THE NEW 600A illustrates the technical leadership which keeps Collins transmitters far ahead of imitative competition. Any one of the following Collins developments is of sufficient importance to make the 600A your choice:

- Maximum permissible CW output (700-800 watts) with 200 watts radiophone output.
- New antenna network suited for use with the MULTIBAND ANTENNA.
- New high stability oscillator.
- New precision flush dials.
- Inductive neutralization resulting in increased output.
- Full automatic control and overload protection.
- Rapid frequency shift including provision for ten meter operation.

Price-conscious amateurs will be glad to know that these technical improvements have not been accompanied by an increase in price. Instead, the 600A brings high power into the medium price field.

Constructional data on the Multiband Antenna and a complete description of the 600A are included in the December Collins Signal. A card will serve to place your name on the mailing list without obligation.

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Accent on modernity... that's the deluxe MARINE group of transmitters in a phrase. In their striking black cabinets, Marine has compactly incorporated all the latest "wrinkles" in transmitter design—all those "efficiency" features which have caused Marine to assume instant leadership in the field. Why "wish" for a perfect rig? Marine is your answer!

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**Marine 140B**: 100 Watt Ultra Modern High Frequency Transmitter

- Power Output: Conservatively rated at 100 watts, CW and phone.
- Frequency range: 15,000 to 1,500 K.C.
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- Dimensions: 60" long x 19½" wide x 15" deep.

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The most powerful transmitter permitted by the government for amateur use. 1000 watt phone and CW. This rig is the finest of its type available today.

**NOW** — A portable 40 watt Phone and CW rig. Built along the Marine quality standards, the Model 35BP is supplied complete with receiver. Originally designed for airplane work this unit is compact and sufficiently light of weight for one man to carry. Ideal for vacations, hamfests, exhibits and for the business executive on long trips.

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- All Band Operation
- Antenna Matching Network
- Receiver 1st stage tuned R.F., Detector, 2 stages audio, Built in Dynamic Speaker
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RICHMOND HILL, NEW YORK
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PR-16K Console less crystal $125.70. With crystal (PR-16CK) $131.70. Chassis also available.

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Nine metal tubes... DuoMicro-Vernier Bandspread... Iron Core IF's... Improved Crystal Circuit... Five Bands 7.4 to 550 meters... Improved sensitivity, selectivity and signal to noise ratio... Automatic volume control... "Low Boost" control.

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Your cost... $79.50
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SARGENT MODEL 10
A complete, self-contained Communication Type All-Wave Receiver.
- Covers broadcast band
- Tuning dial calibrated in M.C.
- Adjustable, calibrated band spreader
- Coil switch for wave changing
- Doublet or regular antenna
- Supplied for any operating voltage.

Your cost model 10SA 15-550 meters. $34.50
Your cost model 10MA 15-1500 meters. $39.50
Also available in wavelength ranges from 15 to 17,000 meters.

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124-11 101st Avenue
RICHMOND HILL, NEW YORK
Published monthly, as its official organ, by the American Radio Relay League, Inc., at West Hartford, Conn., U. S. A.; Official Organ of the International Amateur Radio Union.

devoted entirely to

AMATEUR RADIO

Editorials ........................................ 9
A.R.R.L. Copying Bee ................................ 10
Grunow Competition ............................... 11
The All-Around 14-Mc. Signal Squirter ............. 12
Inexpensive Utility Switchboard Type Racks ........ 18
Oscillators Using 14-Mc. Quartz Crystals .......... 19
A New Radio Transmission Phenomenon .......... 21
What the League Is Doing ......................... 22
Self-Regulating Grid-Bias Supply for Multi-Stage Transmitters .............. 24
Class-B Carrier Control in the Low-Power Phone .................. 25
Handson ........................................... 30
A New Receiving System for the Ultra-High Frequencies ...... 31
3500- to 4000-Kc. Transoceanic Tests .......... 38
A.R.R.L. QSL Bureau ................................ 39
The Young Squirter's Fourth Epistle to the Old Man ............. 40
Experimenter's Section
A "Fly-Power" Phone Transmitter Using a 6A7 — Regenerative Amplification at Signal Frequency — Millimeter Switching for Grid and Plate Currents — Improved Keying-Tube Circuit — More on Switchless Monitoring — Notes on Regenerative S.S. Receiver ........ 41
Amateur Radio Stations ........................... 45
Silent Keys ........................................ 46
With the Affiliated Clubs .......................... 46
Calls Heard ...................................... 47
I.A.R.U. News ................................... 49
Operating News ................................... 51
Correspondence Department ......................... 55
Book Review ...................................... 72
Kansas State Convention .......................... 74
Northwestern Division Convention ............... 76
New Crystal Microphones ......................... 78
Mrs. Isabelle W. Moody, W7DHF ................. 82
16th Pacific Division Convention ............... 86
13th Annual Central Division Convention ..... 88
Roanoke Division Convention .................... 90
Standard Frequency Transmissions ............... 94
Missouri State Convention ......................... 94
Circulation Statement ............................ 98
Power Transformer Design Circular ............... 98
Hemads ........................................... 115
QST's Index of Advertisers ......................... 118

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We're Overwhelmed—
Here's what they say about the SUPER SKYRIDER—

Marine Radio Co., Richmond Hill, N. Y., says: —
Sure is a honey stop completely sold out even samples stop double our order —

Radio Apparatus Corporation, Newark, N. J., says: —
Our customer's reaction to the appearance resulted in an enthusiasm exceeded only by the performance. We are positive that the Super Skyrider is not only the finest appearing receiver of the season but unquestionably the greatest performer.

Dow Radio Supply Co., Pasadena, Cal., says: —
Just received our order on the new Skyrider, after a thorough tryout, I am indeed pleased and thrilled at its marvelous performance.

H. Pless Woodward, Statesville, N. C., says: —
I have received the new Skyrider and regard it as the outstanding value in radio today.

Just went over your new Super Skyrider and must say I am certainly sold on this job. You seem to have outdone yourself.

Walkins Radio Service, St. Pierce, Fla. —
Received the Super Skyrider today and find it really a masterpiece.

McElroy, World's Champion Radio Operator —

We knew the 1936 Super Skyrider was good, but the avalanche of enthusiastic approval has swept us off our feet. From all parts of the country, from dealers who handle all kinds of receivers and from hams who have used them, we've heard a chorus of unqualified praise and congratulations.

No wonder they're enthusiastic. The Super Skyrider has everything. It's sensitive beyond all practical requirements with its Iron Core I. F. system. The new Metal Tubes eliminate all tube shield noises and increase gain. It's convenient with its modern band changing system — no plug-in coils. A controlled Crystal Filter Circuit gives true one signal selectivity. These are but a few of the exclusive Hallcrafters features that have taken the short wave crowd by storm. You have to see the Super Skyrider to appreciate them all.

In spite of all its advantages and superlative Hallcrafters engineering, the Super Skyrider is extremely moderate in price. You needn't go broke for two years to get this fine short wave receiver. See it today.

Weber Radio Supply Co., Clairton, Pa., says: —
Upon trying the Super Skyrider I am sold on it and must order more.

Weber Radio Supply Co., Colorado Springs, Colo. —
We have the 1936 Super Skyrider and are thoroughly pleased with it. It is a model short wave receiver.

In spite of all its advantages and superlative Hallcrafters engineering, the Super Skyrider is extremely moderate in price. You needn't go broke for two years to get this fine short wave receiver. See it today.

9 Metal Tubes — Dovetail perfectly with our efforts to improve signal to noise ratio — eliminate noisy tube shields — reduced inter-electrode capacities and shorter leads afford greater gain.

Iron Core I. F. system — greatly increased sensitivity and a signal to noise ratio unattainable with an air core system.

Duo-Micro-Vernier Band Spread — provides improved logging accuracy — provides electrical band spreading and micro-vernier tuning in an exclusive and distinctive dial.

See your dealer today or write for immediate information.

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the
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the finest short wave receiver we've seen

Our fullest endorsement is behind the amazing new Super Skyrider. We have watched its development, seen it tested, listened to its astonishing performance. Through our close contact with the personnel of the Hallicrafter's organization here in Chicago we are familiar with the skilled engineering that has made this marvelous receiver possible. We can say with authority that the Super Skyrider is today's outstanding short wave receiver.

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We like the complete arrangement of the Super Skyrider, with all the needed equipment in one compact cabinet.

We like the operating convenience provided by this ingenious dial and its handy band switch that does away with all cumbersome plug-in coils.

Above all we like its sensitivity, its ability to get clearly the signal you want.

The Super Skyrider has everything we have always wanted to offer our customers, as complete, as convenient, as efficient a receiver as we have ever seen, priced at only $79.50 ($89.50 with crystal filter). Come in and see it today or send in coupon for full details.

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HINDS & EDGARTON

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CHICAGO, ILLINOIS

TIME PAYMENTS

Buy your Super Skyrider on Hind & Edgarton's Time Payment Plan — small down payment and easy monthly payments — write at once for details.

Gentlemen:

Please send me complete information about the new Hallicrafter Super Skyrider and Hinds & Edgarton time payment plan.

Name _____________________________

Address __________________________

City ________________________________

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SUPER-SKYRIDER
An Outstanding Receiver
Immediate shipment from stock on this and other high grade amateur equipment
GROSS RADIO, INC., 51 Vesey St., New York City

We recommend the SUPER SKYRIDER for its Extreme Sensitivity

With its Iron Core L.F., system and new high gain Metal Tubes, the Super Skyrider is years ahead of its field for sensitivity. It's just the thing for the crowded amateurs' bands of today. We heartily endorse this ultra-modern short-wave receiver. Come in to see it or write for literature. List Price $135.00 — your price $79.50 Net.

THE RADIO SHACK
46 Brattle Street Boston, Mass.

Lightning Calculators

by
A.R.R.L.

THE various LIGHTNING CALCULATORS are ingenious devices for rapid, certain and simple solution of the various mathematical problems which arise in all kinds of radio and allied work. They make it possible to read direct answers without struggling with formulas and computations. They are tremendous time-savers for engineers, servicemen, amateurs and experimenters. They are highly accurate and computations made by them have greater mathematic accuracy than can be measured by ordinary means. Each CALCULATOR has on its reverse side detailed instructions for its use, the greatest mathematical ability required is that of dividing or multiplying simple numbers. You will find LIGHTNING CALCULATORS the most useful gadgets you ever owned.

LIGHTNING RADIO CALCULATOR—Type A ($1.00)
Is for solution of problems involving frequency, inductance and capacity, in design of radio frequency circuits from high-powered transmitters to simple receivers. Gives direct reading answers for size of coils and condensers for any frequency or range between 400 kc. and 150 mc.

LIGHTNING OHMS LAW CALCULATOR—Type B ($1.00). Gives direct reading answers to calculations involving current, resistance, voltage and power with scale for resistance of copper wire and additional supplemental scale for calculating decibel gain or loss. Answers three separate kinds of problems: Finding value of current, voltage, power or resistance, when any two are known; finding resistance or voltage drop in any wire or circuit or resistor; finding decibel gain or loss in amplifiers or circuits. Answers accurate within commercial tolerances.

LIGHTNING WIRE DATA CALCULATOR—Type C (50c). Puts at your fingertips more information on electrical conductors than you could find in a book full of tables: Such as resistance per foot, per mile, per meter, pounds per foot, per ohm, miles per thousand ohms, current carrying capacity, turns per inch, turns per square inch, diameter in mills for all B. & S. and Stubbs gauges, for all kinds of wire such as copper, aluminum, nichrome, manganin, etc.

LIGHTNING DECIBEL CALCULATOR—Type D (50c). Gives direct reading answers in decibel gain or loss in four kinds of problems: When input and output voltages are known, when input and output currents are known, when input and output power are known, when input voltage to the receiver and assumed output level are known.

LIGHTNING PARALLEL RESISTANCE—SERIES CAPACITY CALCULATOR—Type E (50c). Gives direct reading answers for total resistance of two or more resistors connected in parallel, and gives direct reading answers for total capacity of two or more condensers connected in series.

LIGHTNING RESISTANCE CALCULATOR—Type F (50c). Permits measurement of any resistor, from 1 ohm to 1 megohm by use of any voltmeter and any voltage source. Makes an ohm-meter of your voltmeter.

Postpaid from
AMERICAN RADIO RELAY LEAGUE
WEST HARTFORD, CONNECTICUT

Say You Saw It in QST — It Identifies You and Helps QST
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 get your QST with the neutrals; he wants a report from every active ham. If interested and qualified, O.K.'s, or other appointments can be made.

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| Maryland-Delaware District of Columbia | W3BKE       |  |  |  |
| Southern New Jersey        | W3DX        |  |  |  |
| Western New York           | W3DSP       |  |  |  |
| Chicago                    | W3CUG       |  |  |  |
| Illinois                   | W9WR        | CENTRAL DIVISION   | 6618 West 44th St. | Berwyn           |
| Indiana                    | W9TE        |  |  |  |
| Kentucky                   | W9TT        |  |  |  |
| Michigan                   | W8DYH       |  |  |  |
| Ohio                       | W8CHG       |  |  |  |
| Wisconsin*                 | W9ATQ       |  |  |  |
| North Dakota               | W90EL       | DAKOTA DIVISION    | 601 S. Grange Ave. | Hope             |
| Southern Minnesota*        | W91IE       |  |  |  |
| Southern Minnesota*        | W9DEI       |  |  |  |
| Arkansas                   | W5ABJ       | DELTA DIVISION     | 2918 West 15th St. | Little Rock       |
| Louisiana                  | W5DWW       |  |  |  |
| Mississippi                | W5CWO       |  |  |  |
| Tennessee                  | W4BBT       |  |  |  |
| Eastern New York           | W8LH4       | HUDSON DIVISION    | 511 South Holmes St. | Scotia           |
| N. V. C. & Long Island     | W2AVZ       |  |  |  |
| Northern New Jersey        | W2Q0P       |  |  |  |
| Iowa                       | W9LBE       | MIDWEST DIVISION   | 325 Kirkwood Blvd. | Davenport         |
| Kansas                     | W9RLG       |  |  |  |
| Missouri                   | W9JR        |  |  |  |
| Nebraska                   | W9FAM       |  |  |  |
| Connecticut                | W1CTI       | NEW ENGLAND DIVISION | 19 Merrill Rd. | Norwalk           |
| Maine                      | W1CDX       |  |  |  |
| Eastern Massachusetts      | W1ABG       |  |  |  |
| Western Massachusetts      | W1BVR       |  |  |  |
| New Hampshire              | W1AXT       |  |  |  |
| Rhode Island               | W1HRC       |  |  |  |
| Vermont                    | W1BJF       |  |  |  |
| Hawaii                     | K7PQ        | PACIFIC DIVISION   | 21st Infantry Brigade | Schofield Barracks |
| Nevada                     | W7N9H       |  |  |  |
| Sauna Clara Valley         | W7AA        |  |  |  |
| East Bay                   |  |  |  |  |
| Sacramento                 | W7E9C       |  |  |  |
| Colorado                   | K7AQ        |  |  |  |
| Washington                 | W7LD        |  |  |  |
| North Carolina             | W4Q4Q       | ROANOKE DIVISION   | 115 Crafton St. | Winston-Salem     |
| Virginia                   | W3HRY       |  |  |  |
| West Virginia              | W8KKG       |  |  |  |
| Utah-Wyoming               | W8FA        | ROCKY MOUNTAIN DIVISION | 1371 Detroit St. | Denver            |
| Alabama*                   | W4DS        |  |  |  |
| Eastern Florida            | W4CR4       | SOUTHEASTERN DIVISION | 315 Young St. | Soldotna          |
| Western Florida            | W4MS4       |  |  |  |
| Georgia-So. Carolina-Cuba-Isle-of-Pines-Porto Rico-Virgin Islands | W4CE |  |  |  |
| Los Angeles                | W8PBP       | MARITIME DIVISION  | 120 N. El Molino Ave. | Pasadena          |
| Arizona                    | W8Q6C       |  |  |  |
| San Diego                  | W8EBP       |  |  |  |
| Northern Texas             | W8BII       | ONTARIO DIVISION   | 401 Hamilton St. | San Diego         |
| Oklahoma                   | W5C2E       |  |  |  |
| Southern Texas             | W5AZD       |  |  |  |
| New Mexico                 | W5CJD       | QUEBEC DIVISION    | 1221 Burnaby St. | Victoria          |
| Maritime                   | W61DQ       |  |  |  |
| Ontario*                   | W63JT       | VICTORIA DIVISION  | 71 Thelma Mansions | Winneipeg         |
| Quebec                     | W62EE       |  |  |  |
| Alberta                    | W7G4D       |  |  |  |
| British Columbia*          | W7E3P       |  |  |  |
| Saskatchewan               | W7E4B       |  |  |  |
| Manitoba                   | W7E4L       |  |  |  |
The American Radio Relay League, Inc., is a non-commercial association of radio amateurs, bonded for the promotion of interest in amateur radio communication and experimentation, for the relaying of messages by radio, for the advancement of the radio art and of the public welfare, for the representation of the radio amateur in legislative matters, and for the maintenance of fraternalism and a high standard of conduct.

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

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

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

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                     1010 Shoreham Building, Washington, D. C.

Address all general correspondence to the executive headquarters at West Hartford, Connecticut
WE WONDER if we are paying sufficient attention to the language of the F.C.C.'s new Rule 381. This rule has introduced a new concept into amateur regulation. In the early days of radio we used to feel that even if our signals did possess clicks and hum and great breadth and all manner of spurious products, it was nobody else's worry so long as the entire effect fell within an amateur band. The same attitude was observed towards harmonics, and in fact the original partitioning of the high-frequency spectrum into bands roughly an octave apart was not done so much for convenience in doubling from band to band as it was to insure that harmonics would fall in the same service; one of the maxims of allocation engineering in those days was “Every Service Eats Its Own Hash.” (One can imagine how far back that was by noting that it was even harmonics which were then most troublesome.)

In the days when it was a struggle to make apparatus perform properly, it was well enough to have this easy-going idea that any calibre of signal was satisfactory if only it stayed within an amateur band. But we have long since outgrown that notion. There are too many of us and our bands are too crowded. Moreover, there is no longer any reasonable excuse for it, so improved are both our apparatus and our technique. This new regulation in so many words prohibits the excessive modulation of 'phone stations— which is probably the most serious form of selfish signal. The seven monitoring stations of the F.C.C. have gone to work on this new job, and already a stream of citations is pouring forth on the little colored slips already so familiar to us for out-of-band-operation or for operating with inadequately-filtered supply. On a recent visit to Washington we had an opportunity to inspect some of these citations as they flowed through the F.C.C. mill. Some of them stated that the station observed had been employing modulation greatly over 100%, that it also had a very bad audio quality, and that its signal was very broad. When it is considered that the monitoring stations at present are making these citations only after two or more observations of the same signal, and that they are concentrating upon the signals that are greatly and palpably overmodulated, and that they cite only after making due allowance for fading effects, it is borne in upon one that these must be terribly bad signals indeed and that there is little room for anyone to object. It is up to the 'phone men, no less than to the c.w. men, to give their signals a shave and trim off the whiskers. It is much easier to do this for the sake of pride in a good signal than it is in response to an F.C.C. citation. At the very least, the latter involves the annoyance of explaining the situation and making a showing of steps taken to correct it. For a second citation for the same offense, the station is put off the air during the desirable operating hours, until tests made with two other amateurs certify to the correcting of the trouble; and for a third offense the station is put off the air altogether until it can arrange for a special test with one of the monitoring stations. This is not the grim hand of an unkindly government. It is a simple police system at work in our own interests. We trust that all 'phone men realize that the compulsory control of overmodulation will produce a farther-reaching improvement in 'phone operating than any other single step that could be taken.

K. B. W.

December, 1935 9
JUST for some good fun, and to give hams opportunity to try their hand at copying some unusual word combinations, figure groups, and simple punctuation, an annual "copying bee" is scheduled. There may be trick words, or even misspelled words, words sent in no particular sequence. The transmissions will be between 50 and 100 words in length. The sending will be by tape at about 20 to 25 words per minute. It will be a test to copy what you hear.

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

The schedule of transmissions for Friday night, December 27th, is as follows:

<table>
<thead>
<tr>
<th>Station</th>
<th>Frequency</th>
<th>E.S.T.</th>
<th>C.S.T.</th>
<th>P.S.T.</th>
</tr>
</thead>
<tbody>
<tr>
<td>W1MK (Hartford)</td>
<td>3825/7150 kcs.</td>
<td>9:15 p.m.</td>
<td>8:15 p.m.</td>
<td>7:15 p.m.</td>
</tr>
<tr>
<td>W2AYN (New York)</td>
<td>7200 kcs.</td>
<td>9:15 p.m.</td>
<td>8:15 p.m.</td>
<td>7:15 p.m.</td>
</tr>
<tr>
<td>W9IZ (Chicago)</td>
<td>7003 kcs.</td>
<td>10:15 p.m.</td>
<td>9:15 p.m.</td>
<td>8:15 p.m.</td>
</tr>
<tr>
<td>W9ABU (Chicago)</td>
<td>3546 kcs.</td>
<td>10:15 p.m.</td>
<td>9:15 p.m.</td>
<td>8:15 p.m.</td>
</tr>
<tr>
<td>W6ZF (San Francisco)</td>
<td>7053.8 kcs.</td>
<td>11:15 p.m.</td>
<td>10:15 p.m.</td>
<td>9:15 p.m.</td>
</tr>
<tr>
<td>W6AM (Long Beach)</td>
<td>3720 kcs.</td>
<td>11:15 p.m.</td>
<td>10:15 p.m.</td>
<td>9:15 p.m.</td>
</tr>
</tbody>
</table>

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

1. Any amateur operator, not having access to the tape or transmission copies and copying wholly by ear is eligible.
2. Only one copy shall count. Mark the one copy which you are submitting as your "best."
3. It is not necessary to submit more than one copy . . . but please report all the above stations heard.
4. Send in original copies. Re-copying messages invariably introduces errors and detracts from credits.
5. Copies must be mailed within ten days of December 27th to be counted.

A silver loving cup has been selected as a trophy to be presented to the winner of the copying bee. In addition to the cup, a winner in each A.R.R.L. Section will be selected. Full report will appear in QST.

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

— F. E. H.
28-Mc. WAC Accomplished

W3FAR, ZSIH and W7AMX Work All Continents—Other WAC’s Rumored

October, 1935, will go down in amateur history as a month of unprecedented activity and unusually good DX conditions on ten meters. There were times, in fact, especially on week-ends, when one had to look twice to make sure that the right coils were in the receiver—“ten” sounded just about like “twenty” does when DX is at its best! All the old familiar DX calls were there—and often with louder signals than they ever put across on 14 mc.

At the last minute we managed to squeeze word in November QST that ZSIH had worked all continents on 28 mc. Later information indicates that the first man actually to complete WAC was W3FAR, who worked J2CL at 5:40 p.m. E.S.T., October 12th, for his sixth continent—just about nine hours before ZSIH contacted J2HJ for his WAC! W7AMX worked G2PL on the 23rd for his sixth continent, according to a radioed report from G2PL via W2DTB. No other U. S. stations have reported working all continents to date, although many need only one continent. We have been informed indirectly that G2YL, OKIA W, and D4ARR also have worked all continents; no confirmation as yet, however.

W8CRA is not sure whether he made it or not, as auto QRM drowned out the J he was calling just when CRA thought he had him hooked!

Toward the end of September signals from South America and Australia were being heard in this country with fair regularity, along with South Africa. About the first week in October a few Europeans started filtering through; their signals rapidly built up to a peak inside a period of a few days. R8 and R9 European signals were the rule for about two weeks on the East Coast; toward the latter part of the month, however, conditions have taken a drop and although Europeans are still being heard their signals are weaker and fewer stations are getting through. For a time the West Coast fellows seemed to be shut out on the European stuff, but toward the latter part of the month several W6’s had snagged G’s and D’s.

So many American stations have been working Europe and Africa that a complete account of what has been going on would fill several pages. The calls heard lists appended to this screed will give some idea of the activity that has been taking place.

W3FAR’s work was done with a pair of 10’s in push-pull, using an input of only 22 watts. Five of the six continents were worked on ‘phone as well as c.w., using a pair of 46’s as Class-B modulators. The ten-meter band thus lives up to its reputation of giving real DX with low power. The antenna used is an 80-meter Zepp with 33-foot feeders, the flat-top being about 30-feet off the ground. The station is owned by John J. Michaels, transmitter chief at KYW, and is located at North Wales, Pa., about 25 miles northwest of Philadelphia. Michaels is a real old-timer, having got on the air back in 1912 under the call 9MC in Chicago; post-war 9RP, cancelled when KYW was moved from Chicago to Philadelphia. He says North Wales is a ham’s paradise for reception (and we won’t argue with him on it!).

Most W hams agree that the most consistent DX signal is that from ZSIH, the station of G. A. Shoyer of Rondebosch, near Cape Town, South Africa. ZSIH has been putting R7 to R9 signals into West Hartford practically every day during October, and his reports from other parts of the country are just as consistent. He has worked all

(Continued on page 106)
ANTENNA-ITIS is a disease of very common occurrence among the brethren of the amateur fraternity which is taken seriously all too infrequently. The patient shows high temperatures, wanders around aimlessly looking over each and every extension toward the heavens above—the higher the better. Then, too, he always comes to the aid of another ham who has taken to climbing and tries to help Professor Darwin prove out his theory of relativity—principally to the monkey. Incidentally, we have felt that the appending tail Mr. Monk uses so glibly in swinging through the tree tops might be borrowed occasionally. What a help it could be in stringing sky wires.

Having partially recovered, we hope, from quite an extensive attack of the aforesaid malady, it might be just as well that we jot down a few lines for the aid of those who may feel the onslaught of a similar attack. It caught us all unawares. An idea slipped up on us—the same old idea that worries all of us everywhere; the desire to put a signal where we wanted it when we wanted it was the sum total of the order. Roy Hunt out at W6CNE had just pulled through a very bad spell and survived with what seemed like permanent inoculation. Along with many others we had spent considerable time checking and reporting to Roy on his developments; and so came the final decision to start a few checks going in our own backyard.

Even though we live in the "Wilds of Arkansas," we have only a small amount of space in which to erect the skywire. Multi-wave, "V", diamond, phased elements—all of those were out of the realm of possibility. Anyway, they wouldn't do what we were wanting. The half-wave with its "Q" feed system was doing a good job—in its favorable directions; but we were not able to raise some of the odd spots we hoped we could reach if the antenna could only remain good for the directions it was already working and be made equally as good in the others.

