entries, folks.


WESTERN PENNSYLVANIA—SCM, C. H. Grossarth, W5CUG—LOQ sounded some brass during the flood. IFY says all more of the Buena Vista members. QOJ says MII helped with the flood traffic. MIW works a lot of DX with a pair of '46. CMP is still struggling with the ECCCP! MOT gets that R.M. appointment. DGL says his was flood traffic. HBD wants a Pittsburgh schedule; he handled lots of flood traffic. UR was on 24 hours each day during the flood, IOH operated at INE during the flood. KBEH says KUI got a job at St. Marys. GJM says the S.H.B.P. & M. is planning a hamfest for August 12th. CWO says he's doing a lot of DX on 1.75-me. The DX bug bad. INE handled the flood traffic for St. Marys. NDE is back on 3.5 me. KOB has been in Brookville for the N.C.R. KBN is going after some DX this summer. DJY has moved to Montana. Raeford: ANK at U.C.C. Belmont: CXO has been appointed O.P.S. DLY is rebuilding. Issue has been made O.P.S. AEH handled flood traffic for A.P. BIW is going to 56 me. for DX. DEH worked three new countries in DX Contest. The Shenandoah National Park will be dedicated on July 3rd. All of the amateurs have had some messages home, NP sold his speech amplifier and is back on c.w. 73. KOB 40 KNB 178 UK 81 FIP 33 KUN 610 AXD 31 CUG 48. KOB 40 KNB 178 UK 81 FIP 33 KUN 610 AXD 31 CUG 48.

ROANOKE DIVISION

NORTH CAROLINA—SCM, H. S. Carter, W4OG—The S.C.M. wants to thank the Durham Gang for the fine hamfest they put on April 5th. It was enjoyed very much by all, and the entire Gang is looking forward to the next one with much interest. Siler City: QI says they are about ready to go in full service. CEI moved back on c.w. CZU is still experimenting with relays. AIIJ was heard off coast of China on 7 me. CLB visited Trenton on 14-me. and received a QSL from MU in Cleveland, Tenn., and talked to ALD and sent some messages home. NFE sold his speech amplifier and is back on c.w. 73.


WEST VIRGINIA—SCM, Dr. Wm. H. Ribbafelder, W5WQ—BOK is rebuilding. W5WQ is rebuilding entire rig. ZU delivered flood traffic to Cuyahoga Falls. A VR is QRL work but gets on evenings on 14 me. SIU is second op at NFO-they are now W.A.S. and got 13 contacts on 5 bands. CHE also had a high score with 26,000 points. UVA worked W.A.C., W.B.E., and 13 new contacts. QRR is at the station in Norfork. DQB is new O.R.S. and H..M. AKN's new driver is DRU. GJM says the KHU got a job at St. Marys. NDE is back on 3.5 me. KOB has been in Brookville for the N.C.R. KBN is going after some DX this summer. DJY has moved to Montana. Raeford: ANK at U.C.C. Belmont: CXO has been appointed O.P.S. DLY is rebuilding. Issue has been made O.P.S. AEH handled flood traffic for A.P. BIW is going to 56 me. for DX. DEH worked three new countries in DX Contest. The Shenandoah National Park will be dedicated on July 3rd. All of the amateurs have had some messages home, NP sold his speech amplifier and is back on c.w. 73. KOB 40 KNB 178 UK 81 FIP 33 KUN 610 AXD 31 CUG 48.


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Modern Design means . . . . . . .
- Elimination of stem puncture.
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Modern design means far more than just bringing the plate lead out of the top of the tube.

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EITEL-McCULLOUGH, INC.
SAN BRUNO, CALIFORNIA
U.S.A.

Hey 78

Bever, W1DAQ, and V. C. Morehouse, W1AZV, handled a quantity of press and other information, particularly with regard to the Vernon Dam. W1CBW is reported to have been operating 180-meter phone in Brattleboro until power went off.

Up the river, at Windsor, Vt., E. E. Osgood, W1APA, together with Alvin H. Batson, W1GNE, after moving W1GNE's household furnishings to high ground, prepared emergency equipment and stood by for 43 hours. Fortunately, power and communications remained intact, and they had only incoming traffic to handle.

Additional operators at W1INQ in East Hartford, Conn., were Clayton F. Kierman, W1GTG, and Edward Van Gasbeek, W1JO. Later, when W1BEQ of Manchester was near exhaustion, W1GTG relieved him.

At Middletown, Conn., the terminus of the Connecticut River flood, Alexander Thomas, W1ILF, Francis E. Vinal, W1GJY-W3BXC, established an emergency-powered station in Wesleyan's Scott Laboratory utilizing Dr. Van Dyke's lab power gear. Reed B. Eddy, W1AJB, also did an excellent job on 3500 kc. e.w. W1FLQ was a member of the 5-meter net described last month. Everett B. Cladding, W1GTW-W1GTX, went to New Haven to establish an outside contact for W1ILF.

The call of W1HWZ should be deleted from the list of stations active in the Connecticut Valley work—apparently a case of mistaken identity on the 75-meter 'phone band.

Maine: On March 19th word came to Governor Louis J. Brann that the people of Rumford wished him to declare martial law in their city. Lacking explanatory details, with no wire facilities available, he appealed to amateur radio. W1EFA, W1JOA and W1ERB, operating W1JQU at the 86th Brigade Headquarters Company of the Maine National Guard were able to contact Ray E. Longway, W1IST, within ten minutes and secure the information just before power failed at Rumford. W1IST was able to resume shortly with battery power, however, and skeds were maintained for four days, much important traffic being handled on behalf of all official agencies, including provision of serum, medical supplies, etc.

When martial law was declared in Lewiston, Clayton W. Hansen, W1INW, succeeded in getting information out under conditions of great difficulty.

In Wilton, J. W. Singleton, W1CDX, stood by with emergency equipment in the event of power failure, but the local woolen mill was able to supply the city's needs at almost all times.

ODDS AND ENDS

Roland H. Bouchard, W1BLV, performed several important communications jobs in connection with the Woonsocket, R. I., flood. Howard C. Ayer, W1HP, did QRR work in Orange, Mass., when that town was isolated by its own private flood. W3FWR was one of...
THORDARSON COUPLING TRANSFORMERS
FOR THE NEW 6 L 6 TUBES

Modern high power outputs demand these rugged, skillfully designed transformers which insure best "QUALITY."

T-8459 DRIVER TRANSFORMER pushpull 6C5's or 76's to AB 6L6's. List.......................... $3.75

T-8470 MODULATION TRANSFORMER AB 6L6's or Class B Eimac 35T's (500 volts) to 2,500 ohms — 250 m.a.
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affiliated with
CENTRAL DIVISION ARRL CONVENTION
Chicago, Sept. 5–6–7, 1936
See our booth and visit our store. Only three blocks from Hotel Sherman. Write for program!
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CODE TEACHER!
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For beginners, experienced operators, and schoolroom. The sure easy way to learn code and to step up your speed. This amazing new instrument will record your own sending on double row perforated paper and repeat it back to you at any speed you desire. 10,000 words can be recorded on one tape.

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It is the same in principle and in operation for this service is equal to the Wheatstone Perforator and Transmitter, which cost over $1,000.

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THE D-104

This photo of Astatic D-104 Crystal Microphone in action was taken in the Arctic Circle. It is the "speech range" favorite of amateurs the world over — fully guaranteed. Ask your jobber for further information or write Astatic Microphone Laboratory, Inc., Youngstown, Ohio, U. S. A., Dept. Q.