Since the antenna had to be small, there was but one thing to do and that was to use rotation. At the same time we had the usual desire for greater efficiency from the antenna. Since it would be rotated, why not make it as much of a unidirectional system as possible and put our best foot forward in the single lobe? The result was the selection of a single half-wave radiator backed up by a similar reflector spaced approximately a quarter-wave. Field strength patterns for various combinations of spacing, phasing and number of elements were found in an article by Southworth and proved most useful in our experimentation.

POINTERS ON REFLECTOR SYSTEMS

It is not the intention of this article to cover the theory upon which the system used is based; but it might be well to touch lightly on a few points worthy of consideration. First of all, why use a reflector? Two reasons are more than sufficient to justify the addition to the extra element. First, theory predicts and practice proves a reasonable gain in signal strength in the desired direction as shown in Fig. 1. The increase is theoretically about 2.7 db; or, expressed in terms of power gain, a step-up in effective power of about 75%. In other words, a 120-watt transmitter used in conjunction with this system gives an effective carrier in the desired direction of two hundred watts; or, another example, the ordinary rig using a 100-watt bottle in the final does about the same job as a pair of the same tubes will do on the conventional antenna; and the expense is far less.

The second reason, though far less spectacular, is of even greater importance in the long run, especially should the idea become of rather general use. Fig. 2 gives us a nice key to reduction of interference on our all too narrow and crowded hands, whether 'phone or c.w. Not only is it true in transmission that we concentrate our signal in the desired direction with an increase in strength at that point, but also that we obtain a consequent decrease at other points of the compass. This is an actual plotted response on a receiver as the antenna was rotated through the full circle on a given transmitting station. We find that the incoming signal is received best when off the broadside of the antenna and weakest when off the ends of the array with some reduction when off the reflector. Quite frequently the shifting of the antenna direction so as to reduce an interfering signal only one or two R's has been sufficient to allow us to carry through a 100% QSO which was entirely impossible using an ordinary half-wave doublet a full-wave off ground. In cases where we were contacting a station to the west with strong interference from the north, the two

* P. O. Box 604, Texarkana, Ark.
stations being of equal strength, the QSO was impossible when both were on the air on a regular doublet; while on the “Signal Squirter” the station to the north was reduced from an R9 down to an R3 or 4, and the desired station to the west was brought in at a slightly higher strength than on the straight antenna.

Thus we find a double use for the Signal Squirter; first, a concentration of transmitted energy in the desired direction with an average increase of about one R point, and at the same time a decrease of interference produced in other directions; second, a corresponding improvement when the same system is used for receiving, as shown in Fig. 2. Increased signals at both ends with the Signal Squirter used at only one end really gives added effective selectivity. Results in actual operation over a period of a couple of months indicate that our signals are appreciably greater strength over about 120 degrees of the circle on transmission, and that about the same thing applies equally to received signals, though the two patterns are quite different in form, which is as it should be. It is further realized that greater gain in transmission as well as receiver selectivity could be obtained by the use of more complex arrays; but once again we come back to the point of practical application. At present we are not able to visualize a satisfactory array of greater gain than this which can be controlled at will with the push of a button or the twist of a crank. Our experience has indicated that the results with the present unit are so far ahead of common practice as to justify the expense and effort required in its construction.

DEVELOPING THE “SQUIRTER”

After much planning, drawing and figuring with materials obtainable on the local markets, it appeared that we could do a pretty good job of the thing; so we started to work building up a rotating element to carry the antenna and reflector. Plenty of work on nice warm June evenings finally brought out a unit that looked pretty good—until we tried to put the elements on the frame. Then things started happening plenty fast. One corner was up and the other down. The spacing good here and hard to hold there. Angles? Boy, we had plenty of them!

After sitting down and blowing off the surplus steam, we decided to stop, look and listen to see what might be done with another plot. Two or three days and nights of heavy drain on the old 66’s in the top story produced another scheme. More evenings of hard work in hot weather finally brought the second one to its end—the junk pile.

Need we go through the next two attempts? Four times at bat without even a foul ball to our credit. This desire to put signals where desired was proving a real pain in the neck and a strain on the pocketbook. But we were pig-headed enough to think we had a decent idea basically and to believe we still could yet get the unit we wanted.

THE ROTATABLE 14-MC. SIGNAL SQUIRTER MOUNTED ON ITS 31-FOOT LATTICE TOWER IS CONTROLLED FROM A CRANK RIGHT AT THE OPERATING POSITION IN THE SHACK. IT NOT ONLY GIVES REAL GAIN IN TRANSMISSION BUT ALSO LESSENS INTERFERENCE CORRESPONDINGLY WHEN USED FOR RECEPTION

December, 1935
though the rear one was quite narrow and weaker. This finally was determined to be a failure of the reflector to cancel out the higher-angle radiation. On these close-in points we also found that the signal off the ends of the assembly was cancelled out to a greater proportion than on contacts over greater distances. This had to be accepted because there was no feasible method of controlling it. Besides, the contacts over short distances are rather rare and so enjoyable when they do come through that we are glad to have the extra chance at the boys close in. Originally, we had planned to put the unit up on the tower and go to work with the field-strength meter and try to have the assembly in good efficient shape before making use of it on the air; but we had had other original ideas that didn't pan out, so to make it unanimous we went ahead and used the rig on the air as it was put up, without final adjustment, for some little time just to see what it would do in the way of working out. The final adjustment tests came later.

THE FINAL ROTATING UNIT

Passing over structural details of the earlier attempts, we will describe the seventh unit as it was rebuilt from the sixth after a couple of months use. The picture and diagrams reproduced here-with will in all probability give the reader a better idea of the method used in building than elaborate attempts to do it with words; but a few points should be called to attention and the picture thus clarified.

As shown in Fig. 3, the center member of the top structure is the heart of the whole rigging. A base plate of No. 10 gauge sheet iron 20 by 22 inches has a steel tube of 1½-inch diameter welded to it and extending 3½ feet up. Four ½-inch iron rods are used as braces to maintain the upright tube true and are welded to the tube and base plate. These rods are placed so as to not interfere with the supporting arms for the antenna and reflector. As shown in Fig. 4, these supporting arms are made of 2-inch by 2-inch selected straight-grain yellow pine treated with three good coats of shellac to prevent weathering of the wood and to provide further insulation, three pieces being used on each side, one set for the antenna and the other for the reflector. Guy wires are run from the top of the steel tube, as indicated in the drawings, to support the members. Guy wires are also run as indicated in Fig. 4 to keep the various supporting arms in their relative positions. Suitable bolts and fittings are used to fasten the arms to the base plate at the center. The guy wires from the top of the center member to the six supporting arms for the elements have two-inch take-up turnbuckles in them and all of these turnbuckles are mounted at the top of the assembly where they may be reached from the tower to allow any needed take up or slack compensation with the passing of time. Turnbuckles are likewise provided in the guy wires from the front supporting section to the rear supporting section. These of necessity had to be placed where they could not be adjusted from the center. Hence, this adjustment should be made very carefully before erecting the unit. It will hold in fine shape over a long period of time. The spacing guys used across the front and rear sections are permanently set before the end spacers are adjusted.

It is quite necessary that these guy wires all be broken into lengths of less than one-eighth wave in order that there be no chance of their distorting the pattern and producing spurious lobes at undesired points, as well as detracting from the main frontal lobe. Some fear was felt at first that the center member, being located exactly one-eighth wave back from the antenna, might have some effect on the pattern; but by keeping the dimensions below the lengths that could possibly oscillate at the transmitting frequency, this was entirely eliminated. After the entire unit was up and in operation, careful checks were made with neon bulbs and a thermocouple galvanometer to be sure there were no oscillating guy wires or other metal parts in the entire assembly. Field strength patterns later confirmed our hopes that there was no serious electrical effect from the metal in the field of the antenna.

THE ROTATING MECHANISM

The mechanical strength of the assembly described is quite beyond what we had expected and is really every bit that is needed. Before
proceeding to the actual mounting of the antenna and reflector on the assembly, we will drop back to the center member and see how it is to be held up in the sky and what mechanism is to make it turn—and turn easily. This was a problem which brought about considerable hard thinking and much planning. The first system tried for rotation was a large pulley made of wood and tempered Masonite which had a rope fastened around it for a couple of turns and tied down at the center. The unit was then rotated by the pull on one end of the rope or the other. After discarding numerous types of bearings for the unit to turn on, it was decided to use some special casters having large steel balls in place of the customary wheels. These casters were counter-sunk into the platform which had been made of good strong 2-inch material, well cross-braced and firmly mounted on top of the tower. They furnish a wonderful bearing for the assembly to turn on and offer little resistance to the rotary motion needed. They prove to be all that is desired.

How is the unit kept on top of the tower and not let roll off to one side or the other the first time a bit of pressure is applied or a breeze happens to blow? A hole 1½ inches in diameter was drilled through the center of the top platform before the unit was mounted. After it was on top and in place, a smaller tube was slipped up through the bottom side of the platform into the tube forming the center of the unit. This smaller tube telescoped into the larger one with a nice fit and when fastened down below held the top in position nicely and at the same time allowed free turning.

After the large wooden pulley mounted on the underneath side of the top center structure was found unsuitable as the means of rotation, it was decided that there should be a worm driven gear on the lower end of the smaller tube which serves as an axle for the unit. A concern handling such material was able to furnish the needed unit. We mounted this on a sub-platform down inside the tower about two feet, and fastened the drive tube to the axis tube of the rotating assembly. A nickel-steel bolt through both tubes above the metal base transferred the drive to the unit. This unit is very easy to turn from the worm side of the gear but holds the Signal Squirter in any position very firmly.

The shaft of the worm gear extends outside the tower and a light-weight grooved iron pulley of 12-inch diameter is mounted on it there. A weather-proofed rope belt of small size runs over this pulley and extends to the wall of the shack, along with a point outside the operating position where another pulley of similar construction to the one on the worm gear shaft but of about 6-inch diameter is mounted on a shaft extending through the wall to the operating position in the station. A crank on the other end of this shaft provides an easy means of rotating the Signal Squirter while on the air and as desired.

The crank business is very good but the dictates of fancy and a bit of laziness have brought the desire for "push-button" control. This matter is almost solved at the moment and about ready to put into use. Also has come the desire for an indicator in the shack, along with the push-button control, to tell exactly the direction of transmission on a calibrated meter scale. This has been worked out and will be in operation, we expect, at the same time the automatic rotation is installed.

ANTENNA AND REFLECTOR MOUNTING

Now for the actual mounting of the antenna and reflector, and the making of provisions for varying the spacing between the two as well as varying the length of each. All three of these variations are necessary to reach the ultimate in efficiency. The center supporting member indicated in Fig. 4 was cut to a length of 8 feet 3 inches from the center. A cross piece of the same material was mounted underneath to hold it in position. The cross piece was 28 inches in length. Porcelain insulators with a leakage path of better than four inches were mounted at each end of the "T" and served as the center supports for the two halves of the antenna. Similar insulators were mounted on the outside two supporting arms for the antenna side, right in line with the first two, and the distance from the center of the unit to the center of the insulators was 14 feet 4½ inches.
The material used in the antenna in the final version is an aluminum alloy tube \( \frac{3}{4} \)-inch in diameter of special design produced for this purpose. Each side of the antenna consists of a 14-foot section of this material with a \( \frac{3}{4} \)-foot section of a smaller tube that just telescopes inside the larger, providing the means of varying antenna length to the desired transmitting frequency. A small clamp is provided which allows a set screw to extend through a hole in the outer tubing, thus placing pressure against the inner tube and giving good contact between the two sections. The antenna is fed with E01 transmission cable because of its extreme flexibility and ease with which it may be coupled to any final amplifier. Straight inductive coupling was found desirable at this frequency and satisfactory for all practical purposes.

The reflector was mounted in a similar manner to the antenna, except that the "T" was not used on the center member. This was omitted in order that space variations between the antenna and reflector might be made by moving the insulators supporting the reflector closer to or farther away from the antenna. It was expected that the reflector would be farther back from the center than the antenna, which was desirable to provide a balance of weight since the antenna has the E01 cable to support over a short distance. The reflector is of the same material as the antenna. This tubing is very light and strong. There is no visible droop in either the antenna or reflector although there are spans of ten feet with no support between points. The weight of the tubing used in the antenna and reflector together is 12 pounds.

The tubing is mounted on the insulators with aluminum straps about one inch in width and \( \frac{3}{4} \)-inch thick, so cut as to place a very firm pressure on the tubing when the mounting nuts are pulled down tight. A single insulator and strap hold the center together, though there is a one-foot section of the smaller tubing telescoped inside the middle joint in the reflector. The insulators used have a sufficiently long leakage path for any power permitted in the amateur hands since they are not located at high voltage points and the shellacked supporting arms are very good insulation in themselves. No trace of leakage has been detected to date.

**Antenna and Reflector Adjustment for Best Results**

Finally, after using the Signal Squirter on the air for some little time and becoming thoroughly convinced that the thing really did do the work, we went to work with the field-strength measuring equipment and started making final adjustments. There were several factors to be taken into consideration in doing this. First, the spacing between the two halves of the antenna; next, the exact length of the antenna; then, the spacing between the antenna and reflector; and finally, the length of the reflector.

To start with, the length of the antenna was computed and found to be very close to correct. It was finally lopped off about \( \frac{3}{4} \)-inch on each side for a bit better efficiency. Of course this
change was easily made by sliding each end section of the antenna into or out of the larger section of tubing, the final adjustment being fastened firmly in place.

ords kept of all adjustments throughout the procedure, but space would hardly be warranted for the recording of all these. The final selection was 33 feet 10½ inches for our frequency of 14,215 kc. The adjustments of reflector length were found to be quite effective and produced a noticeable difference as each change was made. In fact, it seemed at this stage of the game that the length of the reflector was fully as important as the antenna length, and that both of these were more important than the actual adjustment of space between the two elements in so far as critical and close adjustments were concerned.

The results as finally obtained in Fig. 1 were quite satisfactory to us and check very closely with reports on actual reception at distances greater than 1000 miles. Since revision of the top section, no changes have been made in the spacing, length of elements or otherwise in the radiating system, although actual operation shows that some further improvement might be possible, since our back radiation is a bit stronger than one might desire, perhaps producing a consequent lack of full concentration out front, which is where we want as much as we can get. A bit of time is needed to complete these measurements and a number of other experiments that might be carried on in development of such a unit.

The effectiveness of the Squirter has been (Continued on page 104)
Inexpensive Utility Switchboard Type Racks for Amateur Equipment

By C. W. Van Duyne,* W3AKT

AS PERHAPS every amateur knows, there are many types of transmitter construction, ranging from breadboards to something like the new WOR layout, and the type of construction used depends upon the kind of work the transmitter is to do. Recently the author was quite severely bitten by the retransmission bug (i.e., a desire to patch low frequencies out on 56 mc., and vice versa); and the transmitter, being housed at the time in a steel kitchen cabinet obtained from a well-known mail-order house, did not adapt itself at all to this sport.

After some cogitation we were convinced that probably no one did more or better patching than the telephone company—so why not adopt their methods? Accordingly, the layout shown in the accompanying sketch and photograph was tried and found to be very satisfactory for both economy and utility. Also, when you slam a plug into a jack the jack stays firmly in place making it unnecessary to follow it around the shack.

Briefly, the switchboard consists of three 19-inch bays. The top and bottom supports and four upright pieces are made of dressed two-by-threes. These, of course, can be of almost any kind of wood provided they are straight, well seasoned and not too hard. The panel should be % inch three-ply ply-wood; that is, thick enough so that equipment may, if necessary, be screwed to the rear without the points of the screws showing up through the front of the panel. The top and bottom cross pieces are secured to the ceiling and floor with three brass screws at the points indicated in Fig. 1. Relatively small wood screws are ample, since practically no weight is supported by these screws—and there is no need to agitate the OW or landlord unnecessarily.

The uprights, spaced 19 inches apart on centers, are secured to the top and bottom pieces by small corner angles. Give the entire framework, when completed, a coat of Moore's "Utilack" dull black paint. Use this paint on the panels also. Two coats will cover up all the grain in the wood and give a very good imitation of slate.

(The receiver and other standard pieces of equipment are mounted behind cut-outs in the ply-wood panels, while the jack-strip provides plenty of patching connections for that desirable flexibility. Haywire may prevail in the rear without spoiling the professional front-panel appearance.

The key-shelf was constructed of wood on hand and has a hinged cover which, when closed, covers up call book, station log, patch cords and such, very nicely. The key-shelf at W3AKT is enamelled a very bright red, which is quite effective against the black background.

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(Continued on page 104)
Oscillators Using 14-Mc. Quartz Crystals

Circuits for High Output With New Thick-Cut Plates

By J. M. Wolfskill*

THE story of piezo-electric quartz crystals is, in general, well known. While their properties and characteristics can be predicted fairly well from mathematical considerations, there are still many improvements to be made. We have obtained crystals with practically zero temperature coefficient, crystals which are more active piezo-electrically, and crystals which are easier to handle and control insofar as parasitic frequencies are concerned. Very little has been done, however, to obtain crystals having a greater thickness-frequency ratio in order to extend the frequency range in which they can be used for direct control.

There always has been, and probably always will be, that pioneering spirit in the amateur to push onward and upward in frequency, to explore new territory, to discover new phenomena which exist at these higher frequencies. Any work at these higher frequencies, where the transmitter is to be crystal controlled, ordinarily demands considerable additional equipment because of the doubler and amplifier stages required. Reasonable outputs have been obtained at 28 mc. using crystal control with a forty-meter crystal, or even an eighty-meter crystal. However, the additional equipment required for good output is always a handicap and the attendant adjustments are many. Also, for frequencies higher than 30 mc. the outputs become very small. A rather elaborate setup is required for any decent power at 56 mc. using a forty-meter crystal; and even then the control is not what it might be. This has been a handicap for the amateur, and has probably kept many a good man from exploring in this virgin territory.

14-MC. CRYSTALS

Crystals for the 160-, 80-, and 40-meter bands are made in large quantities, and are used by amateurs the world over for transmitter control. A dependable 20-meter crystal has been a long-felt need; but because of their thinness and the difficulties encountered in manufacture, the old cuts held doubtful promise of such a crystal. It was with this in mind that work was begun on the development of a new 20-meter crystal cut. The objective was one which would not be too difficult to manufacture, one with a fairly low temperature coefficient of frequency, and one which would give considerable output when used in a conventional transmitter. Although tourmaline crystals have been used to some extent for 14- and 28-mc. direct control (and even for 56-mc.), the cost of such crystals is well beyond the reach of most amateurs, and their performance at times erratic. Because of the high cost of the raw tourmaline, as well as the cost of manufacturing, they gave little promise of being a satisfactory crystal for twenty-meter work, from a price standpoint rather than from piezo-electric properties.

From these considerations, development work was continued on the use of quartz to obtain higher frequency crystals. An optimum cut, employing a new operating principle, was discovered which had a considerably higher thickness coefficient than the X-cut. At the same time, the temperature coefficient was reduced to 20 cycles per megacycle per degree Centigrade, which is less than that of the X-cut. This drift is in a positive direction, and although it may seem large when compared to the new low drift crystals, it stabilizes very readily at about 40 or 45 degrees Centigrade, depending on the crystal current and the type of mounting. The fact that a considerable number of amateurs are still using X-cuts of greater drift would seem to indicate that drift of this order is not a serious objection.

Due to the increased thickness, the attendant

1 It is inadvisable to use the crystal in a mounting not especially designed for it. We are informed that this type crystal is only supplied mounted in a special low-loss holder.

—Edron.

December, 1935
ills of previous twenty-meter crystals, such as brush discharge and high r.f. crystal current resulting in fracture, are not present and cause no trouble. The crystal r.f. current may be run up to 200 ma. without danger of fracture, although the operating current should be kept around 150 ma.

This fact, together with their face size (approximately 0.7 by 0.9 inch) enables them to handle considerable power. They can be ground to any frequency in the twenty-meter band and, because of their high activity, make excellent oscillators in most of the present-day conventional oscillator circuits.

CIRCUIT BEHAVIOR

These crystals have been tested in various transmitter circuits using doubling schemes to obtain 10- and 5-meter output. In doing this an attempt has been made to adhere to simple circuits and tubes, particularly those with which the amateur is already familiar. At the same time, however, any changes in circuit design which improved the operation of the crystal were noted and these are discussed below.

The operating characteristics of a 14-mc. crystal oscillator using a Type 47 tube are shown in Fig. 1. These curves, although made on a twenty-meter crystal, are also generally representative for crystal oscillator circuits of this type. Notice particularly that maximum output does not occur at maximum crystal current, but slightly beyond that point, a good operating range being between 32 and 35 µfd. on the tank condenser. Also notice the smoothness of the curves, indicating absolutely single frequency response for a large variation in the tank condenser. The total frequency change over the entire range from 12 to 36.5 µfd. for which the crystal oscillated was not over 1500 cycles. This variation will naturally depend to some extent on the L/C ratio in the tank circuit and on the type of tube.2 For a given ratio, however, it is a good indicator of the controlling power of the crystal.

CIRCUITS

With an ordinary pentode crystal oscillator circuit as shown in Fig. 2, using a Type 47 tube and a twenty-meter crystal, output of approximately 4 watts is obtained with screen and plate voltages of 200 and 400 volts respectively. This is comparable to the fundamental output of a 40-meter crystal using the same tube and voltages. The same output on 20 meters was obtained using a 2A5 tube; with this tube, however, it was necessary to tie the cathode to the center tap of the heater winding to get maximum output. Other tubes used were the RK-20, RK-23, 59, and 6A6 or 53, the crystal giving good performance and sufficient excitation for all these tubes without excessive crystal current. In these circuits both series and parallel feed was used with no appreciable difference in their operation. A reasonably high L-to-C ratio should be used in the plate tank circuit for maximum power.

Using the RK-20, outputs of 40 watts were obtained direct from one of these 20-meter crystals. Using it as a Tri-tet oscillator, it gave an output of 15 watts at 10 meters (second harmonic). Excellent results were obtained using a Type 53 or 6A6 tube. This twin-triode type tube is convenient as a crystal oscillator and may be used either as a push-pull oscillator with the crystal across the two grids; or as an oscillator-doubler, as shown in Fig. 3. High outputs may be obtained with relatively low plate voltage, its harmonic output being considerably higher with 400-volt plate supply than when using a Tri-tet oscillator with 500-volt supply. Several of the 20-meter crystals were used with this twin-triode tube and

2 For data on the advantages of pentodes over triodes see, "Which Tube for the Crystal Oscillator," by George Grammer, Feb. 1932 QST.—Ebolton.
the circuit shown, and outputs of 2 watts were obtained on 10 meters without regeneration in the second triode section. This circuit is easy to adjust and outputs of 2 watts or more on 10 meters, with twin-triode tube crystal control, is to be heralded as somewhat of an accomplishment. The circuit constants and coil turns are given in Fig. 3 and, because of the simplicity, no difficulty should be experienced in duplicating these results. By using regeneration in the harmonic section of the oscillator, as shown in Fig. 4, this output may be increased on 10 meters, and %watt output may be obtained on 5 meters. Regeneration, however, makes the circuit more difficult of adjustment and is hardly worth using if doubling only is desired. If it is used for quadrupling to 5 meters, the feedback must be carefully controlled, so that the circuit does not oscillate at the frequency determined by the harmonic-tuned triode circuit.

The use of 20-meter crystals should open up to amateurs a new field in which crystal control may be used, and with the 6A6 tube in the circuits described, 56-mc. crystal control is definitely within reach. The development of this type crystal also has significance because it opens up new and greater possibilities of practical 10-meter quartz crystals to control our transmitters.

**FIG. 4—REGENERATIVE TWIN-TRIODE QUAD-RUPLER CIRCUIT**

L1 and C1—Same as Fig. 2.
L2 and C2—Same as Fig. 3, but center-tapped and tuned to 26 mc.
C5—Regeneration control, 25µfd. midget variable.

This complete drop-out of signals was noted over the illuminated half of the globe (not the night side) on March 20th, May 12th, July 6th and August 30th. It is believed to depend upon some emanation from the sun and its eventual analysis probably will require the study of such cosmic data as solar radiation intensity, terrestrial magnetism, atmospheric ionization, earth currents, aurora, cosmic rays, meteors, etc. The approximate 54-day period indicated that the phenomena might occur again between October 21st and 25th but at the moment of writing no conclusive reports for this period have been received. This may mean that the phenomenon did not occur this time, or that it was missed because of short duration, or that it occurred on the other hemisphere and the reports have not yet arrived. The bracketing dates are derived from the fact that the interval between the appearances has varied between 55½ and 55½ days.

On May 12, 1935, the French “radio central” receiving station near Paris experienced a sudden fading out of all high-frequency signals, so rapidly that the operators thought the power supply had failed. This wipe-out occurred at 11:57 G.T. and signals returned to normal by 12:15 G.T. R.C.A.C. at Riverhead and A.T. & T. at Netcong confirmed their records the experiencing of the same effect at precisely the same time. Other fade-outs of record occurred on March 20th at 01:50-02:05 G.T., and on July 6th at 14:00-14:25 G.T. Careful watch was made for a recurrence between August 28th and 30th and it duly put in its appearance on August 30th at 23:20-23:35 G.T.

It is a little amazing that this phenomenon went so long unobserved. Looking back on it now, there must have been many a time when we sat before perfectly dead tuners, wondering what was the matter, only to find the signals restored before trouble could be located. The first reported instance in A.R.R.L.’s files was received from F. D. Jenkins, W4SB, of Atlanta, under date of November 28, 1934. Mr. Jenkins reported that on this date at 11:10 a.m., C.S.T., signals at the Eastern Air Lines aeronautical station, WEEG, dropped out completely in the middle of a message being transmitted by WEEG, Greensboro, N. C. The entire Eastern Air Lines net from Newark to Miami was dead for thirty minutes on their daytime frequencies of 4122 and 4745 kc. During the dead period, W4SB tuned over both 80- and 40-meter amateur bands but not a single signal was logged. Broadcast frequencies, however, were normal, WLW and locals being received in Atlanta. At 11:40 a.m. receivers suddenly resumed normal operation. Mr. Jenkins says the fading was the quickest and most complete he ever observed either as an amateur or a professional. The time this was observed was twice 55½ days from the occurrence on March
Election Results

When the nominations in the 1935 director elections were examined by the Executive Committee on November 1st, it was found that three divisions had nominated only their present directors. It is provided in our by-laws that under these circumstances the candidates are declared elected without balloting by the membership. Thus we have to report that Carl L. Jabs, W9BVH, of St. Paul, continues in office for 1936-1937 as the director of the Dakota Division; and similarly S. G. Culver, W6AN of Berkeley, Calif., for the Pacific Division; and Bennett R. Adams, Jr., W4APU, of Homewood, Ala., for the Southeastern Division. In the latter division a nomination was also filed for Sam S. Harben, W4DKZ, of Gainesville, Ga., but was invalid because it bore the signature of only nine members of the Southeastern Division.