ADD HONOR ROLL

The following stations should be added to the "honor roll" presented beginning on page 118 of the May issue, under the same qualifications. The asterisk, as before, shows that reports indicate that outstanding work was performed; its lack does not necessarily mean the reverse. Owing to generally incomplete information, no division is made between 'phone and c.w. operation. The list is not complete; obviously, there were many more stations participating in the handling of flood traffic in these and other districts, but at least it serves to record those of whose performance we have been made aware. The list:


The reading for WSOFO in May should be changed to "WSOFO (assisted by W5M1W)*".
THE NEW

RCA REVIEW

A Quarterly Journal of Radio Progress

combines in one publication articles on the most significant technical developments in all branches of radio and its allied arts contributed by RCA and associated engineers.

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THE POWERACK COMPANY
25 Park Place New York City

The St. Paul’s School Radio Club station, W1LX, operated from the school’s electric system by W1IZL, W2IBB and W2FUU handled 40 messages. W2, W3OM, Rome, N. Y., was active on 160-meter phone and was of considerable assistance to the Curtis Publishing Co. in locating several carloads of paper. W3BEI scheduled W3WX, W8BWH and W8NTP, taking Philadelphia traffic and relaying traffic referred to him through W2CAM. W3FIG working with the N.O.R. handled about 1500 messages, operated by Wentz, Martin, and Schuger, messages phoned by Mrs. Wentz. W3CZQ also did outstanding work with the National Guard, handling over 1000 messages. W3MG, W3AJW, W3DQM, W3SI and W3AQR were on the job at WHP and WKBO and able to operate as amateurs only in spare moments.

Circulation Statement

PUBLISHER’S STATEMENT OF CIRCULATION AS GIVEN TO STANDARD RATE AND DATA SERVICE

This is to certify that the average circulation per issue of QST for the six month period July 1st to and including December 31, 1935, was as follows:

Copies sold .............................................................................. 40,946
Copies distributed free ......................................................... 409

Total .................................................................................... 41,355

K. B. Warner, Business Manager
D. H. Houghton, Circulation Manager

Subscribed to and sworn before me
on this 17th day of March, 1936.
Alice V. Scanlan, Notary Public

I.A.R.U. News

(Continued from page 48)

when DX conditions show the reaction that followed DX contest—and they’re still going down . . . . Wonder what the summer will bring?

Special:

The newest of the I.A.R.U. member-societies is the O.V.S.V., representative in the Union for Austria. Despite its newness, this society has already demonstrated an interest in amateur affairs which may well be emulated by some of the older societies. One of the manifestations of this interest is the official organ, “O.E.M Mitteilungen des O.V.S.V.” Although mimeographed, it is turned out in workmanlike fashion, and it contains a good deal of well-authenticated technical material. The latest article to hand contains articles on 56 me. and antenna design, abstracts from ham periodicals, an interesting article on WAC and other international awards with a detailed statistical analysis, and a number of other editorial features. Membership in the O.V.S.V. costs 12 Austrian shillings annually, or about $2.25 currently. The address is Bahngasse 29, Klosterneuberg, N.Oe.
A directory of suppliers who carry in stock the products of these dependable manufacturers.

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

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NEW YORK, N. Y.
25 Park Place
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NEW YORK, N. Y.
16 West 32nd Street
Royal-Eastern Electrical Supply Co.

NEW YORK, N. Y.
136 Liberty St.
Sanford Samuel Corp.

NEW YORK, N. Y. (BRONX)
542 E. Fordham Rd.
Wholesale Radio Service Co.

NEW YORK, N. Y.
100 Sixth Avenue
Wholesale Radio Service Co.

NEW YORK, NEW YORK
12 West Broadway
Harrison Radio Company

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10 S. 10th Street
Eugene G. Wile

PHILADELPHIA, PENN.
117 North 7th St.
Raymond Rosen & Company

PHILADELPHIA, PENN.
512 Market Street
M & H Sporting Goods Company

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PITTSBURGH, PENN.
603 Great Street
Cameradio Company

READING, PENN.
8th & Elm Streets
Bright & Company

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349 Worthington Street
T. F. Cushing

WASHINGTON, D. C.
938 F Street, N. W.
Sun Radio & Service Supply Co.

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NEW YORK, N. Y.
136 Liberty Street
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124 E. 44th Street
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Wholesale Radio Service Co.

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George D. Barbey Company

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349 Worthington Street
T. F. Cushing

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

BOSTON, MASS.
46 Brattle Street
Radio Shack

BOSTON, MASS.
28 Brattle St.
Selden Radio Company

HARTFORD, CONN.
203 Ann Street
Hatry & Young

JAMAICA, L. I., N. Y.
92-26 Merrick Rd.
Federated Purchaser, Inc.

MONTREAL, CANADA
285 Craig Street, West
Canadian Electrical Supply Co., Ltd.

NEWARK, NEW JERSEY
230 Central Avenue
Federated Purchaser, Inc.

NEWARK, N. J.
219 Central Ave.
Wholesale Radio Service Company

NEW HAVEN, CONN.
86 Meadow Street
Hatry & Young

NEW YORK, N. Y.
25 Park Place
Federated Purchaser, Inc.

NEW YORK, N. Y.
542 E. Fordham Rd.
Wholesale Radio Service Company

PITTSBURGH, PENN.
603 Grant Street
Cameradio Company

PITTSBURGH, PENN.
343 Blvd. of the Allies
Federated Purchaser, Inc.

READING, PENN.
404 Walnut Street
George D. Barbey Company

Listings on this page do not necessarily imply endorsement by QNT of the dealers or of other equipment sold by them.
The tremendous demand for the Nokoil Dynamic Reproducer more than repaid us for the many hours of strenuous study and work in developing this high quality unit.

**First in the Field and Still Superior**
- For Car Radios
- For Battery Radios
- For Sound Installations

Buy through Wright-Decoster distributors. They are always anxious to cooperate.

**WRIGHT-DECOSTER, Inc.**
2259 University Av.  St. Paul, Minn.
Cable Address, "Simontrice"
Canadian Office: Wright-Decoster, Inc., Guelph, Ontario

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**IMMEDIATE DELIVERY**

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<td>The new ACR-175s complete</td>
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<tr>
<td>Steffing 12s complete with crystal prepaid</td>
<td>98.00</td>
</tr>
<tr>
<td>RME-60w</td>
<td>118.00</td>
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<td>National HRQs</td>
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<td>PR-60A complete prepaid</td>
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<tr>
<td>Metal line Super Skyriders</td>
<td>241.88</td>
</tr>
<tr>
<td>The new Skybuddy</td>
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<tr>
<td>The new Ultra-Skyrider</td>
<td>99.50</td>
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**COLLINS, RCA, RME, Marine transmitters**

**TRADE-IN YOUR RECEIVER OR TRANSMITTER**

All makes of amateur apparatus in stock. Your used apparatus taken in trade. Time sale made on terms to suit you. Receivers shipped on ten day trial. You need send but $5.00 with order, balance COD. Write about any apparatus. Your inquiry will prove that it is to your advantage to buy from W9ARA.

**HENRY RADIO SHOP**
211-215 North Main Street  Butler, Missouri

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**"Cold Dry" Crackle Finish**
(Continued from page 19)

be necessary to put on an undercoat of flat black or black lacquer. When a metal panel is to be finished, it should be thoroughly cleaned with a good grease solvent, such as a high grade naptha, or better still lacquer thinner. After cleaning it should be handled as little as possible, as the natural oil from the hands that will get on the surface to be painted will retard the drying, as well as prevent adhesion. This is a very important factor to bear in mind if you expect to get a durable, uniform finish. In finishing wood, Masonite, or other porous material, the surface must be built up in order to prevent absorption. This may be done by applying several thin coats of shellac, or a quick-drying enamel. Shellac is preferable if time is to be considered.

The drying time, under laboratory conditions, which very rarely exist outside, is about twelve hours. Under ordinary conditions the shrivel enamel will get hard in about two days. This does not mean that it cannot be handled before that time; the writers have put panels and apparatus into use in about four or five hours. A little care must be taken in handling so soon, to prevent skinning the enamel off. The drying time can be greatly reduced by the application of a small amount of heat. In the winter place panels near a warm radiator, or in the summer put them in the sun. Do not allow them to get too hot as the enamel will blister. This small amount of heat (temperature between 70 and 90 degrees) is applied for about two hours. By that time the enamel will be dry enough to touch, but not hard. It will harden overnight. If all work is finished on the panels before painting they can be put into use before they are thoroughly hard. The additional hardening time is of little interest, except when the apparatus must be handled.