By sheer happenstance the same divisions named only one candidate each for alternate director, and these have similarly been declared elected for the 1936-1937 term: Fred W. Young, W9MZN, Mankato, Minn., for the Dakota Division; E. L. McCargar, W6EY, Oakland, Calif., for the Pacific Division; and S. J. Bayne, W4AAQ, Birmingham, for the Southeastern Division. Thus in these divisions there is no balloting this year by the membership.

Fremont F. Purdy, W4AFM, of Kingsport, Tenn., was the only candidate for alternate director of the Delta Division, and has been declared elected to that post for the coming term.

In all the remaining areas having elections this year, there is more than one candidate and the members are now making their choice by ballot. The candidates are:

For Canadian General Manager: J. Leonard Walker, VE3JI; Leonard W. Mitchell, VE3AZ; Alex Reid, VE2BE, the incumbent; Samuel B. Trainer, Jr., VE3GT. There were no nominations for alternate C.G.M.

For Atlantic Division Director: Lawrence D. Geno, W8PE; Eugene C. Woodruff, W8CMP, the incumbent, Gilbert L. Crossley of WSXE was also nominated for director but withdrew his name. For alternate: Ward J. Hinkle, W8FEU; W. Bradley Martin, W3QV; Roy G. Corderman, W3ZD.

For director of the Delta Division: E. Ray Arledge, W5SI; E. H. Treadaway, W5DKR.

For Midwest Division Director: H. W. Kerr, W9DZW-W9GP; Floyd E. Norwine, Jr., W9EFC; Frank J. Sadilek, W9APM. For alternate: O. J. Spetter, W9PG; Phil D. Boardman, W9LEZ.

For Southwestern Division Director: Charles E. Blalock, W6GG; Walter W. Matney, W6EQM. For alternate: William L. Sotz, W6HXU; Phillip S. Snyder, W6UT.

Election results will be broadcast from W1MK throughout the evening of December 20th.

Boundary

The F.C.C. has relocated the boundary between its Districts Nos. 11 and 12 in California so as to transfer Inyo County to the 11th Radio District with headquarters at Los Angeles, and the counties of Monterey, Kings and Tulare to the 12th Radio District (San Francisco). Sort of making their line resemble that between our Pacific and Southwestern Divisions.

Portables

A number of amateurs have received six-months suspension of operator license at the hands of the F.C.C. for operating under their own calls with portable status at a fixed station not owned by them. In most of the cases the station thus operated was one not yet licensed, the amateurs believing that they could legalize this operation by calling it their portable. The Commission calls this the operation of an unlicensed station, for which heavy penalties are provided. They state that the portable privilege applies only to apparatus which is portable and which in fact is from time to time moved from place to place. Although an amateur does not have to own the apparatus he employs, they point out that the license application form obliges him to make a showing that he possesses control in the case of apparatus not owned by him, and such showing of control has not been made in these cases. In fact, most of the amateurs who have been thus penalized have failed to notify the radio inspector of their intended portable operation, have not signed the portable indication, and have not kept a log. The A.R.R.L. feels that the Commission's rules are not sufficiently clear on this subject, that there are some contradictions, and the League hopes to arrange for an early clarification. In the meantime we suggest that all amateurs confine their operation in portable status to bona fide personal portable operation; that is, apparatus which is in fact portable and which is indisputably licensed and under their control.
War News Ethiopia's lone point-to-point station, ETA, can be heard on this coast handling news and the traffic of war correspondents. At this writing it is coming in well on 7620 kc. in the early evening and on 18,270 kc. during the forenoons. The French station at Djibouti, FZE, also comes in splendidly on 7635 kc. from about 5 p.m. to 8 p.m., E.S.T. The Department of State has a temporary semi-portable station at Addis-Ababa manned by four Navy operators and operating under the call NCO, frequencies unknown to us but to be somewhere in the vicinity of 9 mc. This station will handle only official U. S. government business. All of this is addressed traffic and the secrecy regulations fully apply.

Conferences The I.A.R.U. has notified the Spanish administration, custodian of such matters under the Madrid treaty, of its intention to participate in the work of the C.C.I.R. The United States does not now expect to call the conferences to prepare its position for the Bucharest C.C.I.R. meeting until after the first of the year. No definite decision has been reached regarding the meetings that will prepare for Cairo, but it is believed that they will not be called until the early autumn of next year.

Cairo Observers The Cairo Committee of the A.R.R.L. Board is distributing identifying buttons to the observers enrolled in its occupancy surveys. The buttons carry the words "Cairo Observer—For More Frequencies" and are distributed by the group controls and club overseers upon the turning in of reports. Pins only to workers—no drones. Have you got yours yet?

QSL Mr. Frank P. Barnes, K7DVF, has kindly consented to act as Alaskan QSL manager. His address is Box 297, Wrangell, Alaska. Appointments are yet to be made in K6 and KA.

Ratifications Hungary and the Dominican Republic are now announced as having ratified the Madrid Convention and its radio regulations, and the same are now in force as between the United States and those countries.

Visiting Members A good many hundred amateurs visited A.R.R.L. headquarters in West Hartford during the past summer, mostly while touring New England. We averaged at least a half dozen a day during the vacation months. For our part, representatives from headquarters have appeared before amateur gatherings during the two months preceding this writing at the following rather representative list of places: Birmingham, Charleston, S. C., Charlotte, N. C., Chicago, Columbia, S. C., Denver, Fargo, Greeley, Colo., Haddonfield, N. J., Indianapolis, Joplin, Mo., Kansas City, Lake Bluff, Ill., Memphis, Miami, Missoula, Mont., Minneapolis, Omaha, Pine Bluff, Schenectady, Spokane, Valparaiso, Fla., and Washington. The railroads ought to be paying dividends pretty soon.

Figures Here are a few statistics that will put your eye out. About 150,000 letters are received annually at A.R.R.L. headquarters. In addition to this there are every year more than 5000 copies of magazines, more than 100,000 QSL cards. A million words of copy are written annually for A.R.R.L. publication, equivalent to more than 15 ordinary books. Our mimeograph ran over 400,000 pages of bulletins and circular letters last year—and the office boy handled it single-handed in addition to his other duties. Last year the League spent $4.35 per member to create and supply QST. In addition, an average of $2.78 per member was expended for legislative protection, Washington representation, maintenance of the communications department, field travel, the technical information service and secretarial work. On top of this there were appropriations by the Board for director meetings, the expenses of directors during the year, special committees, international representation and so on. Grand total last year, $9.06 per member. Many an engineering or technical society has dues of $10.00 per year and performs not half the services for its members that A.R.R.L. does. The League member pays only its annual dues of $2.50, the balance being earned by the League through the sale of advertising space and its miscellaneous publications.

Strays

We are sorry to have to say that the listing of Joseph Schwartz, W2CH, in Silent Keys in July QST, was the result of someone's perverted attempt to be humorous. CIH wishes it to be known that he's very much in the land of the living.

DX

Breathes there a brass-pounder, soul so dead Who never gave up sleep and bed That he might work some foreign land, Whose heart has ne'er within him churned, As round and round the dials he turned To listen o'er the noisy band? If such there breathes, he'll find it true No matter how much he calls CQ, High though his power, mighty his sig, Complex the circuit, costly the rig, His chirp will never leave our sod, For he'll be jinxed by the Radio God Until he sits a whole night through, And gets the DX spirit too! —WSBBHD, with apologies to Sir Walter Scott
Self-Regulating Grid-Bias Supply for Multi-Stage Transmitters

By A. W. Friend,* W8DSJ-W8KIU

LATE radio literature has described several methods and devices for attempting to prevent the "soaring grid bias" on power amplifiers using rectifier-filter types of grid bias sources. Why should we prevent this change in grid bias? In some cases it is desirable to maintain perfectly fixed grid bias; but with most ordinary Class-C systems it is only necessary to have complete control over the grid bias at zero and maximum excitation of the amplifier tube. The thing which it is very desirable to prevent is interaction with the changing grid biases of several different stages of an amplifier. The operation of one stage may change the bias applied to another stage sufficiently to cause trouble.

A system which I have developed limits the interaction between the various stages only to that variation caused by the regulation of the rectifier-filter system of the bias voltage supply itself. This regulation can very easily be held within the desirable limits. The system is illustrated by Fig. 1. Each amplifier stage receives its grid bias from a separate anode of a diode rectifier tube connected, as shown, across the bias supply output. By the use of a resistor with two adjustable taps, the minimum and the maximum grid bias can be set to any desired value. When under load, the rectifier-filter system must supply at least the minimum voltage required for the biasing of the grid of the tube which requires the highest grid bias with no excitation applied.

With no excitation applied to a Class-C amplifier, the bias may be adjusted so as to cut off the plate current. Simultaneously with the above condition, the resistance in each -C lead should have a value which will develop the desired maximum grid bias when the maximum grid current is flowing (maximum input condition). This value may be calculated by Ohm's Law:

\[ R = \frac{E_0}{I_0} \]

where \(E_0\) = the maximum grid bias voltage desired and \(I_0\) = the (d.c.) grid current (in amperes) at full excitation. For instance, if a grid bias of 300 volts (maximum) is desired for a tube which will draw a grid current of 50 milliamperes (0.05 ampere), the resistance to which the bias tap should be set is

\[ R = \frac{300}{0.05} = 6000 \text{ ohms} \]

The _C tap should first be set to approximately 6000 ohms; and then the supply tap (from the diode plate) should be set so that the bias applied to the grid without excitation will cause cut-off of the plate current. After the excitation has been applied and all current and voltage readings have been checked, any slight changes of adjustment which are found to be necessary may easily be made. After several stages have been connected to the bias supply some slight final adjustments may be found to be necessary in the biasing of the stages connected first.

Two very great advantages of this system are that in case of failure of the bias supply voltage, automatic bias will be effected as long as the amplifier is excited, and (the main advantage) that a low-voltage bias supply will suffice for an amplifier requiring a bias nearly double the voltage of the supply. The diode tubes prevent the bias voltage built up in the grid circuit from "backing up" into the lower voltage supply circuits and possibly breaking down the filter condensers, as well as from acting upon the grids of other tubes.

(Continued on page 84)
Class-B Carrier Control in the Low-Power 'Phone
Practical Construction and Adjustment of an Effective 50-Watt Type Transmitter
By Henry S. Keen,* W2CTK

It MIGHT be said that the purpose of a good 'phone transmitter is not just to put out the theoretically best signal on the air, but to push the most intelligible signal out of the other fellow's loud speaker. The answer is not wholly one of audio quality or fidelity, for the most beautiful 'phone signal e'er breathed on the air can be completely washed out by a couple of nice (?) husky heterodynes, or spurious sidebands from an overmodulated neighbor, and rendered completely null and void. It appears that in addition to yelling for more frequencies, we would also be wise to think about how to clean up our act.

The R.F. Exciter
The exciter unit, the circuit of which is shown in Fig. 1, is built on a sheet iron base, 8 by 13 by 3 inches, after the commercial manner. A circle cutter, used with plenty of oil and elbow grease, did for the tube and socket holes. The sockets are all of the usual wafer type. The three midget tuning condensers, $C_1$, $C_2$ and $C_4$, were mounted on a strip of hard rubber panel material, two inches wide. Three holes large enough to clear the shafts were then cut in the front face of the base, and the tuning condenser assembly bolted in place under the base. The buffer tuning condenser, $C_3$, being a split-stator affair with a grounded shaft, does not have to be mounted on insulating material.

All connections to the exciter are made through a row of plugs mounted in a strip of hard rubber panel material, and fastened on the back face of the base. The corresponding row of jacks is mounted to the frame which is built after the fashion of a bookcase. The panels are fastened to the front faces or base boards of each separate unit. The two lower shelves of the frame are devoted to housing the power supplies and the two 45-volt "C" batteries. In the photo of the complete assembly, the panel has been left off the lower "floor" to give a view of the main power supplies.

The oscillator is the old reliable 47 tube. After many different doubler circuits were tried, the one given in Fig. 2 was arrived at, using a 46 tube with excitation applied to one grid and regeneration to the other. The output of the doubler is considerably boosted by use of the tickler coil, and as only one grid of the 46 is excited, it is unnecessary to tap the oscillator coil. The buffer is...
link-coupled to the final amplifier grids, a one-turn link being used. Shields are used over the oscillator and doubler coils, but this is not essential.

The oscillator and buffer plate coils are wound on five-prong forms, connected as in Fig. 1-B. Thus, when operation at the crystal frequency is desired, the doubler becomes the oscillator. The crystal is plugged in where the oscillator coil used to be, and the 47 oscillator tube is shifted along to the socket formerly occupied by the 46 doubler. All other changes in the circuit are made by changing the coils.

**AUDIO SYSTEM**

The audio driver unit is a three-stage affair, ending in a pair of push-pull 45 tubes. The layout is apparent in the photo of the audio system while the circuit is given in Fig. 2. The base is 8 by 10 by 12 inches, and is made of a non-magnetic alloy. The volume control is not mounted on the panel, but on one end of the audio driver base, to facilitate removal of the same for possible repairs or adjustments.

The first stage is a 53 tube used as a phase inverter, to accommodate the single-ended mike transformer to push-pull. There are no tricks needed to get it to working. The second stage is another 53 used this time as a straight push-pull stage, resistance-capacity coupled to the preceding and the following stages. The 45 driver stage is perfectly straightforward. Separate bias is used to avoid loss of plate voltage in a bias dropping resistor. None of the cathode resistors in the first two stages are by-passed.

The Class-B transformers were originally intended for use with 10's in the modulator. It is likely, however, that an input transformer designed to couple to a pair of 46's would be somewhat better for use with Type 841 tubes. The Class-B output transformer is a homemade affair designed to couple a pair of 10's to a 5000-ohm load. Any of the standard transformers on the market designed to do this, with 750 volts or so on the plates, would probably do the trick at least as well.

**POWER SUPPLIES**

The speech amplifier power supply is the usual low-power job, a b.c.l. transformer and an 80 rectifier, a 30-henry choke, and a double 8-µfd. electrolytic filter condenser being its principal components.

The power supply for the r.f. exciter stages, which is also conventional, consists of a transformer giving 575 volts on each side of the center coil connection.
tap, an 83 rectifier tube, a 20-henry choke and two 4-µfd. electrolytics. These condensers are obtained by hooking the sections of a double 8-µfd. condenser in series. Condenser input is used to the filter. This feeds the oscillator, multiplier and buffer stages.

The first steps in putting in controlled-carrier are to change over the main power supply to get double the usual voltage. In this case it was easily done, as separate supplies had already been arranged for the modulator and final amplifier. The two main transformers give slightly over 800 volts on each side. Type 82 rectifier tubes have been used for the last six months and there has been, so far, no tube failure. The filaments are kept hot by a separate filament transformer. The filter consists of a double choke and a pair of 1000-volt 8-µfd. electrolytic condensers in series. Each condenser is shunted with a 40,000-ohm resistor which divides the voltage for each condenser, and acts as a bleeder for the entire pack. The choke is rated around fifteen henries and is not a swinging choke. Hum has never been reported on the carrier, so the filter appears to be adequate.

A necessary to this power pack would be a bridge type, as previously shown by G. W. Fyler.1

As is necessary with this controlled-carrier system, the Class-B modulator plate circuits in parallel are connected in series with the Class-C amplifier. In the center tap of any push-pull amplifier operated Class-B a very strong second harmonic is generated. A Class-B audio amplifier is no exception. In order to prevent this second harmonic from series modulating the final amplifier, it must be by-passed out by means of condenser $C_s$. If this condenser is small it may allow the carrier to “follow” perfectly, but the second harmonic distortion will become excessive. On the other hand, a large condenser still removes the second harmonic distortion, but the carrier becomes sluggish and won’t follow the speech quickly enough to prevent momentary overmodulation and “mushiness.” At this station a 4-µfd. electrolytic condenser was used for several months, but it was found that substitution of paper condensers cleared up the speech and the amplifier “followed” faster. About 3 µfd. seems to be the best all-round value for this capacitance.

The control range of Class-C plate current used in this outfit is from 40 ma. to 190 ma. or, in terms of power ratio, over 20 to 1. If a higher ratio of control were attempted it would be necessary to reduce $C_g$, to allow the final amplifier to “follow” faster. If an extreme ratio were to be used, $C_g$ would have to be very small, so that in order to prevent excessive distortion it would be necessary to filter out or attenuate some of the low voice frequencies by means of a high-pass filter, or similar arrangement. To this end a condenser of 250 µµfd. has been used in the input grid of the first 53 speech amplifier. But if fair fidelity, with good reproduction on the extreme low tones is desired, $C_u$ must be large, and the control ratio will then have to be made smaller to prevent overmodulation.

**PREVENTION OF OVERMODULATION**

Since it takes 50% as much pure-tone audio power as d.c. input to completely modulate a carrier, the useful efficiency of the modulator should not exceed 50%. This can be accomplished in several ways: first, by shunting the secondary of the Class-B output transformer with a resistor of a proper value. The excess audio power is then dissipated in the resistor. Alternatively, the modulator can be operated into a lowered value
of load impedance. This effectively lowers the efficiency. This modulator operates into a load impedance of about 3700 ohms instead of the 5000 ohms for which the transformer is wound. At

Note the antenna current. Now get some source of reasonably pure-tone sound to swing the modulator plate current up to the same value as the final amplifier, and hold it there for a while. Did the antenna current increase over 20% or so? If it did, put the resistor across the secondary of the Class-B transformer to absorb the surplus power. If it’s a wire-wound affair with a slide, we can adjust to the best value. Overmodulation is the least efficient method of all to increase signal strength, and the most obnoxious; so keep on the right side of the fence. Now that the modulator is properly loaded, we can cut in the control by opening switch Sw.

antenna coupled the plate current is around 20 ma. So couple the dummy antenna load to bring the plate current up to somewhat less than 200 ma.

The modulator must use Type 841’s or some such high-mu tube. Type 10’s will not be as satisfactory. A lower-power version of this outfit could use Type 46’s or 59’s very nicely, with around half the input, and perhaps 900 volts for

the value to which we adjusted it. The input to the final varies as the square of the plate current, now that the control is in use, and the output of the Class-B modulator will do the same, so overmodulation will be unlikely.

The modulator must use Type 841’s or some such high-mu tube. Type 10’s will not be as satisfactory. A lower-power version of this outfit could use Type 46’s or 59’s very nicely, with around half the input, and perhaps 900 volts for

antenna coupled the plate current is around 20 ma. So couple the dummy antenna load to bring
the total plate voltage. The control ratio can be varied by means of the bias to the Class-B modulator, but indications are that about 30-1 is about the best obtainable from the 841 tubes without noticeable distortion. It appears that the use of Type 46 tubes would permit a slightly higher ratio to be used.

Another angle to controlled-carrier operation is its advantage with linear amplifiers. When following a controlled-carrier modulated stage, the linear is no longer tied down by the plate dissipation ratings of the tube. The average efficiency is very much increased, depending to some extent upon the control ratio. In view of the double plate voltage needed, it is doubtful whether this type of carrier control would be economical applied to a very high-power stage. It would probably be more satisfactory to control the carrier at a low level, and follow with a linear amplifier. It looks as though many of the boys will be able to increase their effective power output considerably with little trouble.

I would like to acknowledge the assistance of Mr. George Bird of Brooklyn in the photography in connection with this article.

A New Radio Transmission Phenomenon

(Continued from page 21)

20th, thus confirming the interval between the later occurrences.

Amateur collaboration in further observations on this peculiar fade-out is requested. The next recurrence of the approximate 54-day period is some time between December 14th and 18th. Although it cannot be foretold in what part of the world it may appear, it will affect daytime high-frequency communication in unmistakable fashion if it occurs. All amateurs are requested to observe carefully, making daytime observations as continuously as practicable, on these dates, and reporting the exact time of any wipe-out noticed, as well as the time signals return, and any other pertinent phenomena. Just drop a letter to the A.R.R.L. Communications Manager at West Hartford. This “Dellinger Effect” is an intriguing thing, and we amateurs can help in its ultimate identification. Two more items:

The sun rotates in about twenty-seven days. Why has the effect been observed only every second solar rotation? It may be merely fortuitous, and it would be desirable to make observations at 27-day intervals. One such mid-period occurs from November 17th to 21st, the next from January 10th to 14th.

Amateurs who conveniently can examine their log for data on possible effects experienced on previous occurrences, are invited to do so. Daylight operation only, of course. It would be particularly helpful to check on the 27-day mid-period between the 54-day intervals above cited, since no such occurrences are now known and the 54-day period at present seems anomalous.

K. H. W.

Strays

Some apparatus we're curious about (it's all been advertised in ham catalogs):

—the power transformer delivering 600 bolts.

—condenser with plate spacing suitable for low-powdered transmitters.

—an electro dynamite speaker (heavy on the booms!).

—the ultra-short-wave coil form 2 ft. long.

—crystals mounted in modulated Bakelite holders.

—blocking condensers insulated with India rubber mica.

—the receiver in the black-crackled mental case.

Also, we'd like to see some of those car receivers the Boston police are using—according to the newspapers, they use thirty thousand kilowatt high-frequency voltage! To say nothing of the all-mental tubes, mentioned by another paper, which have set W2EBO to wondering if they came as a result of the “Magic Brain!”

December, 1935
THE mere possession of eight transmitters and more than that number of receivers—even with 600 watts on 4 and 14 mc., 200 watts on 7 mc., and "portable" rigs of 100 watts and 1 kilowatt each—does not make a man a good ham. But Dr. James M. B. Hard, X1G, of Mexico City, has the remaining qualifying characteristics as well. His early career is striking. He has at various times been interested in ship building, photography (his inventions in this field are still used), histology, bacteriology, and pathology. In 1900 he moved from Oaxaca, to Mexico City, a prominent chemist and assayer. Three years later he founded the Hard Chemical Works, one of the largest in the Republic. He started building b.o. and s.w. receivers in 1927, became licensed in 1931. In the succeeding years he has built up a world-wide amateur renown, based both on an outstanding station and an outstanding signal.

A DX man of the highest order and never too busy for traffic is John Stanley Johnson, W4ZH. He started his amateur career in 1930 with the old T.N.T. outfit, has worked 89 countries and is WAC. Fifth in the DX Tests and high man for North Carolina in 1933, he was also a consistent old-time BPL'er. A Mexican Border veteran, graduate of Wake Forest (N. C.) College and the University of North Carolina, W4ZH taught at Cullowhee State Normal and has been at Greensboro High School for the past ten years. He has played semi-pro and pro baseball for Scranton and Rochester and in the Carolina and Virginia Leagues; as high-school baseball coach, he has won two championships and last year grabbed second place. But his biggest thrill is betting some of his DX "Students" he can work more DX on a less "DX'y" band than they—and he usually does it.

When he has worked 175 countries he will quit and get married. He has 112 now—but don’t expect rice prices to boom just yet. He has worked more J’s than any other W8, and probably than any other eastern station. His only ambition is greater DX. He has tinkered with radio since 1921; he is now 26. He has no other hobbies. He has many times been found asleep with the cans on and the receiver wide open. He has used the same antenna—an end-fed Hertz—for nine years, but he erected a new 50-foot stick recently. He started with an ’01-A Colpitts and B batteries; since then, he has used a ’10, ’03-A, 852, and now gives a pair of Gammatrons the full kilowatt. His small 8 x 8-foot shack is located almost at the top of a high hill near Cannonsburg, Pa. His name? Surely you’ve guessed it by now—Frank Lucas, W8GRA, an outstanding DX man if ever there was one.

Robert M. Smith, debonair operator of W9LD and Radiolabs in Kansas City, is a Kansan by birth, education, and inclination. He was born in Ottawa, Kansas, in 1901. Graduating in law from the University of Kansas in 1923, he immediately entered the wholesale dry-goods business. In 1929 he sold out his interest in a large wholesale dry goods firm and entered the radio game. W9LD has been on 20-meter 'phone since the very first authorizations were granted. At present, with a kilowatt to a pair of W. E. 251-A's, high-level modulated with a pair of RCA 851's Class AB, all maintained in an isolated and ideal radio location, his call rings familiarly in most corners of the world. Possessor of a rousing signal, a proficient miniature camera enthusiast, a vice-president of Senders Incorporated, Bob's sole remaining ambition in life is to QRM W6CIN.
A New Receiving System for the Ultra-High Frequencies

Complete Constructional Details of Metal- and Glass-Tube Models

By Ross A. Hull*

In Two Parts—Part II

NOW that we have "shot the works" on the general operating principles and design requirements of the superinfragenerator type of receiver, we may now proceed to talk of purely practical things. For a minute though, we will digress to cover again the basic elements and the terminology used to describe them. The first section of the receiver we will call the first converter. It consists of the pre-selector tube, the first mixer and the first oscillator. The main task of this first converter is to change the signal frequency to what we will term the "low intermediate frequency." The second unit of the receiver—the second converter unit—comprises the selectivity circuits operating on the low intermediate frequency, the second mixer tube and the second oscillator. The purpose of this unit is to change the low intermediate frequency to the "high intermediate frequency." The third section of the receiver we will describe as the superregenerative unit. It consists of the input circuit to the superregenerative final detector, the detector itself, the quench oscillator and the audio frequency amplifier. We reiterate all this simply to keep matters straight. With three detectors, a couple of different intermediate frequencies and miscellaneous oscillators it is just about impossible to describe the system (let alone understand it) without a definite understanding of which detector or oscillator is which.

Our suggestion is that the second and third units of the receiver should be built first. These are the sections in which unconventional things are done and if the builder is able to get them working satisfactorily he need have no fear about the first converter unit. Fortunately, all the necessary adjustments on the second and third units of the set can be accomplished by using them as a broadcast receiver on the high-frequency end of the broadcast band. By doing this, the various units can be monkeyed with until optimum performance is had even when the test equipment does not include a test oscillator or signal generator. Naturally, it is essential to prepare the mechanical design for the entire set before construction is started.