If a little care is given to the application so that the thickness of the coat on each panel is about the same, the shrivel will be uniform, and the panels will match very well. Thus with very little effort on the part of the amateur his station can be made very professional-looking.
HAM-ADS

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

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

(3) The rate is $1.50 per word, except as noted in paragraph (4) below.

(4) HAM-ADS is full list only, and the rate is $1.50 per word. The rate listed in the last column of the second Tuesday preceding publication date shall apply.

(5) All rates are in dollars, and the rate applies to advertising which, in its judgment, is obviously non-commercial in nature and is placed and signed by a member of the American Radio Relay League. Thus, advertising of bona fide surplus equipment, used or for sale by an individual or business, is invited and takes the list rate. Provisions of paragraphs (1), (2), (4) and (5) apply to all advertising in this column regardless of which rate may apply.

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


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

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

CLASS B transformers—Universal for two or four 46s, 210s, 80s, 85s, etc., all panel sizes. 70 watt audio from 46s, 100 watts from 10s. Write for details. wsdU, Dayton, Ohio.

CABLOBOOKS—new DX calls, new prefixes, thousands of new W and VE calls, in the spring 1936 Radio Amateur Call Book. Sent postpaid $1.25, or a whole year (four issues) for $4. (In foreign countries $1.35 and $4.35.) Your call and QRA printed in large type, $1. per year. Radio Amateur Call Book, 610 8th Street, Miami, Fla.

FREE samples, wspDS, 2156 West 80th Street, Cleve­land, Ohio.

1970 Wilmot St., Chicago.

Stockbridge Ave., Lowell, Mass.

WANTED—good HRM complete, transmitter above 100 watts output, commercial full, complete, cash or trade. Wcooter Richard, 4 East 72 St., N. Y. C.

FOR sale: A-1 AGX 1935. Five sets coils with panel-speaker­supplies, $25. DeMarchi, 111 So. 4th, East St., LA.

AC-SW3—4 sets coils, tubes, power supply $25. N.R.L. radio course $7., transceiver $7., bug $4., monitor $3., key $1. w1h1J.

FOR sale—150 watt c.w. and phone transmitter—211 class C—$150. w1Kc, 13006 CC, on c.w. Full details on request. w3f1l, 5010 Pine Street, Philadelphia, Pa.


Qisla. Free samples. Printer, Corinth, Iowa.

BLILLY crystal (stickered). Patronized w3d1E, Holland, Mich.

Qisla! World's finest! Samples? (stmp) w3d1E, Holland, Mich.

CALLBOOKS (summer); $1.25, W3dIE.

SPANISH—Write W3d1E.

CRYSTALS: Specials for June only: $1.95 "V" cuts, SoLm. $1.55, $2.50 four cycle "V" cuts, SoLM-160M, $2.25. Beautiful Formulators holders, genuine GR plugs, $1. Request catalog, Ham crystals, 1104 Lincoln Pl., Brooklyn, N. Y.

HAMMERLUND Comet Pro receiver, crystal, AVC, coils 8 to 50 meters, excellent condition. $55. W2CUZ, 50 Bridges Ave., Youkon, N. Y.

RAW quartz—finest quality, for the manufacture of piezo crystals. Largest, most complete and varied stock in America. Brazilian Importing Co., Inc., 6 Murray St., New York City.

SELLING—new and used transmitting equipment, tubes, legal and high power. Public address equipment, receivers and parts. Over 500 items. Write for list and description. Stamped appreciated. w3cuK-W3B1E, Horon Lake, Minn.

USM-ROGA complete, 11015 Southwood, Mass.

SELL complete Thorardin audio with 4-48s class "B" steel chassis $55. Six tubes, parts. Am interested in Collins 32-B if cheap. W3qfc, New Orleans.

ORDERING HAM-ADS Write W3d1E, New Orleans, La.

CRYSTALS: Zero cut, Guaranteed to compensate at near zero, the best. Your approximate frequency, 80 or 160 meters $1.35. Ordinary zero cut outs $1.35 postpaid. Blanks 65¢. Your call and QRA is highly desired. Crystal quartz, will cut twelve crystals $1. Fisher Lab., 4225 Norwood Street, San Diego, Calif.

SELL—2 Ecko Dynamotors—12-500 volts, 100 watts $16 each, both $27. Ferd. Manno, 84 Horatio, N. Y. C.

FIRST $47 takes new condition RCA 136, w9ou, Spencer, Iowa.

SELLING OUT. Write for descriptive apparatus price list. WSAAJ, 2017 Montrose Ave., Richmond, Va.

HAM receiver $6, w1f1W.

GE two stringing sets, $1. Suits, $100. GrISB best frequency oscillator, new $300. Mima Radio, Texarkana.

WE 2UH, VF panel, Complete $25. RCA 17C line equalizer. $50. Mima Radio, Texarkana.

SURPLUS broadcast and amateur equipment and tubes. Stamp for price list. Mims Radio, Texarkana.

JENKINs and Adair, Sampson broadcast audio units. All types, high fidelity, $2.00. Mima Radio, Texarkana.

RMU ODs, 10 meters, complete $75. Comet Pro, crystal, complete $55. SW3, $10. Skyhilder, crystal, $40. Mima Radio, Texarkana.

DIRECTOR Radio 457A modulation meter, AC operated. $50. W5bdB.


QISLA. Finest at lowest prices. Maleco, 1512 Eastern Parkway, Brooklyn, N. Y.

GENERAL Radio 457A modulation meter, AC operated. $50. W5bdB.

Say You Saw It in QST—it Identifies You and Helps QST
CRYS-ALS, X or Y out, 1750 to 2000; 3500 to 4000, Exact frequency, 1" square $2.50. Less than 1", within 10 kilocycles $1.35. Roughcut blanks 80s. Ca-11111, blanks 85s, Small, ir-regular shape 75s. Dist-proof, plug-in holders 85s. William Them, WSFN, 4021 Davis Ave., Cheviot, Ohio.

SACRIFICE: McMurdo silver custom built masterpiece all-\-85s. William Threm, W8FN, 4021 Davis frequency, 1" square $2.50.


TRANSMITTERS constructed. Save 25% State requirements fully. Howard Radio, 154 Pine Avenue, Chicago.

PEAK preselector $12, or swap for transmitter. Planfei1h recep-tor with cathode ray tube $60. 3000V-150W power supply cost $50. SWSHY.


MEASUREMENTS—reasonable prices. Braden & Apple Co. 305 Park Dr., Dayton, Ohio.

RELAY racks cheap W8ANT.

SELL—All Star, Jr. super, 5-550 meters, regenerative i.f., s/s results. Excellent condition. $25. W5IXQ.

NAVY type R. E. chokes $5 W8ANT.

QST—silencers $4; one IP $6; Power supply 110V-150MA: 500V-85MA; 7.5V-8A; 15V. 5A: 4 for $22.50. 5 meter receiver $9.50. Crystals X cut to frequency. $2.75IC; $2.85: 10Mtr, Converter $10.50. All equipment completely built. We build to order. Precision Radio Laboratories, 1065 S. 94th St., Brooklyn, N. Y.

ALL lines of new and used amateur equipment for sale. You used equipment accepted in trade. Before you buy, write to Southern Ohio's only amateur owned amateur business. Jos. N. Davies, W8ANT, Box 602, RR 9, North Bend Road, Mt. Airy, Cincinnati, Ohio.