In both of the receivers to be described, much juggling of shield cans and tubes preceded the decision on layout. The acorn and metal-tube receiver, in particular, was planned for mounting

* Associate Editor, QST.

December, 1935
on a relay-rack panel, space being allowed for the power pack on the left side of the receiver. This required a quite compact assembly in the receiver itself. Hams unused to cramming much gear in a small space might well expand the dimensions and sacrifice the ability to put the receiver and power pack behind a relay-rack panel.

The actual chassis used measures 12 by 6½ by 2½ inches and is of folded 1/16-inch aluminum. The folding was accomplished by scribing the aluminum deeply at the proposed bend point, then clamping the sheet between two chunks of wood and making the bend by hand. Extra rigidity is obtained by using two similarly-bent end pieces as shown in the under-side view of the receiver.

**THE LOW I.F. TRANSFORMER**

At the moment of writing, we are unaware of any commercial intermediate-frequency transformer designed for 1500-kc. operation. Hence, it will have to be rebuilt from some existing unit. The transformer in this receiver was originally a Tobe T1 transformer designed for 465 kc. There are three tuned circuits, the inductance element in each case consisting of three pies in series. These pies should be removed from the tubing on which they are mounted. The best scheme, we found, was to cut away the tubing and to unwind it carefully from the inside of the coils. In the final transformer only a single pie is used for each inductance element and these are mounted on a fresh piece of bakelite tube or even wooden dowel. The optimum spacing, as far as we could determine, is about 1% inches between coils.

The selectivity obtained with this three-circuit transformer is sufficient to make most plain modulated oscillators unintelligible.

**The Second Oscillator**

In the attempt to simplify the harmonic problem in the receiver, the second oscillator was quite fully shielded. The assembly of this oscillator is shown in the close-up view. The tube socket is mounted to the chassis with a pair of threaded brass rods, on the lower end of which is supported a small bakelite piece holding the tuning condenser $C_{15}$. The coil $L_{6}$ together with $C_{19}$, $R_{5}$ and $C_{30}$ are included in this compact assembly. The shield itself is a National Type HRO coil shield cut down to the required height and drilled for attachment to the two threaded rods and for the condenser adjustment screw. The lead from the grid of this oscillator to the 6L7 tube is also shielded with a small piece of folded aluminum. This shield, however, is not essential.

**THE SUPERREGENERATIVE CIRCUIT**

The large shield can (HRO type) located near the rear center of the receiver contains the coils $L_{6}$ and $L_{7}$, the tuning condenser $C_{16}$ and the grid condenser and leak $C_{32}$ and $R_{14}$. The Hammarlund tuning condenser is mounted on the chassis with its adjustment screw projecting underneath. The coils and other components are mounted directly on this condenser. The shield is then readily inverted over the assembly and secured with the lugs projecting through the chassis.
The grid coil $L_7$ is a self-supporting type coil while the primary is wound on a piece of half-inch diameter bakelite or R39 tubing. The adjustment of this primary with respect to the grid coil is very important. It will be given treatment later. After adjustment, the primary is wedged into place with a couple of small slivers of bakelite and made secure with a few drops of Duco cement. The tap on $L_7$ is also very important but the adjustment cannot be made until the unit is placed in operation.

**THE FIRST CONVERTER UNIT**

The acorn input unit is assembled and wired on its own small chassis. This process actually simplifies construction and wiring and provides greater flexibility with respect to possible future modifications.

The chassis of this unit is also of folded 1/16-inch aluminum and measures 7¾ by 3½ by 3½ inches. The latter dimension is required in order to bring the shaft of the tuning condenser gang in line with the shaft of the National dial. The three partitions measure 2¾ by 3½ inches (not including the bond at the bottom for attachment). The three Hammarlund or National acorn tube sockets are mounted on the partition. The tuning condensers are mounted on the chassis itself, the partition being drilled to pass the drive shaft. The coils are soldered directly to the lugs on the tuning condensers, but if provision for coil changing is required, some appropriate pin-jack sockets are mounted on the partition. The tuning condensers are mounted on the chassis itself, the partition being drilled to pass the drive shaft.

The dust cover for this assembly is of folded 1/32-inch aluminum. Its lower edges are slotted so that it may be slipped under the heads of machine screws threaded into the chassis.

The wiring of the second converter unit and the superregenerative section is conventional in every respect. The only important point is to make certain that no wires carrying r.f. are made as short and direct as possible. No special precautions were found necessary to prevent oscillation in the preselector other than the usual business of running by-pass condensers to a single point on the chassis.

The wiring of the second converter unit and the superregenerative section is conventional in every respect. The only important point is to make certain that no wires carrying r.f. and associated with the second oscillator should be permitted to run in close proximity to the input of the superregenerative receiver.

**THE WIRING ARRANGEMENT**

In planning the circuit, an attempt was made to avoid anything freaky. "Simplification" of the set by using double-purpose tubes was avoided even though that procedure might have reduced the total number of tubes employed. Our experience has indicated that the use of double-purpose tubes very frequently leads to serious circuit complications and adjustment difficulties. Probably the only portion of the circuit not readily understandable at first glance is that of the quench oscillator. This oscillator is of the "grounded grid" variety, so arranged as to allow the screen by-pass condenser $C_{23}$ to serve also as a tuning condenser across both coils ($L_9$ and $L_9$) of the quench oscillator. The first and second oscillators are both of the grounded plate type originally described in April 1932 QST. The remaining unconventional section is the quench frequency filter $L_{10}$, $C_{28}$ and $C_{30}$. This is a series-resonant circuit connected across the output of the superregenerative detector to prevent the audio tube from being overloaded by quench voltage.

In the first converter unit most of the wiring is above the chassis. Needless to say, all wires carrying r.f. are made as short and direct as possible. No special precautions were found necessary to prevent oscillation in the preselector other than the usual business of running by-pass condensers to a single point on the chassis.

The wiring of the second converter unit and the superregenerative section is conventional in every respect. The only important point is to make certain that no wires carrying r.f. and associated with the second oscillator should be permitted to run in close proximity to the input of the superregenerative receiver.

**FIG. 1—WIRING OF THE ACORN INPUT UNIT**

$C_1$, $C_2$—National Type UMA condensers with four stator and five rotor plates. These are unnecessarily large for the 56 to 60mc. band but give convenient coverage of about 4mc. on each side of the amateur band.

$C_3$—National Type M30 padding condensers. (Max. capacity 30 µfd.)

$C_{25}$—500 µfd., fixed midget condensers.

$C_6$—100 µfd., fixed midget condenser.

$C_9$—500 µfd., fixed midget.

$C_{10}$—1/2 µfd., 400-volt paper-type condensers. $C_1$ may be low-voltage type.

$C_{19}$—100 µfd., fixed midget condenser.

$C_{24}$—1000 µfd., fixed midget.

$R_1$—1500-ohm half-watt fixed resistor.

$R_2$—100,000-ohm half-watt fixed resistor.

$R_3$—200-ohm half-watt fixed resistor.

$R_4$—1-megohm half-watt fixed resistor.

$R_5$—2000-ohm half-watt fixed resistor.

$R_6$—100,000-ohm half-watt fixed resistor.

$R_7$—50,000-ohm half-watt fixed resistor.

$R_8$—100,000-ohm half-watt fixed resistor.
wiring of the superregenerative detector. It should be noted that the quench-frequency filter was not installed in the receiver at the time the view of the under side was taken. Its location is of no great importance and there are plenty of vacant spaces available for the necessary choke and tuning condensers. Not shown in the diagram is a small toggle switch included in the positive high-voltage supply lead. Such a switch is invaluable.

The next step is to detune the second oscillator by approximately 1500 kc. from the frequency on which the superregenerative detector is operating.

FIG. 2—THE WIRING OF THE INTERMEDIATE-FREQUENCY SECTION

L5—Right close-wound turns of No. 22 double-silk-covered wire on a ½-inch diameter former. A National R39 former of this size was used in the original set. Cathode tap is 2 turns up from the grounded end of coil. L6—Twenty-five-wound turns of No. 30 d.c. wire on a National ½-inch diameter R30 coil form. This coil is wedged into L7 with small pieces of celluloid and the assembly made firm with "Duco" cement or acetone. See text for details of adjustment. L7—Ten turns of No. 14 bare or tinned wire ½-inch inside diameter with turns spaced diameter of wire. Cathode tap at about third turn from grounded end.

L8, 9—Windings of National quench oscillator unit. Improved performance is had in this circuit by using the small coil in the grid circuit. The "G" lug is therefore connected to the tube grid, the "Q" terminal going to the tube plate. C16—1000 pf. fixed midget condenser.

C17—100 µfd. fixed midget condenser.

C18—100 µfd. fixed midget condenser.

C19—100 µfd. fixed midget condenser.

C20—100 µfd. fixed midget condenser.

C21—.002 µfd. fixed midget condenser.

C22—.002 µfd. fixed midget condenser.

Both during the adjustment and checking of the receiver, and during normal operation.

ADJUSTMENT PROCEDURE

Just as soon as the wiring has been checked over half a dozen times, an attempt may be made to get the second and third units of the receiver into operation. The power pack will be required to deliver the usual 6.3 volts for the heaters and about 230 volts at about 50 milliamperes for the plates. We found it convenient to disconnect the first converter unit during the adjustment of the remainder of the set. The first step is to insert

the superregenerative detector tube, its quench oscillator and the audio tube. The third detector should superregenerate very readily since there is no load on its grid circuit. For this preliminary check the cathode tap on L7 might well be two or three turns up from the grounded end of the coil. At this stage, the 6L7 second converter and the second oscillator may be plugged into their sockets. This will immediately impose a load on
This may be accomplished by connecting an antenna through a condenser of 2 or 3 µfd. to the grid of the 6L7 then varying C15 until a broadcast signal toward the high-frequency end of the broadcast band is heard. The difference-frequency between the second oscillator and the third detector may then be determined by identifying the broadcast station. Usually, under these conditions, the sensitivity of the receiver is very great and it should be possible to pick up many miscellaneous signals. The receiver will, of course, be extremely broad and the operator should not be alarmed to find half a dozen broadcast stations on top of each other.

A weak broadcast signal near the high-frequency end of the broadcast band may now serve to allow tuning of the intermediate-frequency transformer. The antenna should be connected through a very small capacity to the input winding of the transformer. Then, the i.f. transformer may be tuned until maximum response is had from the broadcast signal. Naturally, a modulated test oscillator is very convenient for this job. Now comes the very important job of adjusting the coupling between Lg and Lg. This coupling should be very tight and should be increased bit by bit (retuning C15 with every change) until the third detector will just super-regenerate over the last few degrees of the potentiometer R15. It is possible, however, to get excessive coupling at this point. Such a condition will not allow the second oscillator to be tuned to a frequency 1500 kc. different from that of the third detector. Careful experiment and adjustment is essential.

It will be found that the broadcast station or test oscillator signal may be received at two different settings of C15—one when the second oscillator frequency is 1500 kc. lower than that of the third detector, the other when the second oscillator is the same amount higher in frequency than the third detector. Usually, one of these settings will be slightly better than the other.

Now comes the final clean-up. We have so far only tuned the second and third circuits of the intermediate frequency transformer. The tuning of the primary may be made just as soon as the input converter is connected and adjusted. The flexible coupling between the three condensers of the input converter tuner should be loosened and the antenna connected to Lg. Slow rotation of the oscillator condenser should reveal two spots where the background noise increases. Should the location be a particularly quiet one, it may be advisable to set up a modulated test oscillator on 56 mc., or even a superregenerative receiver functioning as a test oscillator. The idea, in any case, is merely to provide some signal or noise on which to line up the pre-selector and oscillator with respect to the first detector. If the three coils of this unit are all identical, it should be readily possible to locate the higher of the two possible settings of the oscillator tuning condenser (the lower capacity setting).

Now, the three condensers should be hitched together with their couplings and the same signal recovered by adjustment of the trimmers C4, C5. This arrangement of trimming does not allow perfect tracking across any wide range of frequency. However, it is ample for coverage of the 56-60 mc. band.

During all this adjustment of the first converter, or after it, the primary of the intermediate frequency transformer may be tuned and its other circuits re-trimmed.

SETTING THE HIGH INTERMEDIATE FREQUENCY
As outlined in the first part of this article, the choice of a suitable high intermediate frequency is very important if trouble from harmonic interference or “birdies” is to be avoided. The best procedure, of course, is to measure this frequency with a wavemeter. Since few amateurs are likely to possess meters tuning in this range, it will

FIG. 4—WIRING OF THE SUGGESTED I.F. AMPLIFIER
R1—350-ohm half-watt resistor.
R2—100,000-ohm half-watt resistor.
C1, 2, 3—.01 µfd. paper-type condensers.

FIG. 3—A SUGGESTED CIRCUIT FOR THE 6AS CONVERTER
R1—50,000-ohm half-watt resistor.
R2—250-ohm half-watt resistor.
R4—20,000-ohm half-watt resistor.
R5—50,000-ohm half-watt resistor.
C1—100 µfd. midget condenser.
C2—.01 µfd. paper-type condenser.
C3—75 µfd. oscillator tuning condenser.
C4—.01 µfd. paper-type condenser.
C5—.001 µfd. midget condenser.
C6—.01 µfd. paper-type condenser.
L1—Eight close-wound turns of No. 22 d.c. wire on half-inch diameter former. Tap at approximately the center of coil.

December, 1935 35
usually be necessary to accomplish the tuning by
cut and try. The general procedure is to find a
high i.f. which will produce no serious beat as the
receiver is tuned across the band. When a strong
beat is located somewhere within the limits of
the band, $C_{15}$ and $C_{16}$ are both turned in the same
direction by a slight amount, the test oscillator
signal recovered and a further search made for the
beats. Two or three tests of this type will soon
reveal the direction in which the interfering beats
are moving and will indicate the direction in
which $C_{15}$ and $C_{16}$ should be tuned in order to
place the beats beyond the tuning range of the
receiver. The high intermediate frequency used in
the receiver illustrated is approximately 22.5 mc.

**POSSIBLE MODIFICATIONS**

While we do not recommend the use of double-
purpose tubes in the usual instance, it is obvi-
ously possible for the advanced worker to use a
Type 6A8 tube as the second converter—so avoid-
ing the use of a separate tube for the second oscil-
lator. A suggested circuit of the 6A8 is given.

Another modification is the addition of an i.f.
amplifier operating at the low intermediate fre-
cuency. Such an amplifier would be essential in a
receiver using the conventional glass or metal
tubes in the first converter section and would be
desirable in a receiver intended for operation on
112 and 224 mc. This amplifier could be used in
conjunction with a pair of double-tuned i.f.
transformers and could be connected in accord-
ance with the circuit given.

**THE GLASS-TUBE MODEL**
The glass-tube model is presented as an ex-
ample of one satisfactory layout. The receiver
illustrated was a predecessor of the metal-tube version but suffers very little in comparison with the latter set. The input converter of the glass-tube receiver differs somewhat in its mechanical arrangement from the input converter of the metal-tube rig, but the circuit and constants are the same. Likewise, the circuit of the remaining portions of the receiver is the same as that already given, with the exception of the second mixer. The arrangement of the 6C6 tube in this position is given in Fig. 5. It is a conventional mixer with suppressor-grid injection. The other tubes in the glass-tube model are Type 97 for the second oscillator and quench oscillator; 6D6 for the superregenerative detector and 42 for the audio stage. The coil assemblies and the values of all other components are the same in both receivers. The remaining difference is in the intermediate frequency transformer. This unit is a rebuilt Hammarlund variable selectivity transformer in which a single pie is used in place of three pies originally provided. The small tuning range of the condensers in the transformer unit will make it necessary to remove a few turns from each pie in order to reach 1500 kc. Of course, there is no reason why the three-circuit transformer used in the metal receiver should not be employed in this case also, should the higher order of selectivity be desirable and should the variable selectivity feature be considered unimportant. The right idea would be to fit the chassis with some GR jacks into which several different transformers could be plugged to suit the requirements of the moment.

OPERATING CONSIDERATIONS

Both of the receivers illustrated have been given a thorough run both in the laboratory and in routine ham communication. The measured sensitivity of the metal-tube receiver is slightly greater than that of the glass-tube model but their performance under normal operating conditions is substantially the same. In neither case is it possible to use the receivers “full out” and listen to the result in comfort. The selectivity of the glass-tube model is naturally less than that of its brother, but with both receivers the now old-fashioned, unstabilized modulated-oscillator transmitter is virtually incapable of producing a readable signal. Signals from well-adjusted short-line controlled oscillators are, however, of good quality. These receivers (or any selective receivers for that matter) discriminate against frequency modulated signals and a comparison with the straight superregenerator in this respect is interesting. A very badly frequency-modulated signal, aside from being unreadable on the new receivers, is usually of no greater strength than with the straight superregenerator. On the other hand, we have run into many instances where

(Continued on page 38)
A SERIES of transoceanic tests using the 3500- to 4000-kc. band of frequencies has been arranged during December 1935, the R.S.G.B. making arrangements and obtaining full cooperation of European amateur societies and A.R.R.L.

It is hoped that great DX possibilities will be realized and that greater DX use of this band will result—to the benefit of all interested in amateur work. Many of the pioneer transoceanic contacts were made on neighboring frequencies and, after ten years’ experience, the return to good conditions and equipment as well should assure real results.

To obtain satisfactory results during the test period all stations are urged strongly to follow the suggested arrangements to reduce QRM and permit DX working. If the low frequency end of the band is kept for C.W. work only, this will give a better chance and avoid phone QRM on weak signals.

The “Silent Periods” are to give all an opportunity to locate and log DX signals, impossible otherwise. The observance of these periods is very important. The test is divided into two series of four days each, with different time periods to allow many who cannot operate at a particular time to get in on the other schedule. All hams are invited to take part in both series. All European Societies have been asked to cooperate.

The “silent” or listening periods must be kept. They will give a unique opportunity for logging. European stations (including the G’s) do not transmit for the first 15 minutes of each period, concentrating upon logging the “test” calls heard from W’s and VE’s. For the following 15 minutes W/VE’s are silent and Europe calls “test” with a view to getting heard and logged. After this, it is purely two-way working for the rest of each period. The arrangement to use two different times for each half-week is to suit those who may not be able to fit in one or the other. It will also give some comparison of results, with the hoped for reduction in QRM, between midnight and morning conditions. From 00.15 to 02, the air is free for all stations to establish contacts in both directions. The same procedure holds for the second series, starting the cycle at 05 in place of 23.45, GT.

DATER.—First Series: December 15th, 16th, 17th, 18th (Starting 23.45 GT December 14th); Second Series: December 19th, 20th, 21st, 22nd.

All stations, everywhere, using 3500- to 4000-kc. transmitters, are urged to take part in the tests, and, in any event to cooperate, first in observing the 15-minute silent period specified above for the test dates. Second, transmit in the transmitting period, attempting two-way QSO’s in the longer interval that follows. Third, report your results! This test has been arranged at the best hours for transatlantic working so that maximum possibility of successful DX work exists for all groups of phone and telegraphing amateurs. Cooperation pays big dividends in results. Do your part.

FREQUENCIES.—To assist searching and minimize QRM all stations are asked to observe the following frequency allocations:

- 3900 to 4000 kc. American and Canadian phone.
- 3850 to 3900 kc. Canadian phone.
- 3630 to 3730 kc. British phone.
- 3500 to 3650 kc. W/VE C.W.; European (including British) C.W. only. It is hoped that phone stations will leave these frequencies clear for low power and DX C.W.

American and other C.W. stations, outside Europe, have the choice of 3730/3850 kc. and 3500/3630 kc.

LISTENING PERIODS.—All stations, during the listening periods, should call “TEST RSGB de……,” giving their own call signs very frequently. After the second listening period, that is the European transmitting period, European stations should run through the dial for calls before going on the air themselves.

Send W/VE reports to A.R.R.L. and we shall forward them all across the water together for you. All European reports and those from other continents than North America should be sent direct to G5VL.

European societies are enthusiastically lending cooperation in the tests, and it is hoped that new DX records will be established on this band, the one on which so much pioneer transatlantic work was accomplished. The German society, the D.A.S.D., have published the announcement of the tests in CQ-MB, and are halting all intra-German amateur communication schedules on this band for the period of the tests. The R.E.F.
## TIME TABLE

<table>
<thead>
<tr>
<th>1st Series, Dec. 15, 16, 17, 18</th>
<th>GMT</th>
<th>EST</th>
<th>CST</th>
<th>MST</th>
<th>PST</th>
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<tbody>
<tr>
<td><strong>Starts (Dec. 14, 15, 16, 17)</strong></td>
<td>(Dec. 14, 15, 16, 17)</td>
<td></td>
<td></td>
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<tr>
<td>Europe keeps silent ..........</td>
<td>2345-2400</td>
<td>6:45-7:00 p.m.</td>
<td>5:45-6:00 p.m.</td>
<td>4:45-5:00 p.m.</td>
<td>3:45-4:00 p.m.</td>
</tr>
<tr>
<td>W/VE keeps silent ..........</td>
<td>0000-0015</td>
<td>7:00-7:15 p.m.</td>
<td>6:00-6:15 p.m.</td>
<td>5:00-5:15 p.m.</td>
<td>4:00-4:15 p.m.</td>
</tr>
<tr>
<td>Transmitting (all stations)</td>
<td>0015-0020</td>
<td>7:15-9:00 p.m.</td>
<td>6:15-8:00 p.m.</td>
<td>5:15-7:00 p.m.</td>
<td>4:15-6:00 p.m.</td>
</tr>
</tbody>
</table>

| 2nd Series, Dec. 19, 20, 21, 22 | (Dec. 18, 19, 20, 21) | | | | |
| Europe keeps silent .......... | 0500-0515 | 01:00-12:15 a.m. | 11:00-11:15 p.m. | 10:00-10:15 p.m. | 09:00-09:15 p.m. |
| W/VE keeps silent .......... | 0515-0530 | 12:15-12:30 a.m. | 11:15-11:30 p.m. | 10:15-10:30 p.m. | 09:15-09:30 p.m. |
| Transmitting (all stations) | 0530-0600 | 12:30-3:00 a.m. | 11:30 p.m.-2:00 a.m. | 10:30 p.m.-1:00 a.m. | 09:30-12 p.m. |

(France) has promised publicity and support and PA9ASD reports that he and all European amateurs seem keen for the revival of 80-meter DX working. As reported elsewhere in this QST, United States hams have since October been making two-way contacts with VK's and ZL's on this band, and everything looks bright for world wide contacts during the December 80-meter band tests. QST will report the contest results as fully as possible. All readers are asked to report the stations heard and worked in full for the contest periods given. Good luck, all.

### A.R.R.L. QSL Bureau

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

W1—J. T. Steiger, W1BGY, 35 Call Street, Williamstown, Mass.
W2—H. W. Yahnel, W2SN, Lake Ave., Hel- metta, N. J.
W3—R. E. Macomber, W3CZE, 418 10th St., N. W., Washington, D. C.
W4—B. W. Benning, W4CBY, 520 Whiteford Ave., Atlanta, Ga.
W6—C. E. Spitz, W6FZQ, Box 1804, Phoenix, Ariz.
W7—L. Q. Kelly, W7BPC, 4919 So. Prospect St., Tacoma, Wash.
W8—F. W. Allen, W8GER, 324 Richmond Ave., Dayton, Ohio
W9—George Dammann, W9JO, 319 Sherman Ave., Evanston, Ill.
VE1—J. E. Roue, VE1FB, 84 Spring Garden Rd., Halifax, N. S.
VE2—W. H. Oke, VE2AH, 5184 Mountain Sights Ave., N. D. G., Montreal, P. Q.
VE3—Bert Knowles, VE3QB, Lanark, Ont.
VE4—Dr. J. J. Dobry, VE4DR, Killam, Alberta.
VE5—E. H. Cooper, VE5EC, 2024 Carnarvon St., Victoria, B. C.
K4—F. McCown, K4RJ, Family Court 7, San- turce, Puerto Rico.
K7—Frank P. Barnes, K7DVF, Box 297 Wrangell, Alaska.

### Strays

W8KPL claims to be the only ham having a "bluffer" stage—a defunct 50-watt pretending to work alongside a 10 in the final.

### QST Index (1935) Now Available

The annual index to QST for 1935 (Volume XLIX) has been published as part of this issue, and sent to every member of the League. Newsstand readers may obtain a copy of this index for 6 cents in stamps.
The Young Squirt's Fourth Epistle to the Old Man

Well, you old mossbacked greybeard, I ain't been hearing much from you of late, and I about decided that you ain't finding nothing rotten to yell about. Guess the game is too fast for you. Putting that infernal old Betsy up in the attic along with all the other relics must have put the skids under you. I hope so, I bet you ain't even got up a stick.

They ain't nothing wrong with radio now, I guess. The only thing that ever was wrong was giving space in QST to those snorts and bellows of yours. That Wouff Hong you sent Eddie Warner hasn't been down off the wall since 1921. That's a pretty good sign, ain't it, old Methuselah? Since you quit blowing the pole transformer every Saturday night and making sparks hop across inside my Audiotron, the game has become jake for me, and if you never get back on the air again, that will be too soon. You went out just like a Swedish match in a Kansas hurricane as soon as CW come along, and that is one reason CW is such an improvement.

I been thinking about you ever since the other night. There was something mighty gosh-darned suspicious that has been worrying me, and the more I think about it the madder I get until I could bite a plug out of a nine-foot rattlesnake. You never was able to pull the wool over my eyes none, you old petrified fossil.

One of these Old Timers dropped in the other night while I was throwing the works to my bottle. The glow from my plate, which showed it was working good, causes this Pelican to get off a few wise yelps about power output. According to him, the only fellows who know anything about getting the high-powered snorts out of a jug were graduated from spark. This didn't get no rise out of me because I had a squeak box with an E. I. Co. electrolytic interrupter, as you well remember, but his next remark made me sore enough to kick the step-ins off of a tree full of wildcats. He ups and says that since the old timers are coming back in the game it is getting better, and that all it needs to be a hunnered percent is for the Old Man to get back in so there will be law and order. Just as soon as he said that, everything turns red in front of me and I bit the wrong end off my El Ropo, which didn't help to calm me down none.

When that happens, I says, I am going to move to Siberia. This oily lamp raises his eyebrows and says that since the old timers are coming back in the game it is getting better, and that all it needs to be a hunnered percent is for the Old Man to get back in so there will be law and order. Just as soon as he said that, everything turns red in front of me and I bit the wrong end off my El Ropo, which didn't help to calm me down none.