Traditional in crystals for the most exacting requirements. "Y" and "A" cuts, absolute zero temperature coefficient, exact specified frequency $4.95 less than 4 cycle coefficient, approximately $1.65, exact frequency $1.65, less than 10 cycle coefficient $1.25, approximate frequency $1.25, exact, $1.65. Calibration accuracy 99.99%. Holders $1.00. Brand new ideas for DXers or rag-chewers. Free samples to Hams only. W2FJE, 14 Lafayette Avenue, Brooklyn, N. Y.

BREAD & APPLE—special introductory offer. Radio Headquarters, Ft. Lauderdale, Fla.

SOLD—recently new S-9 Skyrider 10 meter band perfect. Want AJI Universal screen grid 250 cheap, W7EMQ.

NEW RCA ACR136 $60. W8ANT.
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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<td>1024 Hamilton Street</td>
<td>10 S. Tenth Street</td>
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<td>Complete Stock of Quality Merchandise</td>
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<td>303 W. Baltimore Street</td>
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<td>Complete stock of standard Ham &amp; BCL parts</td>
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<td>Branches — Portland, Me. and Barre, Vt.</td>
<td>Standard Discounts. Free technical service</td>
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<td>Quality parts and equipment for discriminating buyers</td>
<td>Standard discounts on standard lines.</td>
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<td>&quot;Ham&quot; Headquarters for Pennsylvania-Ohio-W. Virginia</td>
<td>Complete stock of amateur Equipment at standard discounts</td>
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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.

For Your Convenience

QST'S

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Say You Saw It in QST — It Identifies You and Helps QST
GROSS THE COMPANY WITH A CONSCIENCE — YOU ARE SAFE WHEN DEALING WITH US

GROSS C C TRANSMITTER—OUTPUT 25-30 WATTS

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

Complete kit, less tubes and crystal ................................................................. $14.95

P-25 POWER SUPPLY—for CW-25 transmitter with matching chassis — $11

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“Band Spread” over any portion of the tuning range — only finest material used throughout. Employs one 32 R.F., one 72 detector and one 52 Pentode Audio — 15 to 200 meters — four coils, supplied. The “EAGLE” is economical — two dry cells will operate the filament.

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EIMAC UNSURPASSED TRANSMITTING TUBES!

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NOTE: Alternative Parts are listed in groups

A. XR-6 Coil Form with Square Socket
B. UR-13 Buffer Coil Form Assembly
C. TX-9 Shaft Coupling
D. TMS-100D Condenser
E. HRO Dial-type 10-0
F. TX-1 High Voltage Coupling
G. XM-10 Transmitting Socket
H. 4-Prong Tube Socket
I. GS-1 Stand-Off Insulator
J. TX-12 Flexible Shaft Coupling
K. NC-800 Neutralizing Condenser
L. GS-5 Stand-Off Insulator
M. TMA-50DA Condenser (with GS-5 Stand-Offs)
N. O-Dial-type 0-100
O. R-154U Choke
P. GS-2 Stand-Off Insulator
Q. XR-10A Coil Form (with GS-5 Stand-Offs)
R. R-100 Choke
S. STD-50 Condenser

The parts listed above are fully described either in our general catalog No. 250 (which is bound into the ARRL Handbook) or in the recent supplement to this catalog. The supplement also describes in detail other recent additions to our line and may be had from any official National dealer or by mail direct from us.

NATIONAL COMPANY, INC., MALDEN, MASS.
THE ACT-200 is conservatively rated at 200 watts output on phone and 260 watts output on C-W. It will bring to your shack RCA's high engineering skill, practical experience gained in long years of commercial work, and extreme accuracy in manufacture. There is actually no amateur transmitter with such a background as this, except its companion 40-watter, the new ACT-40. This new transmitter will bring to you a tremendous satisfaction, not only in pride of ownership but in easy, reliable operation and the world-wide contacts its power makes possible. Write for complete details of this professional-type transmitter for amateur use.

RCA ACT-200, an RCA-designed and RCA-built 200-watt transmitter. $475, amateur's net price, f.o.b. Camden, with one set of coils (less tubes and accessories).