(Continued on page 108)
A "Fly-Power" 'Phone Transmitter Using a 6A7

Two circuits suggested by Leonard Tulauskas, W9LKV, for using a 6A7 tube as a crystal oscillator with modulation applied to the inner grid, are shown in Fig. 1. The upper circuit is for operation at the crystal frequency, while the lower is for obtaining output at the second harmonic of the crystal. In the latter case a circuit tuned to the crystal fundamental is inserted in the screen (grids Nos. 3 and 5) lead, the plate circuit being tuned to twice the crystal frequency. The ordinary single-button mike and transformer will have high enough voltage output to modulate completely the output of the oscillator.

W9LKV writes that no frequency modulation is detectable so long as the plate current of the oscillator does not change with modulation. These circuits have been used very successfully for short-distance work on the 160-meter band, using an input of less than three watts to the tube. They should be of interest to the amateur who wants an inexpensive low-power rig for local work or for portable use.

**FIG. 1—SINGLE-TUBE CRYSTAL-CONTROLLED 'PHONE TRANSMITTER USING A 6A7**

- $R_1$ - 500,000 ohms.
- $R_2$ - 1000 ohms.
- $R_3$ - 40,000 ohms.
- $R_4$ - 1000 ohms.
- $T$ - Single-button microphone transformer.
- $C_1$ - 1 μfd.
- $C_2, C_3$ - 0.1 μfd.
- $C, L$ - To tune to crystal frequency.
- $C', L'$ - To tune to second harmonic of crystal.

**FIG. 2—USING A REGENERATIVE DETECTOR AS A SIGNAL-FREQUENCY BOOSTER FOR AN AMATEUR-BAND SUPERHET**

No constructional changes in either superhet or regenerative detector are required.

W9LKV writes that no frequency modulation is detectable so long as the plate current of the oscillator does not change with modulation. These circuits have been used very successfully for short-distance work on the 160-meter band, using an input of less than three watts to the tube. They should be of interest to the amateur who wants an inexpensive low-power rig for local work or for portable use.

**REGENERATIVE AMPLIFICATION AT SIGNAL FREQUENCY**

Additional sensitivity and selectivity may be obtained at the cost of slight inconvenience by the use of a regenerative receiver having no radio frequency amplification, when used in conjunc-

December, 1935
Another method is to introduce an old regenerative b.c. tuner, such as the Radiola III, for instance, in the lead from an a.w. converter to the antenna post of a broadcast receiver used as an i.f. amplifier. The result is the same but the inconvenience is not so great, since the regenerative set need be tuned only once.

Other applications also may suggest themselves.

---Leonard C. Jensen, W1IW

Editor's Note.—This scheme has excellent possibilities for increasing the amplification and providing signal-frequency selectivity with amateur-band superhet having no pre-selection. Its chief advantage is the fact that a discarded regenerative receiver (most ham stations have one) can be used without the necessity for even slight changes in the wiring of the superhet receiver.

Fig. 2 shows how the method has been used successfully with a receiver of the FB-7 type using the detector of the two-tube receiver described in June 1934 QST as the regenerative signal booster. Although the ground post on the regenerative set can be connected to antenna on the super and the antenna run to the antenna post on the regenerative set, as suggested by W1IW, it has been found preferable to connect the ground posts of the two receivers together and couple the antenna lead to the regenerative tube through a turn or two around the detector coil as shown. This “ties down” the regenerative set and avoids body-capacity effects. The coupling to the regenerative tube is readily adjusted by varying the number of turns on the coupling coil. The coupling should be fairly tight, but not so tight as to prevent the regenerative tube from going into oscillation.

In operation both super and regenerator should be tuned just as they would if both were independent and were being used to pick up the same signal. With regeneration at minimum the regenerative tube will have practically no effect on the signal; with the regenerative circuit tuned to the signal frequency and adjusted just below the point of oscillation, however, there is a very marked increase in signal strength, depending upon the initial pick-up. If a short antenna is used, the increase may be as much as four or five R's, being particularly noticeable on 'phone signals. Careful observation indicates that the increase in signal strength is accompanied by an increase in the signal-noise ratio, the difference being perhaps one point on the R scale as judged audially. That is, if the original signal was R4 and the background R2, adding regeneration might increase the signal to R8 and the background to R5. At any rate, it has been possible to bring up signals to readability from being just audible in the background without regeneration. Maximum gain is of course secured when the regenerator is worked just below the oscillating point; however, a definite gain results with the regeneration backed off far enough so that the tuning is not critical.

This method of introducing regeneration also provides a means for reducing image response in supers without pre-selection. Actually the image signal is left unaffected by the regeneration, but the increase in desired signal strength gives a decided improvement in the desired-signal to image ratio. Again talking in ham language, let us suppose that without regeneration the background is R3, the desired signal R5 and an interfering image R6. With regeneration at the critical point, the signal will be increased to perhaps R8, the background to R5, and the image will be unaffected. However, if the superhet gain control is reduced to bring the background back to R3, the desired signal will drop to R6 and the image to R4, approximately. In other words, the image is now considerably weaker than the desired signal instead of stronger as it was without regeneration, for the same background noise level in both cases. The figures are of course only approximate. In practice it has been possible to pull up an amateur signal from being unreadable below an interfering image to the point where it was perfectly readable with the image practically inaudible. This was done using a small antenna; the improvement may not be quite so marked with a larger receiving antenna.

The “catch” is of course that for maximum results the tuning of the regenerative circuit is just as critical as though the tube were being used as a detector. However, for general listening the regeneration can be backed off so that the superhet operates normally; when additional gain or selectivity is needed the regenerator can be brought into play. Since no constructional work is required it may be well worth a trial by those having ham supers without pre-selection.
Milliammeter Switching for Grid and Plate Currents

Although many amateurs use plugs and jacks for transferring a meter from one circuit to another, it is often more convenient to use a switch for the purpose when the meter is to do only two jobs, such as reading grid and plate currents in a single stage. Bob Hayward, W9HDI, suggests the arrangement shown at Fig. 3A, making use of a single-pole double-throw switch to shift a milliammeter from grid to plate. With the switch thrown to the upper position the meter reads grid current; on the lower position a shunt is connected in to extend the meter range and the meter reads plate and grid currents combined. The shunt idea permits using a low-range meter of a value suitable for grid-current readings. The circuit of Fig. 3B, used by Robert E. Foltz, W9GBT, makes possible separate readings of plate and grid currents, requiring, however, the use of a double-pole double-throw switch. With the switch thrown to the left, the milliammeter is connected to read plate current alone, a shunt also being connected in to extend the meter range. With the switch thrown to the right, grid current is measured. W9GBT uses a d.p.d.t. toggle switch for the purpose.

In both diagrams the shunt may be omitted if the milliammeter range is sufficient to take care of the plate current taken by the tube or tubes.

Improved Keying-Tube Circuit

The circuit of Fig. 4, utilizing keying tubes with a fixed-bias supply for blocking, is suggested by J. O. Sales, W6HFF. He writes:

"An examination of the circuit will show that the internal resistance of the keying tube is in series with the center-tap return. This resistance is high with the key open, thereby giving very high bias and low-effective plate voltage on the tube being keyed. The bias on the keying tube need not be as great as in usual tube keying systems; the effective bias on the two tubes in series in the high voltage circuit blocks the plate current. The operation of the system is more positive than either grid-block or tube keying alone, and the current broken by the key is less. A slightly lower value of grid bias or leak than usual should be used because the plate resistance of the keying tube at zero bias is in series with the c.t. return (cathode bias) with the key down. This system works excellently with the crystal oscillator and allows break-in operation without any click in your own receiver."

More on Switchless Monitoring

The monitoring scheme outlined in the October Experimenters' Section by W3EHE has the hearty endorsement of Roy A. Jenkins, W6RB, who worked out the same type of system independently for use with the regular non-regenerative type of superhet. W6RB makes no provision for introducing the transmitter signal into the receiver, depending upon stray pickup for the purpose. He writes:

"The method allows break-in, provides a constant check on actual signal transmission, requires no relays, no extra phones are needed, nor is any switching whatever used. The fact that the monitoring signal is the same strength regardless of the receiver setting is in itself enough to make this scheme desirable.

"To put it into operation, the receiver, transmitter and frequency meter are all allowed to warm up a bit. If the oscillator is not keyed, rotate the freqmeter dial until the beat against the transmitter is heard in the receiver. Turn the receiver dial just a bit and see if the beat disappears. If it does, turn the freqmeter dial until another beat, one which does not disappear when the receiver is tuned, is heard. The beat is then on the intermediate frequency of the receiver and must necessarily remain unchanged when the receiver is tuned. When the oscillator is keyed, the key must be closed but the succeeding stages need not be operating unless a louder signal is desired. It should not take longer than five minutes to make the whole test; after that changes can be made to secure proper signal strength in the receiver.

"One point worth mentioning is that the receiver is equipped with a crystal filter, only the two transformers of which are shielded. Since the phasing condenser, shorting switch, crystal holder and socket are all unshielded there may be more signal picked up in this receiver than in one with the intermediate stages fully shielded. It may be necessary in some cases to leave the shield cap off the first i.f. tube, couple a short wire to the grid leak and stick it out through the cabinet, or even couple the grid of the tube fairly tightly to the output of the freqmeter. Individual station equipment will require different adjustments."

(Continued on page 100)
W2CBO, Scotia, N. Y.

R. A. LASH of 111 Pershing Drive, Scotia, N. Y., is the man behind the key at W2CBO. His first license, under the call WSCQS, was issued in 1928; moving to New York in 1930 brought W2CBO.

The transmitter shown in the photograph consists of 47 crystal oscillators, two frequency doublers using 46's, a pair of 10's in a buffer amplifier and push-pull 211's in the final. Power is furnished by four separate rectifier-filters and the input to the final amplifier usually runs about 500 watts with a plate voltage of 1400. Plate and grid meters are provided for all stages.

The receiver is a duplicate of the original crystal-filter single-signal receiver described in QST in 1932. To its left is a frequency meter-monitor. A 3.5-mc. Zepp antenna, 40 feet high, is operated at all frequencies.

While W2CBO has operated both 'phone and c.w. in the past, present operation is confined to c.w. in the 3.5, 7, and 14 mc. bands. WAC was made during the last DX contest.

W7BVL, Seattle, Wash.

The accompanying photograph is a general view of W7BVL, owned by Howard L. Dull, 7214 Talatine Ave., Seattle, Wash. In the design of the station, good quality transmission rather than power output has been the first consideration. Most of the operating is done on the 20- and 75-meter 'phone bands, with a power input of 150 watts. W7BVL has been on the air since January 1932.

The rack and panel on the right contains a four stage r.f. unit, consisting of a 59 crystal oscillator, a 59 buffer-doubler which excites two type 10's in push-pull, and a link-coupled 211 as a final amplifier. Grid leak bias is used in the final amplifier, and the coils of the r.f. exciting units are shielded to eliminate feedback. The high-voltage and low-voltage power supplies are at the bottom of the rack; next above are the low-power stages, followed by the final stage and antenna matching network. The antenna used at the present time is a 75-meter center-fed Hertz with 45-foot feeders and 120-foot flat-top.

The audio equipment includes an Amperite velocity microphone with a four-stage resistance coupled pre-amplifier employing a 75 high-gain triode, a 76, and two 37's. The pre-amplifier is not
shown in the picture, but it is one completely shielded unit. The output of the pre-amplifier feeds into two 56's in push-pull, followed by two 2A3's as push-pull drivers. These in turn excite four Type 50's in push-pull parallel as Class-AB modulators, making a total of seven stages of audio. The modulator and high-level audio equipment are in the rack on the left—the large meter shown in the picture is in the plate circuit of the modulator, and provides a check on modulation. The additional equipment includes a vacuum-tube voltmeter and a special two-stage amplifier in the phonograph box on the desk. It is utilized for the phonograph pickup, and as an emergency pre-amplifier for a carbon mike.

The receiver at W7BVL is a nine-tube home made superheterodyne which incorporates a.v.c. and an "R" meter. A separate matched impedance doublet receiving antenna is used making possible duplex operation. Cuba, Mexico and the Hawaiian Islands, as well as all districts in the United States and Canada, have been worked on 'phone, and SWL verifications have been received from beyond these limits.

W6GHD, Walnut Creek, Calif.

GEOEGE S. BENNETT of Walnut Creek, Calif., owner of W6GHD, first ventured into amateur radio in 1909. Seven or eight years of sea-going brasspounding followed—must have seemed enough to last a lifetime, since he swore he wouldn't touch a key again! However, the bug wouldn't be downed, and 1932 found him back in the game with more enthusiasm than ever. W6GHD has two transmitters, the large rack-mounted one at the left in the photograph being a c.w. rig capable of inputs up to a kilowatt. It uses a 47 crystal oscillator, push-push 45's as doublers, a 50-T driver and a pair of 150-T's in the final. An auto-transformer with plenty of taps makes it possible to vary the plate voltage to the final in steps of 500 volts. For trans-Pacific work, a specialty of this station, the input usually is about 600 watts.

The small rig on the file cabinet at the right in the photo is a low-power 160-meter 'phone job using a pair of 46's to modulate a pair of 45's in the final. The r.f. plate input is about 40 watts. The receiver will be recognized as a Hammarlund Comet Pro.

W6GHD's chief interest is handling traffic over the Pacific. Schedules were maintained with AC2RT and KA1NA for about two years before these stations closed down. At the present time schedules are kept three times a week with both OM1TB and VK6MO, considerable Carnegie traffic being handled with the latter. W6GHD is WAC and also an ORS.

Silent Keys

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

Harry D. Blain, W6BLS, Monrovia, Calif.
Dorothy Dodds, W9OSJ, Mindenmines, Mo.
S. L. Fasley, Jr., W5AMF, Hereford, Texas.
Eggar R. Gamble, W4CTK, Kings Mountain, N. C.
Alfred H. Grebe, ex-W2ZG, Richmond Hill, L. I.
Robert L. Green, W6GHH, Cleveland Heights, Ohio.
William E. McMurtry, W5AHC, Longview, Texas.
George P. Taylor, W9BAN, Henderson, Ky.

Strays

Old Poor Richard may have been one of the original amateurs, but he's been a long time getting a call. W9OKZ writes that WSONJ has just been issued to Benjamin Franklin!

Why buy a receiver when an electric stove will do just as well? W5AID says his 75-meter fone rig puts a QSA4 R5 signal into a teakettle on the electric stove in the kitchen of one of his neighbors!
**With the Affiliated Clubs**

**Hamfest at Indianapolis**

DECEMBER 7th and 8th are the dates set by the Indianapolis Radio Club for its big hamfest. Activities will center in the Indianapolis Power and Light Auditorium, 1234 West Morris St., Indianapolis, Ind., and will take place from 10:00 a.m. Saturday (the 7th) until Sunday p.m. Admission is fifty cents. The program will include some of the finest talks and demonstrations ever presented at any ham gathering on subjects of interest to all. A special committee has arranged to provide answers to any ham problems which may be troubling you. Come early and avoid the rush!!

**Houston Amateur Radio Club**

The Houston (Texas) Amateur Radio Club is working out plans for better cooperation with the Red Cross in times of emergency. Definite and systematized arrangements will make possible fullest amateur radio aid in time of need. The H.A.R.C. is building portable equipment for emergency use.

**Intercity Radio Club**

The Intercity Radio Club, which includes the amateurs of Mansfield, Shelby, Galion, Bucyrus, Crestline, Tiro and Mt. Vernon in the state of Ohio, presented a c.w. and 'phone station on the air at the Richland County Fair, Mansfield, September 17th-20th. Operation was under the calls WSIWK and WSWE. This was the first public display of amateur radio in that vicinity and attracted much public interest. Many contacts were made and some traffic originated and handled via schedules with WSJ,JM, WSBCA and WSDQA. Operators were WSIWK, WSNAE and W8WE. The highlight of the exhibit was a chess game between WSWE at the Fair Grounds and WSJJM in Mansfield.

At the Shelby Community Street Fair, September 26th-28th, the I.R.C. was given the use of a business room, light and water, and another exhibit was put on, which was well attended by local citizens. An amateur station operated under the call WSEM. Operators were W8EMK, W8DWP, W8FQY and W8PO. Traffic outlet was provided via W8KUY. The regular club meeting was held at the exhibit room on the 27th. The Intercity Radio Club plans to repeat these exhibits, the publicity from which is beneficial to amateur radio.

**Navy Night**

The Oakland Radio Club is indebted to Fred Mangelsdorf, W6KTU, who secured speakers and sound-pictures from the Naval Reserve unit in Oakland, Calif., for the September 17th club meeting. Speakers were Lt. Commander H. U. Linkins, commandant of the 12th Naval District, U.S.N.R., Lt. (jg) Lucas, and Chief Radioman U. Stenbach.

CRM Stenbach, U.S.N.R. opened the meeting with a terse history of Naval radio equipment from the days when the admirals and captains flatly refused to have radio equipment aboard their ships because it spoiled the symmetry and gracefulness of the Naval vessels by adding unsightly aerials, to the present day when radio is one of the most important features of our "first line of defense." He told of the difficulties encountered during the last war when operators were at a premium, unskilled, not knowing Naval procedure, unfamiliar with the various codes, of their difficulties with the old spark and arc sets in use in the "good old days," of the intensive course in radio given to new men, a six months' course with one month at Harvard before being shipped to sea as full-dressed Naval radio operators. It was a good talk and well received.

The second speaker, Lt. Comdr. Linkins, U.S.N.R., told of the present organization of the Naval Reserve, its aims and ambitions, the two weeks' cruise every year available to members, their drilling, seamanship instruction, and other phases of Navy life. He made one very pertinent statement: During the World War it was figured that it took at least six months to train a radio operator in radio fundamentals, then another thirty days of the most intensive instruction before an operator was sent to sea; seven months in all. It is now estimated that thirty days' training will enable the present members of the U.S.N.R. to go over the side of a Naval vessel, knowing procedure, tactics and thoroughly familiar with shipboard life!

Lt. Lucas, U.S.N.R., added to the comments of CRM Stenbach and Comdr. Linkins by telling more about the present set-up of the Naval Reserve Communication System, always stressing the point of accuracy and speed, so essential to the fleet maneuvers in all its many ramifications, from the huge "battle-wagons" down to the little "Eagle-boats" and lowly colliers and tugs. Six reels of sound pictures were shown. Subjects covered were "General Navy Battle Maneuvers," the light draft Naval vessels on "Yangtze Patrol," "Submarine Service," "Sky Service" and ships in "Far Eastern Service." The old U.S.S. Utah, ex-NVE, has now been converted to a floating radio laboratory, capable of being controlled (Continued on page 114)

46 QST for
DX Score:

W4EG's DX scoring system, proposed on page 41 of the October issue of *QST*, has aroused appreciable comment, both pro and con. The general consensus of opinion seems to be that it is a good system, but that it has its faults — these being primarily matters of definition, like all the rest of these DX problems. In view of the generally favorable reception of the suggestion, we are pursuing the matter to the additional extent of answering a few of the questions that have been raised and suggesting some uniform solutions.

The principal objection to the system, which, it will be remembered, comprises the counting of *districts* worked, as indicated by prefix sub-divisions, seems to be that not all numerals following prefixes indicate geographical divisions. Countries where this is true are: Algeria (FA), Argentina (LU), Bolivia (CP), Dominican Republic (HI), Egypt (SU), Great Britain (G), Guatemala (TG), Hungary (HAF), Iraq (YI), Irish Free State (EI), Norway (LA), Panama (HP), Paraguay (ZP), Poland (SP), Uruguay (CX), and Venezuela (YV). Under the present call assignment systems in these countries, only one point can be claimed for each country in the DX Score. Information concerning other countries where these conditions apply is requested.

A number of other, less obvious, points have been brought up. Among these is the status of such calls as W10, VE6, VE9, etc. Since the DX Score is based on geographical coverage, these prefixes fall into the same category as above, and do not count. Ships at sea, it would seem, cannot logically be counted, considerable discussion of this point having evolved no reasonable ruling. In South Africa, the prefixes ZS, ZT and ZU are regarded as identical, only the numerals being counted, giving a total of six districts. NY1 and NY2, being irregular amateur prefixes, it seems can best be combined with K5 to give one point to the Canal Zone.

We wish again to emphasize that the DX Score system is offered only as a suggestion, in the interests of uniformity. Its use or non-use, adaptation or modification, is strictly up to the individual. But it does offer an interesting and sporting new DX goal to shoot at. Further comment is solicited.

Erratum:

Incorrect was the first digit in the membership figure given for the R.S.G.B. in the November issue. The thriving, active British Union member had a membership total of 2200, not 1200, as stated; the membership now, less than a year after the figures quoted were issued, is in excess of 2500.

QSL:

J. MacIntosh, ex-VS2AF, has resumed his post as R.S.G.B. representative for Malaya and Borneo, and all cards can be sent to him in care of the Posts and Telegraphs Dept., Penang, Straits Settlements, Malaya.

The correct address of the J.A.R.L. Japanese QSL Bureau, is as follows: P. O. Box 377, Tokyo, Japan.

Regulations:

The P.Z.K. reports that the following bands are open to amateur operation in Poland: 3.535—3.565, 7.05—7.245, 14.09—14.31, 28.16—29.83, and 56.3—59.68 mc. Operator and station licenses are
both issued upon examination, without fee, in cooperation with the P.Z.K. Both 'phone and code are permitted, the maximum input being 50 watts. The Polish government regards amateur radio as a cultural asset. There are 200 licensed stations in Poland; the P.Z.K. has 520 members.

From the Newfoundland Amateur Radio Association comes the information that no power limit has been fixed in Newfoundland, all Madrid bands are open but special permission is required for 1.7-mc. operation, c.w. and 'phone subdivisions are similar to those in the United States, an operator's license costs $1.00, a code speed of 12 words per minute is required, a station license costs $2.00, the station license covers operation of portable equipment under the station call with the addition of /P to indicate portable operation (the R.S.G.B. proposes that a similar system be followed throughout the world), third party traffic is permitted, and pure d.c. is required. On June 30, 1935, the end of the licensing year, there were 22 amateurs licensed, of which nine were members of the N.A.R.A.

The R.E.F. reports the following sub-division of French prefixes by the Posts and Telegraphs Ministry:

CN8: Morocco
F3, F8: France proper
FA3, FA8: Algeria
FBS: Madagascar
FDS: Togo
FE5: Cameroons
FF8: French West Africa
FG8: Guadeloupe
FIS: French Indo-China
FK8: New Caledonia
FLS: French Somaliland
FM8: Martinique
FN8: French Indies
FOS: Oceania
FP8: Islands of St. Pierre and Miquelon
FQ8: French Equatorial Africa
FR8: Reunion Island
FT4: Tunisia
FU8: New Hebrides
FY8: Guyane

Amateur station licenses are readily obtainable in Estonia. The operator is required to pass an examination on code practice and radio fundamentals in order to secure his license. The annual fee is 10 Kr. or about $2.50. 'Phone and c.w. are equally permitted; the maximum power is 50 watts.

General:

Membership in the official "They Don't QSL" complaint club is growing ....... YU7VV is the latest addition ....... D4DJC-exD4BOC reports non-QSLing by several stations ....... See also the "Correspondence" section, this issue ....... Send cards for XZA10G in care of A.R.R.L. Hq. ....... G2OW reports unauthorized use of his call, and requests that the call be ignored if heard during the remainder of 1935; information on the bootlegger is, of course, desired ....... J. S. Nicholson, VU2/F, writes concerning his QRA: "Perhaps you will be interested to know that I am situated at a height of 6450 feet above sea level, and that the position of Munnar is 10.10' N and 77.4' E. The station is a CO-FD-PA affair, with 10 watts to the PA. The antenna is a ½-wave Zepp, with 66-10 1-inch top and 45-foot feeders. The angle of radiation is low; in fact, it is almost on the horizon!" ....... Harry G. Burnett, W1LZ, claims a record for DX QSL cards received in one batch: 402 cards, weight 4 lbs., from A.R.R.L. 1st district manager Steiger, W1BGY ....... A total of 72 WAC certificates were issued during the month of October; if things hold up, the grand total will closely approach 2000 by the end of the year ....... A new station is F7CGV, located in New Caledonia, worked by K6BUX October 21st ....... The frequency is about 14.3 mc., with a wobbly and creeping d.c. note ....... Any station which has worked VK2FD and not received a QSL card should notify W7CSF ....... Len Moncour, VK3LN, has been making a true "ham's journey" of the United States and Canada, stopping off to see almost every ham he has ever worked ....... QSL cards from these stations are his identification cards; he has been royally received in many places on the long road between Hollywood and West Hartford ....... Manfred Asson, EP2D, of Tartu, Estonia, reports excellent reception of East coast W stations and K4 and K5, with west coast stations being heard frequently ....... Asia and Oceania, too, are received very well; harder are Central and South Africa, with South America the hardest of all ....... Cards for Andorra (PX) should be sent to the U.R.E., Apartado 262, Madrid, Spain ....... T. Okinishi, K8CQV, visited the shacks of 29 Japanese and two Manchurian hams on his recent tour, met a total of 75 ....... That's covering the ground! ....... On Sunday, Oct. 27th, Miss Nelly Corry, G2YL, made WAC on 28 mc. in a little more than 6 hours! ....... Says W1BLO, it looks like the YL ops are showing us up ....... Hi!—and hearty congrats, G2YL ....... This was, incidentally, the first W.B.E. on ten; tax, G5BP ....... The E.D.R. held its annual meeting Sept. 15th, elected the following officers: James Steffensen, OZ2Q, president; Ahrent Flensborg, OZID, secretary; H. W. Petersen, OZ7Z, treasurer; Poul J. Jensen, OZ7GL, QSL manager; and Helmer Fogdcigaard, OZ7F, editor "OZ" ....... The E.D.R. now has more than 300 members, and is steadily growing; membership dues were recently decreased from 18 Kroner to

(Continued on page 100)
THE SWEEPSTAKES will be in full swing as this copy of QST is delivered to readers. Every U.S.A. and Canadian ham can take part. The badge of entry into the “SS” is merely the adoption of the call CQ SS. If just looking for QSOs without time to spend in more than a passing way on the contest, the use of CQ SS will still bring ample in the way of QSOs and contacts with every corner of North America. It is an achievement to “work all states” and many the ham who completes his collection of cards from the hard-to-get states during one of the national QSO parties, that have become so well known as the “SS.” The “SS” is a thoroughly democratic activity into which every ham on any ham band can enter in a large or small way as he desires. Just by use of a CQ SS. It is requested that all participants with their reports include suggestions and comments that will be helpful in modifying the arrangements from year to year in line with what the majority want.

We expect that the degree of phone participation will be somewhat greater than usual this year since a parallel certificate award to the leading “phone” participant in each A.R.R.L. Section has been announced. While the announcement met with favor, the decision on whether this feature will be discontinued or the “phone” part of the contest tailored, expanded, or rearranged is yours to make. Reports and reactions from a majority of radiotelephone operators will govern. Special consideration has been given to “phone” activity in this “SS.” If this is what you like, let us know. If not, then what would you and do you suggest as a suitable activity?

Personally if we had our choice, the “SS” would run, say, four days only, ending in a Saturday-Sunday period, but we have hesitated to announce such a change fearing this might detract from the success and popular affection in which this and the DX tests are held. Comments on this thought will be appreciated. If so shortened, should the corresponding 40-hour-operating-time handicap be included, or could it then be dispensed with?

The Cairo survey blanks are available to every W or VE ham who wants more frequencies for operating work and is willing to put in some time making observations in the 4000-4500 kc. or 6000-8000 kc. range. Any receiver with a beat oscillator that will cover these ranges or even a sub­

The League’s Cairo Committee (WSCMP, WIKH, W8HC) announce the availability of a new A.R.R.L. button for work in the cause of amateur radio in the Cairo Preparatory Surveys (4-4.5 and 6-8 mc.) of commercial occupancy. Done in black and gold, the pin is of 1⁄4-inch diameter and bears the A.R.R.L. diamond. This attractive button in League colors will be given to amateurs who are doing things regularly in the survey. The new buttons will be carefully restricted to Cairo Observers who actually submit logs of value in connection with the survey, either direct to A.R.R.L. Headquarters, or through one of the group-centers conducting planned work in connection with the survey. Those who have already won the new League button through consistent surveying will be first to receive the emblems.

DO YOUR PART. Get lined up for survey work to-day if you have not already volunteered. Your acknowledgment card, and a word as to which range you can cover will bring you details and the new League button when your logs in behalf of the cause have been forwarded.

Here’s a pose that can be answered by taking part in different operating activities. How is your operating ability? Is your ability to copy through QRM as good as you think it is? If your ear can pick them out then it is a question of how accurately you can copy what you hear. The Navy Day receiving competition brought us a deluge of copies (Honor Roll will appear in an early issue) and showed up inaccuracies. Another test is afforded in THE A.R.R.L. COPYING BEE scheduled for December 27. Six high power stations have been selected to transmit. See the full schedule on page 10. Mark the calendar now. Be on deck. Copy what you can and send it in reporting how the various stations came in at your location. It’s lots of fun to try it besides being good practice.

— F. E. H.

Florida QRR Work

Emergency communication work is not new to Florida amateurs. Many times have they been called upon to provide communication when regular channels have failed, and never have they been found wanting. They have always come through. Such was the case during the Labor Day storm this year. Reports of work at various stations follow:

W4GOT: This station was on the air 107 hours and was open for storm duty 172 hours and 23 minutes. W4GOT in Miami, and W4AHI and W4DNY in the Keys were the only means of communication with the stricken area up to September 6th, and all news items, relief instructions, orders for medical supplies, etc., came through these stations. W4AHI was on the air 36 hours, W4DNY, 14 hours. W4AHI was actually set up for 74 hours and W4DNY for 49 hours. Operators doing duty at the three stations were W4GOT/ W3K, W4AHI, W4D, W4DER, W4CXB, W4CNA, W4GRI, W4BDD, W4CQZ, W4DNY, W4DMY, W4D, D. H. Cross, E. G. Little, George Hill, and C. R. Gray. These men put in a total of 677 hours of duty! All work at W4GOT and W4AHI was on 3.9-mc. phone. W4COT went on the air September 1st at 7:30 a.m. Reported into the 3.9-mc. phone storm net at 8:30 a.m. Copied NAA storm report at 10:00 a.m. Stood by for weather reports all afternoon. Worked W4DLH, W4ACZ and W4AHE and gave latest WX. Transmitted WX several times throughout day and night, September 2nd, W4COT: Sent latest WX at 10:30 a.m. Warned W4DLH and W4CZ and stood by to report. At 1:30 p.m. called W4CXB and W4DNY to line up relief operators. Later also got W4DER. At 6:45 called W4CQZ to warn residents of Redlands district that storm was approaching. Obtained latest WX from state amateur storm net. Electricity was cut off all over Miami at 7:28 p.m. as safety measure; while in contact with W4CQ, Converted receiver to battery operation and continued to copy weather, which were relayed by telephone to the proper locations.
This continued all night, with both telephone trunk lines kept busy. No time to eat or sleep and no relief operators. September 3rd, W4COT (his 30th birthday): After daylight transmissions and antenna was repaired in heavy gale. Electricity still off. W4AKI was trying to get some sort of emergency power. By noon W4AKI was on the air with emergency 3.9-mc. Phone, 60 watts. W4COT continued to handle calls and give WX reports. He would go to the Keys, W4COT called W4AVQ and reported into the storm net. W4AKI came on at Islamorada about 9:30 p.m. with relief traffic. Contact continued all night. September 4th, W4COT: Continued traffic with W4AKI. Volunteer operators began to report Ian. COT had been on (the one op) 63 hours and moved deeper into the stricken area, and at 1:15 p.m. contact was established between COT and AKI at Matacumbe Key. Due to a mistaken order of the Coast Guard, W4COT was permitted to operate here. At 4:30 p.m. contact was again established between W4AKI at Tavernier. The COT-AKI hook-up gave the Red Cross answers to messages in 10 to 20 minutes, and several times the Red Cross representative was connected directly with HQ's in Miami by feeding the receiver into the telephone line. This enabled him to give a direct and complete statement and report fully as to conditions at that time. September 5th, W4COT: Continued to contact W4AKI. At dawn Fred Bassett, Jr., owner of AKI, was relieved and returned to Miami after 45 hours of duty. At 2:05 p.m. W4AKI closed down and returned to Miami as other communication (one telephone, and two telegraph lines) had been opened. COT continued to contact stations of the Florida storm network. At 4:30 the Red Cross called to say that commercial communication was unsatisfactory and asked if we would go down to the Keys again. September 6th, W4COT: Continued to contact state storm network. Line up several operators and a boat (U.N.R. YP-48) for transportation. Boat got under way at 3:00 p.m. and contact was established at 9:00 p.m. Operators aboard were W4DMY and W4MD; the latter had not been asleep since September 1st, so another operator, W4CWX, was sent from Homestead; he arrived Saturday morning after sun-up. September 7th, W4COT: Continued to contact YP-48 (call W4DMY), handling messages for Red Cross and FERA. September 8th, W4COT: Reported on storm net at 8:00 a.m. Worked YP-48 at sea. Off the air at 11:30 a.m. Closed station, met boat, and drove W4CWX home to Homestead, 35 miles from Miami. Approximately 1700 phone calls were made at W4COT during the emergency period. Approximately 8000 words were handled. Power at W4COT was 200 watts to the antenna. W4AKI, the portable, used batteries to run the generator from it. 

W4AVQ: This station went on the air in the Florida 3.9-mc. Phone Emergency Network at 7:30 p.m., September 2nd, and went off the air at 11:30 p.m., September 5th. During these seventy-six hours the transmitter was off the air for only four hours; this four-hour absence was due to power supply failure. Weather reports and storm progress reports were gathered from various amateurs in the storm net and forwarded to those concerned. Stations worked at W4AVQ included W4COT, W4GQ, W4CQJ, W4AKI, W4ASR, W4AUQ, W4DU, W4AFO, W4WS, W4AFC, W4NN, W4ZJ, W4CQ, W4BCZ and W4COS. Information handled at W4AVQ filled letter-size sheets! Every half-hour schedules were maintained with W4TQ. Sarasota, many messages being handled over this circuit for the Florida Power and Light Co. An every fifteen-minute schedule was kept with W4GQ, Clewiston. An hourly schedule with W4COT was maintained part of the time. Operators at W4AVQ were Francis Wagner, the owner, Robert Touchton and Sidney Gumore. The telephone was kept busy by people calling for information about their relatives. Hundreds of messages were handled for such people as well as regular relief traffic, and press reports. During the disaster the Peninsula Telephone Company extended the special use of two 'phones to W4AVQ, the regular one at the station making a total of three. Data was exchanged with Western Union. W4WS: This station, as Net Control of the Florida 'Phone Net, A.A.R.S., went on the air at 4:20 p.m., September 2nd, getting barometer readings and logging the supposed course of the storm. At 12:30 a.m. he was called by W4DU, who gave him the SOS message from the S.S. Diste, which had been picked up in Jacksonville. W4WS relayed it through W4GQ and W4AVQ to the General Electric Guard at Palm Beach. Due to being closer to the strainer area W4GQ took over the Net Control position at 6:30 a.m., September 3rd. W4WS continued to stand by, handling traffic to the National Guard headquarters in St. Augustine, giving barometer readings at regular intervals and rendering all assistance possible. Amateurs who assisted W4WS in the operation of his station were W4BGL, W4DBB and W4BHH. W4WS signed off and left the air at 10:30 p.m., September 8th. After a constant watch was maintained part of the time. They were stopped by the storm within three miles of Cedar Keys. They turned around in a howling 120-mile gale and went back several miles to Cedar Keys. W4BIN and W4CPW took this unit to that point. There was only one operator available at W4ASR, although valuable assistance was given by the YP, who served meals at the operating table and kept the log. Much important information was relayed for the power companies. W4ASR worked in the 3.9-mc. 'phone band. W4ANN: This station handled Red Cross traffic to Coast Guard headquarters and sent out official weather reports from storm warning headquarters located in Jacksonville. Transmissions were sent every thirty minutes on 3.9-mc. 'phone and 7-mc. cw. W4NN worked with the Florida 'Phone Storm Net for 45 hours. W4BIN: When it was quite certain that the storm would hit Cedar Keys on the west coast of Florida, W4BIN and W4CPW loaded BIN's portable rig into a car and headed for that point. They were stopped by the storm two miles of Cedar Keys. They turned around in a howling 70-mile gale and went back several miles to a small town called Otter Creek. There they put up the antenna and got the rig ready to perk, planning to use 'phone, but found one of the audio transformers wet so went on cw. Several stations around the state were worked and dope given on the storm. They were on the air constantly until 3:00 o'clock the next morning. They later learned that the telephone line was still up and the storm most over so they headed for home. The rig was used many hours of the next day. The rig was used again in the closing hours of the storm and was in a fair condition at the close of 9:00 both twin speakers in good condition at the close of 9:00 both twin speakers in good condition. W4BIN was a 36 detector and 37 audio.
\[W4BCZ: \text{BCZ built and installed WA2Z, commercial, for the Florida Power Corp. and finished installing it at Tarpon Springs one hour before the storm hit. WA2Z was the only communication from that point. W4BCZ also was active with the 'Phone Emergency Net.} \]

\[\text{CMIWW/CW2WW: This station was on the job starting September 1st, relaying warnings to Florida hams via microwave.} \]

\[\text{amateur radio was on the job and had it been necessary to} \]

\[\text{the tests, since a wire had been received for the service.} \]

\[\text{5:00 p.m. •• but rather than use the circwt then, new ar­} \]

\[\text{station at Miami, CO2WW using the special call OTC. The} \]

\[\text{approached CO2WW to ask if he could establish contact} \]

\[\text{and Havana. On September 9th the Cuban Telephone Co.} \]

\[\text{and the A. T. & T. lines; both of these lines serve Key West} \]

\[\text{Although no actual commercial use was made of the circuit,} \]

\[\text{the 14-mc. 'phone hooked to the final of the c.w. rig. Contact} \]

\[\text{between Key West and Miami} \]

\[\text{September 1st, relaying warnings to Florida hams via} \]

\[\text{telegraph circuits to Key West had gone out of} \]

\[\text{good to know that again amateur} \]

\[\text{was} \]

\[\text{was} \]

\[\text{On October 12th and 13th W3AYS heard VS6AQ; from 7:59} \]

\[\text{ous frequencies between 14,300 and 14,450-kcs. PJlB, re­} \]

\[\text{forced by W6GAL on October 30th-CR7GC, d.c. on vari­} \]

\[\text{border. When worked at W6GAL he was on 14,360-kc.,} \]

\[\text{had cut out and did no damage to the Florida coast, it is} \]

\[\text{in the recent VK/ZL contest. W4AKH, with 76 countries} \]

\[\text{QSO! Record? The input} \]

\[\text{is} \]

\[\text{prepared and we} \]

\[\text{on the} \]

\[\text{had been necessary, W4ASSR was on the air from} \]

\[\text{9:00 to 10:00} \]

\[\text{QSO with the heart of} \]

\[\text{exclusive of} \]

\[\text{the American amateur and the amateur-affiliated organisa­} \]

\[\text{DX Notes} \]

\[\text{IN THE 1935 A.R.R.L. DX contest, W9FM reports that} \]

\[\text{at W9GY they learned that F3 and OA4 size came in at} \]

\[\text{Europe pounded in about 6:05 or so. In the} \]

\[\text{14-mc. 'phone net.} \]

\[\text{the National Guard} \]

\[\text{VElEI/VE1HG have worked 70 countries and have} \]

\[\text{is} \]

\[\text{a Portuguese} \]

\[\text{December, 1935} \]

53
on 14,295-ke. and KAIMC on 14,255-ke. are anxious to QSO South America. They have heard S.A. stations between 0400 and 0900 UTC and have been tuning for those hours every Saturday and Sunday hoping to contact.

W2EQQ is now engaged in radio sales and service work in Spain and will be there for one year. He took his 50 Trio, 46 doubler, P.F. '10 rig along with him, and although unable to secure a license, has set up at EAI1DU and is on the air daily. He operates chiefly on 7297-ke. and during a month's working has made 129 contacts with U.S.A. hams. He also operates on about 14,300-ke. occasionally. W3CHG reports the QRA of CR7GC in Box 11, Inhambane, Mozambique; SC1GH worked him on September 25th and says he is using 11 watts! Did anyone work CR7GC prior to September 25th? W3CHG reports Africans coming through fairly well middle-September; he says they are starting tuning through about 3:00 p.m. EST and last until about 6:00 p.m., on 14-9e. QRA of ZE1JS: Box 700, Bulawayo, So. Rhodesia. From August 1 to October 1 W3CHG worked 21 new countries, mostly Asians and Africans.

2500-ke. is looking up again for DX. Not much has been heard about 3.5-ke. DX working since the excellent '34-'35 winter season. Now W8CNC comes forward with the news under date of October 18th that since September 14th he has heard a number of ZL stations on 3.5-ke. He has worked in succession VK3WO, VK3KR, VK3HG and ZL2GN, VK3WG and VK2KR putting in 85 to 87 signals! G6RR and PA9ASD are again "on eightly." G6RR was recently worked by W8CNC, W9AUT, W8EUY, W3CHG and W8DCI are also working VK and ZL on 3500. Better get the rig primed for the G 3500-ke. contest, OM's.

W8BKP lists several good DX calls coming through well on 14-ke.: VK2AG T9, 14,385-ke.; U80E J1, n.d.e., 14,360; V83AQ T9, 14,300; PK3KX n.d.e., 14,200; P83LC T9, 14,015; V85BD T9, 14,310; PK4RF n.d., 14,300; VS8AX d.e., 14,330; AR5MO d.a., 14,400. W8BKP reports VS6CQ coming through regularly around 8:00 a.m. EST. Countries worked at W8BKP now total 143; he is using a single 500 with 150 watts input. W9FM says of W6CUH's DX chart in November QST: "That time for raising VK's and ZL's is for the first 3 hours after sunrise in Australia or New Zealand—only the all-daylight path, the logical one. It is 2:45 to 6:00 p.m. CST, 2045 to 2400 GMT. In fact the 0300-0500 time given was 0300-0900 one Saturday in October, not much less on the adjacent Tuesday. Re the 14-ke. trend reported by W9LBB in November QST DX Notes, W9FM reports that on September 28th at 5:15 a.m. CST he heard a W5 call D4LTN, and heard Q6NJ working a W2, and saying that he was the earliest W QSO the G6 ever had. W9FM then heard the other side (W2) of the QSO, the W2 saying that Q6NJ was the only sig on the band. There were no other signs heard at W9FM but those three. An interesting observation by W9FM after using a beam is that 14-ke. signals from VK's apparently travel the short night path. W9FM has made WAC, W6E and worked 75 countries in 14 months on the single circuit of an IEC-20 final; he has also worked all states but Vermont, and all Canada but Yukon.

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ABOUT TUNING DX

One of the greatest questions in DX tuning, especially during a DX contest, is "where is that fellow going to start tuning—is he going to listen near my frequency?" I have a suggestion which involves using the international abbreviation QX—"[I will listen for ... on ... ke."

On finishing a QSO a station could send "QRT7 QSX 14,300 de K4XX," or cut it down to just "QSX 14 300" indicating approximately where his receiver is tuned, and only stations close to that frequency need bother to call—the rest have little chance. Or, when there is not a long waiting list of fellows ready to call, use one of these:

QLM—"I will tune from the low frequency end across the middle.

QML—"I will tune across the middle toward the low frequency end.

QHM—"I will tune from the high frequency end across the middle.

QMH—"I will tune across the middle toward the high frequency end.

These are easy enough to remember. Just keep in mind "low, middle, and high" using the proper initials to indicate. The use of "middle" seems to some to be a complication, but permits tuning from the middle, giving the fellows in the middle a chance and making four "edges" in each band for the W stations to pile up into, instead of two as now seems to be the case. It should help to scatter the stations rather than force them to concentrate at the two outer edges and fight it out.

During the 1933 A.R.R.L. DX Contest, ZE1JS used these abbreviations, saving plenty of time and QRM. Once, from around 14,300-ke., he used QLM, at which W8B raised him at 14,001-ke., followed directly by W9FM; both had been at the other end, made a quick change and a successful, short call. In the recent VK-ZL DX contest, ZL2KK used QHM frequently and could be raised on three calls and one said he's all use these apparently underestimated QX signals regularly.

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S. H. Cockett, W9FM

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**DX Time Table**

(For Eastern North America)

<table>
<thead>
<tr>
<th>Month</th>
<th>Frequency</th>
<th>Callsign</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
<td>14 MC</td>
<td>W9FM</td>
</tr>
<tr>
<td>Winter</td>
<td>7 MC</td>
<td>W9FM</td>
</tr>
</tbody>
</table>

**EUROPE:**

(1) CT1, CT2, CT3, D, EA, EI, E. G. GH, HB, ON, PA, TF, YJ, ZB .................. 1100-1300 & 2400-0400 1900-2300

(2) BE, HAF, I, LA, LY, OE, OH, OK, OZ, SM, SP, SX, U, YL, YT, YR .................. 1000-1200 & 0100-0500 2000-2400

**AFRICA:**

(1) CN, E8, EA, FA, FT, SU .................. 1100-1300 & 2400-0400 1900-2300

(2) Central and South CRW, FBS, ON4, VQ2, 3, 4, 5, 8, ZD, ZE, ZL, ZU .................. 1100-1300 & 1800-2000

(3) Also around 0400

**SOUTH AMERICA:**

(1) CE, CP, CX, H, HJ, OA, PY, TV, ZF .................. 1100-1200 & 2100-0700 2100-0100

**ASIA:**

(1) AE, AO, AX, J, MX, VS8, 7, 8, ZL .................. 1100-1400 2100-2300

(2) AR, YJ, ZC .................. 2000-0100

**OCEANIA:**

(1) F7, K6, KA, OM, PK, VE, VR4, VS1, 3, 5, 7, 8, ZL .................. 1100-1500 0500-1200

**NORTH AMERICA:**

(1) CM, F3M—HI, HI, HP, HR, K4, 5, NY, TG, TI, VPI, VP2, 4, 5, 6, 7, 8, YN, YS, ZB, 1000-1500 & 2100-0900 2100-0200

The above are best times only. On monthly DX peaks, a considerable extension of the above times can be expected, for example, on 14-ke. Europe lasts from 1330 to 0200 GT without a break during peak conditions. 7-ke. is not quite as affected in this way because it is less critical as is well known.

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**Correction Re 28-Mc. Contest**

Full details of the 1936 10-meter contest were given on page 56 of November QST. We wish to call attention to the error which appears in the detailed rules in the paragraph numbered (6). It is stated that in computing final score a competitor may claim points for each different station worked once during each calendar week. This should read, "... during each calendar month," It was stated later in this announcement that monthly contacts with the same sta...
On Rag Chewing
By Ralph F. Hunter, W2AKH*

Once upon a time, not so many years ago, there was an unusual organization known as the "Rag Chews' Club," whose members became acquainted with a gentleman known as the "Old Sock." Now it seems that the time has come for a revival of the ideas which the club and the "Old Sock" represented.

From time to time articles appear showing us better ways of operating our stations and making the most of our hobby. But rag chewing is another phase of the game which too often is neglected. Too often a QSO consists of only the audibility of the "hi ho" and the "how d'ya do" without much an individual question. But it is easy to point out many things which have often been overlooked, many of which may seem a bit fantastic but all of which are practical.

We also have those who love to become reminiscent and who think that there is nothing like the "good old days." It is improper here to discuss the pros and cons of the question of what makes a good QSO. Indeed we have some "eccentrics" who delight in collecting stamps and old coins. Here's a chance to swap stories via amateur radio and discussing their common problems should be mutually beneficial. Amateur radio itself probably will always be the one big source of conversation. There are hundreds of things to be said regarding our transmitters and receivers, QRM, experimenting, antennas, good relay nets, Naval Reserve, Army, Amateur work, etc. We all know that when a real radio "nut" gets loose he needs no suggestions regarding rag chewing.

Let us not forget though that amateur radio is not the only hobby in the world. Just as one example there are the amateur telescope makers. Now anyone who has spent many hours grinding and polishing a telescope mirror has plenty to say about it! Then we have some "eccentrics" who delight in laying down rules on what to talk about since that is so troublesome via amateur radio? Surely keeping contact with those of his profession via amateur radio and discussing their common problems should be mutually beneficial.

Mr. Hunter's article wins the C.D. article contest prize for this month. Each month we print the most interesting and valuable article submitted in connection with the article contest. Contributions may be on any phase of operating or communication activity which adds constructively to amateur organization work. Prize winners may select a $150 handbook six feet, six months' fee, or equivalent credit toward a combination of A.R.R.L. publications. Let's have your articles. Mark them "for the C.D. contest," please.

F. E. H.

VE9CNE—Canadian National Exhibition

Amateur radio station VE9CNE was in operation at the Canadian National Exhibition at Toronto from August 23 to September 7, 1935. During this period 1039 messages were handled! All work was on the 3.9- and 14-mc. phone bands. The station had 280 QSO's in all U. S. districts, VE1, 3, 4, HH, VO, F8 and CO. The three operators were VE9KX, VE9UY and VE9DJ. Approximately 100 hams signed the visitors' log, coming from VE1, VE9, W2, W8, VE2 and W9 districts. Several listeners' reports were re-

VE9CNE, AMATEUR STATION AT THE CANADIAN NATIONAL EXHIBITION, TORONTO, AUGUST-SEPTEMBER 1935

The three operators, left to right: Sandy MacArthur, VE9KX; Truman Locheed, VE9UY; Jack MacArthur, VE9DJ. VE9CNE was equipped by VE9UY (transmitter at the left) and VE3HJ (transmitter at the right).

Received from "across the pond" on the 14-mc. phone. Schedules were kept with VE2WB, VE8YD, VE8NO, VE8ACL, VE8Y7, VE9SA, VE9JT, WS5WA, W8NVR/ W8CDW, W8GUF, W8SKK and VE8NFX, the majority of the traffic being handled through these stations. Two transmitters were in use at VE9CNE, one furnished by VE9UY and one by VE9HIC. VE9HIC's rig consisted of 500 class B modulating 500 in the final 3.9-mc. VE9UY's used Elims 30-T in class B modulating 50-T's in the final

December, 1935

55
A.R.R.L. announces the snappy procedure used will long be remembered by those who listened to the operators clearing the hook. Well done, VE9CNE set a new record for traffic handling by voice and A.M. Crowell, VE1DQ, SCM Maritime Section, said one ds,y earlier than customary. This year the contest was called to the splendid work done in the 1935 Labor Day sweepstakes.

VE1's are invited to join in the contest, which starts at 6:00 p.m. A.S.T., December 15th, and ends at Midnight A.S.T., January 14th. Scoring is as follows: For each VE1 QSO on the 3.5-mc. band—10 points; for each VE1 QSO on the 7-mc. band (outside of 10-mile area)—20 points; for each VE1 QSO on the 14-mc. band (outside of 10 mile area)—40 points. This contest is held under the auspices of the Halifax Amateur Radio Club, and a copy of complete log must be submitted to that club not later than January 20th. Reports must be mailed to the secretary, VE1FN, Coburg Hotel, Halifax, N.S., Canada. A large loving cup will be awarded to the highest scorer.

**The Ohio Regulars**

The Ohio Regulars, an organization of Ohio O.R.S., is keeping a regular watch of 3710 kc. each evening from 6:00 to 8:00 E.S.T., for Ohio traffic. The station on duty calls "QV Ohio 10" and combats the entire band for replies. The Regulars, with WS1AW, R.M., as Control Station, is connected directly with A.R.R.L. trunk lines and provides a reliable delivery and traffic feeding system for them in addition to prompt clearing of intra-state traffic. In addition to traffic work the Regulars hold round table discussions on the air. A regular bulletin is issued to the gang by WS1MHM, R.M. and WS1AW. It is hoped that eventually all Ohio Regulars will operate on the spot frequency of 3710 kc. When you have Ohio traffic, tune to 3710 kc. at the specified time and look for any of the following stations, members of the Regulars: WS1AW WS1MHM WS1SK WS1AI WS1AI and W8DVC. It is expected that 6210 kc. will be used mostly for work with amateurs on 6210, 12,420, 5520 and 11,040 kc.

**Florida A.A.R.S. 'Phone Net**

W4WES is Net Control of the Florida 'Phone Net, A.A.R.S. At the present time this net has 14 active stations. It was organized in 1930 and is believed to be the first 'phone net in the A.A.R.S. Much excellent work has been done by these Florida stations during numerous storms. Attention is called to the splendid work done in the 1935 Labor Day hurricane emergency work!

**Carnauba Expedition—KHAQ, 6210 kc.**

The Johnson's Wax Carnauba Expedition left Miami on October 1st on an aerial exploration trip into the wilds of northeastern Brazil in a Sikorsky Amphibian plane, Carnauba. The Carnauba will be gone two and a half months with officials of the Johnson company and scientists from the Chicago Field Museum, Ensign J. A. Hoy, U.S.N.R., is with the party as co-pilot and radio operator. KHAQ is the call assigned to the expedition. Besides working on aircraft frequencies, permission has been granted to contact amateurs on 6210, 12,420, 5520 and 11,040 kc. It is expected that 6210 kc. will be used mostly for work with amateurs due to its proximity to the 7-mc. amateur band. QSL cards will be sent to all amateurs worked. Arrangements have been made with F. Lee Deschart, W6QC and Stanley Fisher, W8DEE, for regular communication. Listen for KHAQ, especially on 6210 kc., and report all reception and contacts to A.R.R.L., please.

**Andes-Amazon Expedition**

W2DPO and W2AHC are maintaining schedules with Ecuador (HC1FQ) for contact with the 1936-38 Andes-Amazon Expedition, of which W2DPO is radio operator. These schedules are kept every Tuesday night at 10:30 EST on 7 kc. The main purpose of the Andes-Amazon Expedition is to try to establish contact with a tribe called the Sazella Indians. Practically nothing is known of these people and there is no record of a white man having entered their country. Further interesting details of the findings...
of the expedition are expected as the W2DXO/W2AHC schedules progress. Everything of interest to amateurs will be passed along through the pages of QST.

Amateurs Contact U.S.S. Minneapolis

Communication Reservists in the 12th Naval District were given the unusual opportunity on Navy Day, October 27th, to establish two-way communication with the U.S.S. Minneapolis in San Francisco Bay. Arrangements, which made possible contacts with the Minneapolis by seventy-seven radio amateurs (all members of the Naval Communication Reserve), were completed by Lt. Sydney J. Fass, U.S.N.R., W6NZ, NACF, the Minneapolis, transmitted on 3475 kcs., the N.C.R. amateurs using various frequencies in the 3500-4000-kcs. band. Practically all amateurs used the frequencies assigned to their particular sections of the N.C.R. in the 12th Naval District. A time schedule for contacts with each section was adhered to. Naval procedure was used for all communications. A special QSL card was designed particularly for acknowledgment by NACF of all QSO's. Each Reservist writing the vessel sent a message of greeting, which contained his address to facilitate the sending of QSL cards. Amateurs of the 12th Naval District are located in California, Nevada, Colorado and Utah. This was the first time that Naval Reservists of any district have been given the chance to make direct two-way contacts with an actual Naval vessel on such a wide scale, and the unique experience provided a thrill for all concerned!

W6EAN Aids Expedition

Considerable assistance has been rendered the Fairchild Aerial Surveys Colorado River Expedition by W6EAN, Herschel Calvert, Pasadena, Calif. The expedition, engaged in a field survey for the United States soil conservation service, carried radio equipment operating under the calls KBAX (base station at Milford, Utah) and KBAZ, a portable. These stations operated outside the 4000-kcs. end of the 3.5-mc. band. W6EAN used 3.9-mc. phone. Regular evening schedules were maintained by W6EAN, conditions encountered by the expedition being followed by the nightly schedules. On one night's contact KBAX reported bad weather, high water, illness in the party and other serious difficulties. The W6EAN contact made possible an immediate request for additional help and supplies, which was speedily complied with by Survey headquarters. To W6EAN goes the commendation due all amateurs who perform the kind of services that perpetuate amateur radio! FB, OM!

'Like the Old Way Best'

"Telegraphin' sin't what it used to be. This here editor learned the rudiments of hamography back in the days when men was men and made their own dots. Nowadays everybody's got a splatterbug with no weights on it and the guy that's waggin' it don't no more know what it's going to make than he know what's going to come out of his nose. It's laughin' stock, and nobody repeated nothing. They done it right the first time. I like the old way best."

The Day Before Christmas

By Robt. H. Votaw, W7WY*

'Twas the day before Christmas, And all through the shack None of the floor could be seen— Not even a crack! For traffic was plastered Knee-high on the floor, And every few minutes 'Twas "QTC more."

The poor op. was sweatin' O'er "mill" and o'er "stick"— Couldn't finish one sked Before his next "trick." After QSG S—My goad! What a shock! "QRM," says the other guy, "Put in that other 'rock.'"

Three hours later He leans back with a groan, Thinking, at last, He has some time of his own . . . But, "CQ, CQ North" Comes the far-away cry— The op. tunes him in With blood in his eye. . . .

Some time later He pauses to stare— Hark! The tinkling of bells Floats out on the air! Can It be Santa? Oh, boy! What a sight! "Ye gods! 'Tis the alarm clock— I've been working all night!"

* Route 1, Box 398, Vancouver, Wash.

ELECTION NOTICES

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

(The list gives the Sections, closing date for receipt of nominating petitions for Section Manager, the name of the present incumbent and the date of expiration of his term of office.) This notice supersedes previous notices.

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

Due to resinations in the Alabama, Southern Texas, Virginia, and Northern Minnesota Sections nominating petitions are hereby solicited for the office of Section Communications Manager in these Sections, and the closing date for receipt of nominations at A.R.R.L. Headquarters is hereby specified as noon, December 16, 1935.

<table>
<thead>
<tr>
<th>Section</th>
<th>Closing Date</th>
<th>Present SCM</th>
<th>Present Terms of Office Ends</th>
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<tbody>
<tr>
<td>Alabama</td>
<td>Dec. 16, 1935</td>
<td>L. D. Elwell</td>
<td>(resigned)</td>
</tr>
<tr>
<td>Southern</td>
<td>Dec. 16, 1935</td>
<td>B. L. R. Bead</td>
<td>(resigned)</td>
</tr>
<tr>
<td>Texas</td>
<td>Dec. 16, 1935</td>
<td>Nell E. Henry</td>
<td>(resigned)</td>
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<tr>
<td>Northern</td>
<td>Dec. 16, 1935</td>
<td>R. L. Rode</td>
<td>(resigned)</td>
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<tr>
<td>Minnesota</td>
<td>Dec. 16, 1935</td>
<td>L. T. Madsen</td>
<td>(resigned)</td>
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<tr>
<td>Saskatchewan</td>
<td>Dec. 16, 1935</td>
<td>Wilfred Skaffe</td>
<td>June 15, 1934</td>
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<tr>
<td>San Diego</td>
<td>Dec. 16, 1935</td>
<td>Harry A. Ambler</td>
<td>Nov. 20, 1935</td>
</tr>
<tr>
<td>Ohio</td>
<td>Dec. 16, 1935</td>
<td>Carl S. Wilson</td>
<td>Feb. 15, 1936</td>
</tr>
</tbody>
</table>

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

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

2. The elections will take place immediately after the closing date for receipt of nominating petitions as given opposite the different Sections. The Dakota mailed December, 1935 57
from Headquarters will list the names of all eligible candidates nominated for the various A.R.R.L. positions. Sections concerned. Ballots will be mailed to members as of the date indicated as specified above, for receipt of nominating petitions.

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

(Place and date)

Communications Manager, A.R.R.L.

[Address]

Dear Sirs:

I hereby nominate [name] as candidate for Section Communications Manager for this Section for the next term of office.

(Please sign)

[Signatures]

The candidates and five or more signers must be League members in good standing. The petition will be thrown out as invalid. The complete name, address, and station call of the candidate should be included. All such petitions must be filed at the headquarters office of the League in West Hartford, Connecticut, on or before October 15, 1935.

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

F. B. Handy, Communications Manager

ELECTION RESULTS

Valid petitions nominating a single candidate as Section Manager of Sections or as provided in the Constitution and By-Laws, electing the following officers, the totals being on the date of voting:

West Virginia: For the Mississippi and the Midwest Division, Dewey Mills, WJCF, and Mr. Robert A. Hathaway, WJGTR, were nominated. Mr. Mills received 110 votes and Mr. Hathaway received 57 votes. Mr. Mills' term of office began October 15, 1935.

Central California Net

W6LW, Route Manager, Santa Clara Valley Section, A.R.R.L., announces the "CCN"—Central California Net. Members include W6LW, Salinas, 3855 kc.; W6FWY, Paso Robles, 3657 kc.; W6TU, San Jose, 3545 kc.; W6HH, Oakland, 3525 kc.; W6KMQ, Berkeley, 3810 kc.; W6LMD, Sonoma, 3570 kc.; and W6JAT, Yosemite, 3525 kc. More stations will be added later. Stations are scheduled every Monday, Tuesday, Thursday and Saturday night. Each station is assigned certain towns and is responsible for QSP and delivers to those points. The aim of the "CCN" is 100% coverage of central California. "CQ-CCN" is the call to use when wishing to raise net members.

National Highlights

EMERGENCY work is probably the most outstanding highlight this month. Attention is called to the excellent performance of Florida amateurs during recent hurricanes in that state recounted elsewhere in Operating News. The Butte (Montana) Radio Club and Butte U.S.N.R. operators stood by to help during the Helena earthquake in ease regular communication broke up. K7DEV, Colorado Radio Association, recently called a meeting to organize an all-college net. Ohio O.P.S. swung into action with one in Virginia, North Carolina and Tennessee, "WlCAB received a message from Shanghai promptly shifted to 3.5 mc, and completed relay. Is your net capable of speedy band change? W1ABG is new S.C.M. in the Eastern Massachusetts Section, replacing WLAS, who completed a long term.

The winner of the Washington State Progressive Contest will receive one of the famous, hand-made, W7BU fishing bells, Washington QSO Parties are held on the third Sunday of each month, 8:00 a.m. to 8:00 p.m. W7EJJ was on the air during the Washington State Fair at Puyallup. W6JAT, who is located in the high Sierras near Yosemite Valley, sports an antenna 300 feet long! KA1AN and KA1AK on 14-mc, phone are making good DX records; KA1LB and KA1CM on 14-mc, c.w. offer a chance for a net west of Montana. KAIIB is now in full swing, connected with similar nets in Ohio and Tennessee. W6ABC received a message from Shanghai within eight hours. Speed and service combined! Dick Watson, W6WLC, operator with the Byrd Expedition, recently gave a talk at the Great Bay Radio Club, New Hampshire.

50 mc. continues to be put to unique use! We have heard of several instances lately of hams out driving, running out of gas, utilizing their 50-mc. portable sets and have fuel brought out to them. W6FTR, W7EED and W1IPU were the hams who put too much faith in the "gas indicator." The Kentucky spot-frequency net on 3810 kc. is now in full swing, connected with similar nets in Ohio and Tennessee. W6ABC received a message from Shanghai on a W7 from 14 mc, destined for Washington, D. C, promptly shifted to 3.5 mc, and completed relay. Is your net capable of speedy band change? W1ABG is new S.C.M. in the Eastern Massachusetts Section, replacing WLAS, who completed a long term.

Amateurs of the Sacramento Valley Section, several hundred in number, were guests of Mr. and Mrs. W6ATP at a hamfest in Auburn, Cali. It was acclaimed the outstanding event of the year in that Section. W6IGA maintains schedules with K0MEG, W6JZJ with K6DV, 50-mc. activity is at a peak in the San Francisco Section. K7DBV has published schedules with W6JZJ, W6WEEG, who has relayed the upper 40's to the States via W7APS and W7DBG. Traffic for San Francisco? W6KNN is looking for S. F. traffic at 10:30 a.m. EST each Sunday; he uses 7057 and 7135 kcs. The Virginia Phone Net operates in the 3.5-mc. band every Sunday from 1:30 to 2:30 p.m. W7FY, president of the Central Colorado Radio Association, recently called a meeting to order via 50 mc. from his home, and then kept in touch with them via mobile. W6WLC arrived at the meeting place, Army and Navy amateurs each conducted a meeting for the Utah Amateur Radio Club.

A.R.R.L. Trunk Line "D" is operating net fashion on 3855 kc. with W4DS as eastern control. This trunk gives daily service to all ends. Contact can be had at K8D, Hubbell, Cuba and Guam, as well as to all southern states. W6KOL, Arizona Trunk "D" station, the Upper Peninsula Net (W9) being on 3850 kc., the Lower Peninsula (W8) on 3856 kc, W8DVC, Chief R.M., W9PDE, Asst. S.C.M., and W9PDE, R.M., W9FPH, Jr., on the last two nets together. The North Dakota Section has inaugurated a North Dakota bulletin via W9KZJ on 3971 kc, "phone at 12:30 p.m. every Sunday. News of interest to all. No. Dak, hams is transmitted on these weekly schedules. W6EEZ, S.C.M., E. Penna., says, "High power is a good operator, but regular practice does. O.R.S. and O.P.S. are the highest skilled operators in the country. Are YOU in that class? If not, why not?"
leads the state in traffic this month. QG is making good use of new oscilloscope. ODH says QRN is ruining schedules. HBQ has new Sky rider SX. A.R.S. ready for schedules and DX. AXR is remodeling his "Studio." BNQ has new Sky rider, TZD has new All-Star super. FP is QRL with A.A.R.S. schedules. JHK is back from Marion. HPP has finished new rig and has new receiver. TGC is trying grid mod. 'Phone. HPP won't give up DX until he finds a way with heavy traffic again. SBP raised Fs, W6, X and D4 for DX on 28 mc. GFS is QRL school. EDP is pondering brass after several years on 'phone. NTP raised his first W6 on 'phone. NZB likes 2.8 mc. 'Phone. 'Phone puts out Baudot at Torre Haute. HSF is at Kokomo now. UFX is QRL school work. DET visited JCG and is rebuilding. UYF finally went crystal. NNX is now working at Marion. TYF is working for heavy traffic. UFX sends a call. 'Phone YL keeps him QRL. LQE is getting out fine on 1.75 mc. EQQ is getting bugs out of new super. PBS worked ZL for DX this month. LKY is now W.A.C. after getting 28, HBE is back at O.R.S. work again. PFL is ready for O.R.S. schedules. MCX is interested in O.R.S. Keeping pace, with RWS, 'Phone SLK is interested in O.R.S. The Tampa (Fla.) Amateur Radio Club had a very successful ham exhibit at the local fair; much praise was given to the club's efforts. W5DNE and the gang at Sherman, Texas, put together a very neat antenna for 1.75 mc. DIX DAM threatens 1500-zero traffic to Panama, Costa Rica and Peru. The Alabama A.A.R.S. Phone Net is in high gear with the following numbers: W4BSG, W4BG, W4WQ, W4BC, W4EQ, W4BRG, W4BRC. The Tampa (Fla.) Amateur Radio Club will hold a 1.75-mc. phone QSO contest starting December 2nd and ending December 16th: the object of the contest is to get every member of the club to equip his station with 1.75 mc. A.R.S. operators have submitted copies of their 1935 Navy Day receiving competition as this issue goes to press; complete results of the competition will appear in an early QST.

**CENTRAL DIVISION**

**ILLINOIS—SCM, F. J. Hinde, W6WR—R.M.'s SAND, 9ILH, 9KJY. ENH is gradually getting things together for his new rig. MCG wants a 'Q antenna. BPU announces arrival of 7-b. YL: op—Congress, OM. GSB wants the S.C.M. to join his A.A.R.S. net. Receiver completed, KKD begins on transmitter. KXE is still working nights. With all his schedules and A.A.R.S. organization work, DOU seems very little of his YL. IYA is all set for O.R.S. party. Things kinda dead for ERU. EQX is awaiting DX. VTB is JYV's brother's call. AND is taking tap dancing lessons to go on stage with that beauty contest winner from Marion, Ind.!! Photograph of nice EGG. ITA is working 7 and 3.6 mc. SUW's '19 puts out a neat 56-mc. sig. HPG is head-over-heels in work. New Class A ticket adorns shack of SKF. VCB finds he can't work DX if he can't hear it. NGG controls rig and has 1.75 mc. going. KXG is not in nice schedules. Lots of Owl boilings at Egyptian Radio Club. Photography interests EGG. 'TA is working 7 and 3.5 me. VCB finds he can't work DX if he can't hear it. NGG continues the pattern of the past several months. NWG is the chief here. KBM has new crystal to work on that frequency and get going with the competition. Assistant S.C.M., Joe Lessard, 9PDE and R.M. 9RHM to connect with Assistant S.C.M. 9PDE and R.M. 9RHM to connect. Nine stations are now affiliated with A.A.R.S. QRL. Nine stations are now affiliated with A.A.R.S. QRL. Assistant S.C.M., Joe Lessard, 9PDE and R.M. 9RHM to connect.
working for State. CEX complies of too much 1-kw. QRM on all bands—and double check! CWR wants to know where all the U.P. gang is hiding out! TTY Bros. finally hooked WB9 on 3.9 mc. with 10 watts input! HSQ is still scratching at the bugs in his rig DQT is putting out FB signal nowadays. MICHIGAN EIGHTS-ONE-SPOT—9TAW is working on Trunk Line "C." KUY handled traffic during fair at Shelby. MQO now has HK-20 in the final. KXY is a new reporter from Oberlin. WE is going strong. MXF will have 70-ft. mast soon. LCY is working overtime but finds time for traffic. NGS collects data you can't get. DFR wants you to give him direct for schedules and information. We can get crystals for about one dollar or grind your own, O.M. MDP is lining up his schedules for the season. FB. Mrs. DRY will now picture "Trans-Fashion"! FWG is still putting on M.F.C.'s first big show in months in Traverse City. The State A.R.R.S. net daily from 6 to 6:30 p.m. will listen for traffic calls, when clear with A.R.R.S. traffic. CSX and AOM have totalled over 141 QSO's on their weekly schedules. NNC, QN continues to be our most active Official Observer. KSY, AKN, NXT, FTW, FEE, IAV, DEN, EFI and rest of the gang are trying to recuperate after putting up over that FB Hamfest. Much thanks goes to Tom Lombardo, KNN, a new brother-in-law for the FB crew. A mighty fine job, Tom. We'll make a ham outa you yet! FPV at new QRA finds old B.C.L. skywire works much better than the fine job, Tom. We'll make a ham out of you yet! JPV at new QRA: 50 Close St., Pontiac. OJT on 1.75 mc. with 10 watts input. He is a student of Engineering. HL CPG will be acting from recent operation. 9SQB/9PCU flower-growing contest will be announced in issue of D.A.R.A. Bulletin. MQC was visited by HMH and the gang. MUR is putting up a new transmitting antenna. VP has a nice VP has a nice.

Traffic is picking up and the boys are getting into his final. RSA has plenty of soup in his antenna. We have a sales office at 211 on 1.75-mc. 'phone. MQA recently bought an SW3—almost new! IIGD is fiddling around with motor-"Doc" Weaver (BYF) have taken hold of the O.P.S. HCS is still trying to get going. UW time. NBM hides in the corner when his father brings him home. Warhm 223 PDE 29 GJX-TTY 12 PCU 11 CEK-HSQ 3 ADY 2 CWR 1.

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Gundry, 8KNP/RTF, has moved from Pontiac, Mich., to Milwaukee, and is looking for a "9" call and O.R.S. The Four Lakes Radio Club of Madison sponsored 9AKT for S.C.M. AKT publishes a nice sheet for them called F.L.A.R.C. News. Let's hear more about some of these sheets. ACK sends the following dope on the Sheboygan gang: CDO will soon be on 2.9-mc; phone with an "04A. SCS is back on 3.5-mc. C.W. AUX and HVB are still nailing the lakes as Ops. HSU is on 1.75-mc; 'phone. IDG is building to QSA4 R5 in Moscow, Russia, on a crystal rig. RZZ will soon be on high power Class A module. CDC will soon be on 3.9-mc; phone with a "04A. SCR in Wisconsin, settled down in Fort Sheridan, back on 3.5-mc, C.W. AUX and HVB are still sailing the 9NY spoke on 28 me. in the past year. The Milwaukee Club Four Lakes Radio Club of Madison sponsored 9AKT dating way back to 1912, NPS is building up a new rig, and the Milwaukee Radio Amateurs Club, talk at club meeting about M.R.A.C. and A.R.R.L. history, their first contacts on 28 me. LJU has his receiver perking W9XAZ on 31600 kc., Nov. 14th, at Waukesha, and on the Great Lakes, reports that he's hearing note •ounds like "pulling a cork out of a bottle." GWT says 961 (Aug.-Sept, NNZ 83).

Traffic:

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Traffic: W9LEZ 661 (WLUD 190) NNM 323 HCH 96 AW8 22 CWG 35 (WLUD 2) LCX 82 GWT 15 ABE 12 PGG 10 IPC 6 ACL 4 REH 16 DZ 30.

KANSAS--SCM, O. J. Spetter, W9LEO--R.M.'s: 9G4 and HZ3. We Enquirer awaits reader's reports of AAA and others to help out these duties from now on. PXW moved to West Plains, Mo., LHE has a new Budding receiver. FMX is in jail house again (veterans hospital). IOL moved to Anthony, EBF, LTO and TRF are rebuilding. K.Y.R.C. Convention was a great success and C.E.G. had lots of seconds in shack. BFC won Woff Hong trophy for 1935. Come on, fellows, join us with those reports.

Traffic: W9LEO 348 RIZ 334 K0G 125 OZ7 77 EYY 66 393 FMX 10 FB 8 SIT 2.

MISSOURI--SCM, J. Dewey Mills, W9CTR--A1J leads the Section in traffic with SGP running second. O.QI is holding several A.A.R.S. schedules. HUG is hitting on high with D.N.C.S. job in A.A.R.S. KQG handles his traffic with "TA" final at 5 watts input from "B" batteries! YL OUD asks for O.R.S. --Atta girl! KEF is Missouri position on Trunk Line "E." EDK (Bro SEIP) gets O.R.S. UYF requests a few "way more DX." D.M. is still after DX --wants Asia to get W.A.C.-----took message from BEAR addressed to 9FEA, and made direct delivery within 8 hours! VEE is revamping to work 3.5, and traffic, JAP has been away from rig all summer but now back and ready to rejoin! to go. St. Louis gang says: Amateur Radio Association is still going strong; monthly meetings with over 150 members--Amateur Radio Fraternity, South St. Louis, Hams, will hold field day this fall with battery rig. CTR is back on 3.5-mc, after sojourn on 7-mc. OCI is off the sick list and on the air again. LTH is rebuilding for 3.5-mc. c.w. KKR deserted 3.5-mc, after 3 years to land on 7-mc, UAB is ironing out troubles in generator on wind power rig. NOI is working from New London, and can't get enough O.R.S. and reports efforts for DX on 14 and 28 me. The S.C.M. wonders why not more individual reports from those St. Louis hams. What say, gang? Who wants P.A.M. appointment? Let's have MISSOURI REPORTS--MORE MISSOURI REPORTS.

Traffic: W9AIJ 701 SGP 179 TGN 166 OQI 77 HUG 67 ENF 30 K0G 17 OUD 15 K13 13 EDK 9 KEF 6 DINH 2 VEE 1 (Aug.-Sept, NNZ 88).

NEBRASKA--28, Dave Wallace, W9PAM--BNT leads the Section with FB total. TAM is back in the A.A.R.S. as S.N.C.S. and traffic totals greatly improved; he is working on Trunk Line "L." DMY is doing nice work, handling various schedules, leaving few nice schedules to carry and helping keep the old state alive. EHW is pounding away on the A.A.R.S. in fine shape. POJ is just lined up in the A.A.R.S.; he says Trunk Line "E" to WYDIE is working. DI has moved to St. Louis, Mo., and will be active there in the future. Sorry to lose such a good call KQX is keeping nice bunch of schedules. KJP expects to do a little more traffic work in the interest of Omaha this season. TBD has been doing a little DX work but is looking for traffic and some good schedules on 3.5 me. JDL had an FB trip to the north coast and southwest and reports visiting a lot of hams on his route. DHA is operating in U.S.N.R. at Grand Island. DMY is doing nice work, handling various schedules, and on the air again giving talks from chapters of the A.A.R.L. Handbook.


DAKOTA DIVISION

Traffic:

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Traffic: W9KTT 310 (WLUD 27) FAM 386 DMY 105 RZJ 66 HAW 65 POB 21 DI 17 K0X 10 BQJ 7 KJP 6 TDB 5 DGL 3 DHA 18 THF 16 JEE 33 KBV 45.

NEW YORK--SCM, W9CTR--A1J has moved to New York. NCC, pinching-into AZV, who broke his ankle in football game. KZL has new Skydrome with metal tubes for C.C.C. station. RYX went to Dunsieth to set up C.C.C. station. DGS visited A.A.R.S. in hospital. BZQ at Hope received emergency station certificate, HJG attended the Minnesota and Tulane game. DGS taking over Jim's duties.
in A.A.R.S., while gone. PVA visited with HJC in Fargo. PHII is back home after Red Oviing at Grafton. DGB reports new rig: 6F6 osc., 802 buffer, 801 final, North Dakota Section inaugurates North Dakota Bulletin via JZZ on 2071-kc. FB plans to be down at 12:20 p.m. every Friday. Bulletins are sent with instant success with practically all hams here tuned in. You North Dakota ops are urged to send all material for this bulletin to JZZ at Leeds. Appointments are made to send traffic and other reports by Form 1 instead of via radio. You phone operators report traffic reports for their section. We hope you can double these totals next month. What say, gang, let's keep this Section on top.


SOUTHERN MINNESOTA—SCM, Francis C. Kramer, W9DEI—BKK is looking for new members for the A.A.R.S. TQQ plans on more 7-mc. operating this fall. LTN is interested in O.P.S. appointment, KDI says, "To an old-timer like me, gals don't mean nothin'." AIR has one more month of commercial oping before he will be back at ham radio. REG has little time for radio now that he is in college. HW now has 70 counties, and reports working G2BY on 7 mc. ELA had 51 European QSO's in five days. MXW has his rig on 28 mc. DIX gets good reports with his 03A 'phone job. OMI is up at Rochester C.C.C. camp. FGA gets more of a thrill from receiving than transmitting. GTE complained of time between YL, a car, and radio. FPGA hopes to return to Mpls. soon. HCC is thinking of putting in a small 'phone. (FHE is now living in Wayzata, and expects to be on soon. O.M.I. from HCC spent most of their time on 8.9-mc. 'phone. DEI is still working on the 1-kw. rig. With the fall session upon us, let's all get a couple of good schedules lined up. Don't forget, FDL and BKK will be glad to arrange schedules for you.

Traffic: W8BKE 82 TQG 15 BN 14 DEI 8.

WEST GULF DIVISION

NORTHERN TEXAS—SCM, Richard M. Cobb, W8BII—DNE and the Sherman gang put over the ham exhi- bit at the fair in a large way, making the B.P.L. EW also makes the B.P.L. this month; he reports that WLPF is back on the air. Dallas was visited by Brad of WLM and 85ML AZI sends nice traffic report from Abilene. DXA reports AXX has moved to Bryan; BEY has '46's in final amp; AVC is active; CIN is active on 'phone. BII added a final amp. to his rig; using a pair of '10s in parallel and is active in the rig. LDE-XL reports on spot frequency of 56 kc. AFS is on Police Radio job. COK is now an Official Observer and has increased power, CPB and CPT are running the new show in Clarendon. FBA reports in an O.R.S. appointment and is very active. CIN gets plenty of 7-mc. traffic from stations copying the Official Broadcasts from his station. IA reports his crystal freq. won't stay put. APW is rebuilding and will be back on 3.9-mc. 'phone soon; he is building a 1.25 meters-'phone rig. EKN is building a 1.8-mc. 'phone rig. EQQ is building a 1-kw rig. RFC 13 EKN 10 BJG 8 BWM 2. RXQ moves from 7 to 3.5 mc. and signed up with the A.A.R.S. MM has 105 schedules each week and clears enough traffic to look like news bureau. DLT is changing to 03A in 1.8-mc. 'phone final. DUK contemplates 1-kw. 14.2-mc. 'phone; he is using 260-watt 1.5-mc. 'phone at present. 03A is having some transmission troubles on 885 kc. KESV is on 14.2-mc. 'phone. DWN is working on 2-28 mc. rigs, handling traffic and experimenting. PC turns in swell report for G.V.R.C. G.V.R.C. is to hold annual blow-out Dec. 18th. Many prizes promised, everybody invited. Address 5DUO for registration ($1.00). CIX is working on 1.8-mc. 'phone and has 400 watt 7-mc. 'phone rig. CEI says that DX is certainly coming, and is trying hard to make that '10 do its stuff. W5DHZ is at work on 1.8-mc. 'phone rig. EONM says, "To all old-timers, let's all get a couple of good schedules lined up. What say, gang, let's all get a couple of good schedules lined up."


OKLAHOMA—SCM, Carter L. Simpson, W5CEZ-CEZ worked a ZL on 3.5 mc. AMT reports Trunk "D" operating FB. BJG has his A.A.R.S. district working efficiently. ASF has forsaken C.W. and gone 'phone exclusively. DAB is another club member. DAB's rig has a pair of 300 kc. and is being worked by a number of CB operators. EK1Z wants more traffic. BBN moved to new QRA and assigned as Okla. 1st District D.N.C.S., A.A.R.S. AKB and AMS spent an enjoyable vacation in Calif. DQM is always on the job for the A.A.R.S. district. BTZ does all his work on 'phone. ST and EID are new members of the Oklahoma A.A.R.S. Phone Net. BJU has a new ACR-138 receiver. BDX is still working on his super. CVA is trying to get his rig to perk on 3.5 mc. FDU attended the Kansas State Convention in Topeka and has his new rig perk ing. PX moved from his regular job for the A.A.R.S. district. BTZ does all his work on 'phone and DX c.w. EPE, enroute to Oregon with mobile equipment, is still working on the 1-kw. rig. With the fall season increasing power. RA is QRL beer business but maintains a good DX station. W5MN is QRL DX hams and has had good DX. W5ADZ-Luther CJ. Smith, W5EOO, writes the activity report this month as ADZ gets the coveted brass-pounding rig with RMCQ on S.B. Pueblo, KESQ, FD says DX is on the increase, and DAB is trying to increase his DX activity. O.S. recently, JC is back on 14.2-mc. 'phone with 4'-52's. EIS is hot on 7 mc. DNB sports crystal SF, EDX, and DCP are on 14.2-mc. 'phone. EUL is an "old-timer" who couldn't stand the urge to get another rig. CGJ sends nice traffic report from Abilene. DXA reports 450 miles to home, Austin. EUN uses '03A DX won't do for TX 616, and will be active in the A.A.R.S. G2BY has 78 EXZ 62 BWN 54 ABK 42 DQM 28 BTZ 22 EST 20

Traffic: W5CEZ 1200 AMT 426 BJI 229 ASF 127 DDW 78 EXZ 82 BWN 84 ABE 42 DQ 28 BTZ 22 EST 20 EIK 20 BLJ 16 DX-CVA 15 FDU 5 FX 4.

SOUTHERN TEXAS—SCM, Bradfield A. Beard, W5ADZ—Luther C. Smith, W5EOO, writes the activity report this month as ADZ gets the coveted brass-pounding rig with RMCQ on S.B. Pueblo, KESQ, FD says DX is on the increase, and DAB is trying to increase his DX activity. O.S. recently, JC is back on 14.2-mc. 'phone with 4'-52's. EIS is hot on 7 mc. DNB sports crystal SF, EDX, and DCP are on 14.2-mc. 'phone. EUL is an "old-timer" who couldn't stand the urge to get another rig. CGJ sends nice traffic report from Abilene. DXA reports 450 miles to home, Austin. EUN uses '03A DX won't do for TX 616, and will be active in the A.A.R.S. G2BY has 78 EXZ 62 BWN 54 ABK 42 DQM 28 BTZ 22 EST 20

Traffic: W5CEZ 1200 AMT 426 BJI 229 ASF 127 DDW 78 EXZ 82 BWN 84 ABE 42 DQ 28 BTZ 22 EST 20 EIK 20 BLJ 16 DX-CVA 15 FDU 5 FX 4.
Line and A.A.R.S. traffic. DZY is working portable at Gallup and will soon be located in Aria. We all certainly hate to lose such an active amateur from our Section. DIL is doing double time, working in Post Office and Picture show, and is only on for short times in the mornings before 6:30 and now and then in the evening.

Traffic: W5ZM 87 (WLJG 8s) W5DZY 25 (portable 30) W5DLG 44.

ATLANTIC DIVISION

EASTERN PENNSYLVANIA—SCM, James M. Brung- 

ing, W3EZ—R. M.'s: 3AKB, 3AQN, 3EOP, 3ASW. 

High power does not make a good operator, but regular 

practice does. O.C. and O.S. are the highest skilled 

operators in the country. Are YOU in that class? If not, 

why not? Brapeshounders this month: 3EOP and 3EZ. AQN 
divides time between radio and the new baby. AZJ was 

heard in England with 40 watts input on 3.5 mc. BES and 

EUP are working for O.R.S. rating. BXE has new Jr. Op., 

born Oct. 6th.

WESTERN PENNSYLVANIA—SCM, C. H. Gros- 

seth, WSQUG—GUY changed his QRA and doesn't have 

the new skyliner up yet. OLA is recouping from a siege 
of pneumonia. OJP sends his first report and has a nice 

ing on 7 mc. FIP has been off the air rebuilding. UR 

burned up his class B output transformer. KWA basted a 
nine foot tall salted chicken with 40 watts input and 

returns with ten schedules, working and promises some of those big totals again. EFA joins the O.R.S. gang and starts off with a swell total.ओर्ज्ज ने 14 मिनटों तक बहुत सुंदर टीले की रिलीज की थी।

KBM becomes an O.R.S. and says they had a nice hamfest 

again; he operates the C.C.C. station at Wellsboro. KOB 

is looking forward to the next O.P.S. party. KQQ got an R9 

21 NNC 20 lOH 15 MOT-IUY 14 IQB 12 LIG 10 OFO 8 

161. GUX has a new Skyrider re- 

ceiver and we think MST will get a lot of use out of it. 

EA 

would soon have the 1.75-mc. 'phone. O.A. QRA, 3EOP, 8ASW. 

is new R.M. and control station for N.S. 

 logically method—our way—amateur radio. If your 

call is not in our report this month—cooperate next month by working 

more with new QRA, Truro. BT uses prize mike 

for '10's final. IV just got back on after 

a month's illness. He schedules his brother, CE, in Windsor. 

BD is planning a new rig. IA is QRL on farm. BL 

is getting out on 7 mc. with Single '45. EY is QRL 

service. The H.A.R.C. Maritime net with VE1GL, Route 

Manager and Chief Control Station is now functioning per-

fectly. About ninety percent of the dope contained in 

this report was landed direct in Halifax via the quickest and most 

logical method—our way—amateur radio. If your call is not in 

our report this month—cooperate next month by working 

a control station and sending in the dope. Newfoundland: The Second Annual Convention of VO hams was held Nov. 11th. VO11/P reports for VO gang. Active on 'phone: VO11, VO11, VO11/P, VO11, VO11 is on 3.5 mc. VO11/P is rebuilding. VO11/P is working VE1L with a 6-watt 'phone job. 

VO11 changed QRA. VO11 is getting married.

Traffic: VE1GL 52 EA 18 GD 10 CE 8 X 3 HI 8 VO11 4.

ONTARIO DIVISION

ONTARIO—Acting SCM, F. W. Hartley, VE3JFT—The 

very best wishes of the Ontario hams go to our S.C.M., 

VE3GT, and his bride, who are honeymooning at the time 

of writing. He presented with a new bus, as an added 
incentive to keep the station in operation. JT helped his 

move station. GT is running for Canadian General Manager. 

SG, QK and HP are candidates for post of S.C.M. GW ap-

plauds 802 buffer. Come on you hams in the Ambitious City 

and key. WK keeps good schedules. DJ boys 

build new rig great. HX is building new RK-20 

trin. DB is planning a new rig. IA is QRL on farm. BL 

is getting out on 7 mc. with Single '45. EY is QRL 

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VO11 changed QRA. VO11 is getting married.

Traffic: VE1GL 52 EA 18 GD 10 CE 8 X 3 HI 8 VO11 4.

CANADA

MARITIME DIVISION

MARITIME—SCM, A. M. Crowell, VE1DQ—Nova 

Scotia: GEJ is new B.M. and control station for N.S. 

in Maritime Net; he is also building Class B 'phone. EA 

schedules VE2BT semi-weekly mostly on 14 and 7 mc.; he 

worked CE, FE and IW on 28 mc. and handled traffic with 

VE3FX, Resolution Island. CD says Maritime network is 

FB. CRT expects his brother, CE, in Windsor. 

separate transmitters. 14- and 7-mc. crystal. CD uses P.P. 

par. '45's and SW3. IW is new station at Newport Landing. 

He uses P.P. RK-20's final crystal-controlled and home- 

made a.s. with crystal and a.v.o.; he works 3.5, 7, 14 and 28 

mc. GF has moved to Montreal. O.J. is running 14 mc. 

'phone has been heard in Bombay, India. IX, new 

station at Mount Dennis is using '45's P.P. on 3.5 mc. IX 

is new man coming on at Bantport with P.P. '45's. CV, 

Somersville, works 3.5 and 7 mc. RX has landed the 3.5- 

mc. working VK, BM will soon hit the air at Summerville. BW 

is very QRL work. WN will soon have the 1.75-mc. 'phone. 

GW is taking a shot at DX. BU is going on 1.75-mc. 

'phone this fall. GK is on the 3.5-mc. band. DS expects to be 

in the air at Summerville. BW is liberal with new rig; 

'Iphone, band. O.U. has new Jr. Op., John. AJ and DC are working in new Cap-

Phone band, 3850 kc. OJ is technician on staff of CFNB and 

works 3.5-mc. o.w. HS is Morse opr. at McAdam and uses 

3.5-mc. o.w. FJ works 7 mc. exclusively. G.U.'s new rig uses 

pair of '10's in Hartley. CJ has P.P. '45's TNT. FC is on 

3.5 mc. three nights a week. EJ accepts traffic any time; 

he has the 1.75-mc. 'phone going FB and is going to try the 

3.9-mc. band. EP is still piling up the DX on 14 mc.; 70 

countries to date. DQ is going to put the 14-mc. 'phone to 

use again via uses 'phone. 'Q' antenna. GI, Loch Lo- 

mond, uses 90- '10's. '10's got report from Tjiikistan. In 

total to over 50 foreign QSO's. GS is another old Morse 

man for C.N.R. at Moncton. Prince Edward Island: HH is 

Net Control Station for GIS, and schedules and logs all 

donors. GS is on Sundays for usual hour rag-chew. BJ is on 

with new rig; 2A5 '10- '10's final. IV just got back on after 

month's illness. He schedules his brother, CE, in Windsor. 

XT is on Sundays for usual hour rag-chew. VOlT changed QRA. VOlX is getting married.

Traffic: VE1GL 52 EA 18 GD 10 CE 8 X 3 HI 8 VO11 4.
interested in traffic handling. PLEASE get in touch with JF, or your nearest R.M., giving full dope on your station, schedules kept, if any, time available for schedules, etc. We have been trying so hard to get a Provincial Net working, but it can only be done by everyone doing his part. Write right now! This applies to all stations handling traffic.


QUEBEC DIVISION

QUEBEC—SCM, Stan Comach, VE2ES—The approach of the fall season is evident from the activity on all the bands. The 3.5-me. band especially shows that a lot of rigs have been dusted off and hops are flying. Traffic totals are again on the increase. JB is our new Trunk Line Station and schedules AP and JK for Montreal outlet. DR is the new R.M. and is doing a good job. DG is the Trunk Line Alternate. EC is new O.R.S. Traffic is nothing new to the Rev. RK-20’s. HM has a rig at his country home. IE is considering Cla!m B ten’s. DD is rebuilding stations and we believe that VE3 is ten. JT, or your nearest R.M., giving schedules to keep that Toronto schedule, the old reliable. Another VE3 line up with us; x3AD is now 2LC. Welcome, Bill. KK done gone an’ got married. Congrats, Bud. JE has moved the location of the station; we pitty JK. Bl. FQ has a nice up North pole transformer on 14 mc. ND and ZW are going OK. QF. Good luck, fellows. GA has fallen heir to a new mikes. CA has been trying his luck on 7 mc, and talks of keeping schedules with the V’s. DG is back with the gang after 15 months. RB has been heard on XU on 7 mc. VE3 is using a new receiver and likes it very much. DM is trying the Jones three-tube super. AM is modulating a pair of RK-20’s. BM has a rig at his country home. GE is considering Class B ten’s. DJ is rebuilding and we believe that IQ is also. IV is the DX man in that territory. IDE, who was with us for a while, is now in Kingston and hopes to have a VE3 call soon. IO is conducting quite a few ladies; it must be with the right women. DJ has erected a 60-foot mast in the backyard, it took a complete rugby team to hoist it. JS is putting out a nice ‘phone signal. Our deepest sympathy to W2HVI and his brother on the sudden passing of W7 AOF, a 30-year member of the Section. Our deepest sympathy to W2HVI and his brother on the sudden passing of W7 AOF, a 30-year member of the Section. Our deepest sympathy to W2HVI and his brother on the sudden passing of W7 AOF, a 30-year member of the Section.


PRAIRIE DIVISION

MANITOBA—SCM, A. J. Simpson, VE4BG—All Trunk Lines are in full operation once again and set for the coming winter season. AG will handle all Trunk Line traffic east and west of Winnipeg with GC receiving in any emergency. All rural stations in Manitoba wanting to arrange schedules as feeder stations to the Trunk Line are requested to get in touch with AG, who is Route Manager. RV is busy lining up his country schedules again. The 14-me. band still very popular and there is still lots of DX to be worked. BU is to be heard working G’S on ‘phone these days. XK is all set in new QRA and busy getting up a vertical. GC is still working with 56 mc. MY has been having trouble with his new W.H.S. mixer. RK lost one of his transistors and is now trying to go being high-power ‘phone. KU is looking around for a bigger tube for his final. Winnipeg is going to lose another one of the gang. John Simons CD expects to leave shortly for up North, operating for one of the Airways. AP from Inuvik is giving everyone a visit in Winnipeg and intends to start up and self-assembly with 200 watts c.w. VE5AC is in Winnipeg for a short time and expects to get around to seeing some of the local clubs. NV is still QRL business. AE is still helping to mate 7 mc. these days. DJ is waiting for conditions to settle down before coming on very much. DY is cleaning up rig and will be heard soon. BR has left Winnipeg for about a year. FT is going to duplicate his DX records of last year. AG will handle all Trunk Line traffic for the coming season and already many new prospective members are showing up.

Traffic: VE4AG 79.

SASKATCHEWAN—SCM, Wilfred Skill, VE4AL—The Moose Jaw Club started away to a new season with new officials; JU in the chair is heard inside and outside the club room. By working OA, F8 and G since building new receiver. IG is back on the home station. PG is hunting DX on 7 mc. WQ worked his first X on this band. RL is now on the home front. OA’s rig is in good shape. JU has gone home north for a tour of the interior gang. True Ham has passed on. Traffic schedules are again increasing and we believe that VE5AL 4 KB is our new QRA and busy getting up a vertical. GC is still working with 56 mc. MY has been having trouble with his new W.H.S. mixer. RK lost one of his transistors and is now trying to go being high-power ‘phone. KU is looking around for a bigger tube for his final. Winnipeg is going to lose another one of the gang. John Simons CD expects to leave shortly for up North, operating for one of the Airways. AP from Inuvik is giving everyone a visit in Winnipeg and intends to start up and self-assembly with 200 watts c.w. VE5AC is in Winnipeg for a short time and expects to get around to seeing some of the local clubs. NV is still QRL business. AE is still helping to mate 7 mc. these days. DJ is waiting for conditions to settle down before coming on very much. DY is cleaning up rig and will be heard soon. BR has left Winnipeg for about a year. FT is going to duplicate his DX records of last year. AG will handle all Trunk Line traffic for the coming season and already many new prospective members are showing up.

Traffic: VE4AG 79.

VANALTA DIVISION

ALBERTA—SCM, J. Smalley, Jr., VE4AG—Winter A brings its usual increase in activity and numerous stations are to be heard on both ‘phone and c.w. as well as numerous oldtimers who have reappeared. LX as usual has the highest total; he is back in Calgary for the winter leaving L.C. to look after his interest in Toronto. FM is getting up on the Frontiersmen Network pretty well lined up. QK still does his bit in the traffic world and more than his bit in the realm of rag-chewing. WQ at Thelma has put Alberta on the 17.5-me. ‘phone map. OD has joined the 3.5-me. ‘phone ranks. PU attended the Pacific Division Convention. EO’s visit to Calgary resulted in his getting bitten by the ‘phone bug. The Calgary gang is talking hamfest for next summer. JK is using all bands to advantage. KT is also active in Strathmore. HM has moved onto a farm. DA has gone north with AW and AR have come out for the summer. RV gets out FB with a low-power battery rig. SN is on 14- and 3.5-me. ‘phone using GD’s rig. RQ has rebuilt crystal. OF and JW like their new rig. BS has moved into a new home and will be active again in the near future. BD is busy to amusing good total. It is time to consider who is to be next S.C.M. Yours truly will be unable to handle the job again.

Traffic: VE4ALX 112 SD 27 QK 26 BR 14 JK 8 SQ 20.

BRITISH COLUMBIA—Acting SCM, Don Vaughan-Smith, VE5B—FQ, EA and AW are all on the air and are doing well. BC is now on 14 mc. 250-watt tubes. NT is reported doing FB in various parts of the province. IG is back on the home station. PG is hunting DX on 7 mc. WQ worked his first X on this band. RL is now on the home front. OA’s rig is in good shape. JU has gone home north for a tour of the interior gang. True Ham has passed on. Traffic schedules are again increasing and we believe that VE5AL 4 KB is our new QRA and busy getting up a vertical. GC is still working with 56 mc. MY has been having trouble with his new W.H.S. mixer. RK lost one of his transistors and is now trying to go being high-power ‘phone. KU is looking around for a bigger tube for his final. Winnipeg is going to lose another one of the gang. John Simons CD expects to leave shortly for up North, operating for one of the Airways. AP from Inuvik is giving everyone a visit in Winnipeg and intends to start up and self-assembly with 200 watts c.w. VE5AC is in Winnipeg for a short time and expects to get around to seeing some of the local clubs. NV is still QRL business. AE is still helping to mate 7 mc. these days. DJ is waiting for conditions to settle down before coming on very much. DY is cleaning up rig and will be heard soon. BR has left Winnipeg for about a year. FT is going to duplicate his DX records of last year. AG will handle all Trunk Line traffic for the coming season and already many new prospective members are showing up.

Traffic: VE4AG 79.
DX Scoring System

Woods Cross, Utah

Editor, QST:
I just got through reading "How to Count Countries Worked" by Clinton B. De Soto and I believe he has struck the DX nail right on the head. I, for one, am in favor of this system. The only drawback is countries like Argentina. The number in their call letters runs from 1 to 9 inclusive, but there are no defined areas for each number.

—Chester R. Ashby, W6DTB

Acton House, Felton, Northumberland, England

Editor, QST:
A definite ruling about how to count countries worked was much needed and I have just read your article in October QST with great interest. Incidentally I have been able to add another country to my list of those worked, as previously I had counted PK1 and PK4 as one! I note you say "The Federated Malay States are one country." That is VS2. How about the non-Federated States (VS3), and the Straits Settlements (VS8)?
As regards W4EG’s suggestion of a “DX score,” counting the number of districts worked in each country, I think this would cause some confusion. For instance, people would count G2, G5 and G6 as three districts, whereas the figures do not indicate any districts in Great Britain. For example: G2XT, G5QY and G6IR all live quite near each other in and around Newcastle-on-Tyne! There are probably other countries where figures in the call signs do not indicate different Districts. Of course W4EG’s suggestion would be OK for W, VE, VK, etc.

—Barbara Dunn, G6YL

5100 Cornell Ave., Chicago, Ill.

Editor, QST:
Mr. De Soto’s suggestion for a new DX scoring system is quite a good one—but why not use the time-tried system that A.R.R.L. uses in the International DX tests? Give one point for each foreign contact, total the contacts, and then multiply that figure by the number of countries worked. That seems to me a far better indication of all-around DX work.

—I. F. Lauman, W9MGN

Editor’s Note.—The theory of the DX Scoring System, as promulgated by W4EG, is not to place a premium on time spent on the air or amount of DX worked, but on coverage—which, it seems to us, is a fairer and more uniform criterion.
For answers to the queries contained in the above letters, and other moot points raised by correspondents, see the I.A.R.U. News department this issue.

Voting Age

S. W. Texas St., Portland, Ore.

Editor, QST:
Under our present set-up any kid member, regardless of age or experience, has a vote that carries the same weight as a mature and experienced member.
As citizens we do not qualify ourselves to vote until we have reached the age of 21. The affairs of the A.R.R.L. should be given the same thoughtfulness that we give to our other interests if we are to make the most of our hobby. The Board would do well to bring up for discussion the age limitations of voting.

—Temple V. Ehmsen, W7VS

Armistice

414 Redcross St., Wilmington, N. C.

Editor, QST:
I noticed in the October issue of QST a cartoon by an artist who evidently shares my sentiments. The drawing represented a couple of fellows having a first-class brawl over the c.w.-phone situation. Somehow, that cartoon wasn’t so funny as it was serious. It was too near the truth for comfort because it is becoming a brawl in the verbal sense. Believe me, old John Q. Public is beginning to think so, too. Lots of people ask me why all the dissension in the ranks. What can I tell them but the truth? Just narrow-mindedness and dissatisfaction.
So, fellows, what about a silent period on the question? After all, what is there to be so excited about? I don’t believe a bunch of fellows fighting like alley-cats will have much effect in changing the rules of the F.C.C.
But I do think the situation is hurting the grand old game of amateur radio. It’s only a hobby, so let’s don’t violate rule number 6 which
QSL Threats

54 Prince's St., Stockport, Cheshire, England

Editor, QST:

I received the enclosed card through the mail this morning. Is this an example of American courtesy?

I may say that since QSO No. 1 I have always sent a card for every QSO, but usually through the QSL Bureaus. I work several hundred local W's every year on 20 meters and I cannot possibly mail a QSL to each one direct for every QSO, but usually through the QSL Bureaus. I have never had a complaint from a W on this score.

Reason? Apparently, disinclination to QSL, no desire to work several hundred local W's every year on 20 meters perhaps, it was intended.

Ennor's Notes.—The card reads: "Poo! Poo! Poo!! Poo!!!! Poo!! Q.S.L.L. This is the second time I've written for a card. Why not be an honest ham at least. Yours (and the name and address)."

To G6ZU: No. American amateurs do not use our QSL Bureau to its full extent. There are in our district files perhaps 26,000 QSL cards which have not been called for in the past six months. Hundreds of American stations fail to send cards, even when advised that cards are being held for them. Reason? Apparently, disinclination to QSL, no desire for QSL cards. DX stations who can persuade American amateurs to apply for cards held in abeyance for them (see rules elsewhere in this issue) will be doing themselves a service.

Millygoats

122 Eighth St., Augusta, Ga.

Editor, QST:

Curv. I was working W4DN in Winterville, Ga., on the 160-meter phone band when I noticed the plate milliammeter on the output stage was just going crazy. First, it was drawing fifty milliamperes and then one hundred and fifty and back again to seventy-five. At the height of this performance I took a usual glance out of the window and noticed that the yard man had tied the kids' goat on the end of the counterpoise and that it was moving in circles around the back yard trying to get at all of the choice grass that was available. Now I have had lots of trouble before with bugs in my radio, but never before goats. You probably know a goat has a very strong and distinctive carrier on the air most of the time, so I either ignore the offenders entirely or make it apparent that a call from an unwanted district is seldom appreciated, and that it is better to wait until the station stands by for a call from anyone or gives a general CQ.

An example of good judgment and common sense was observed recently. During a QSO with W5EHM I was asked if I had a schedule with any K5 station. I replied that I did not, but that if W5EHM had any traffic for K5 I would take it and try to push it through, making it clear that I could not guarantee being able to do so. Immediately after the QSO I called "CQ K5 mag K5AF" and received an answer from W9LUV who had a schedule with a K5 that same day. He accepted my traffic, and I hope, successfully relayed it.

Under other circumstances I might have been annoyed at being called by a W9 when I called "CQ K5," but on this occasion I greatly appreciated W9LUV's call.

May this serve in the future to encourage other hams to use their judgment before indiscriminately answering a directional QSO.

Ennor's Notes.—Emphasis on this point has been placed recently by numerous correspondent foreign stations. Directional QSO's, most useful of calling devices, are abused, should not be, for the good of the art.

About A.R.R.L.'s DX Tests

512 N. Main St., Wheaton, Ill.

Editor, QST:

The "DX Test Rules" letter in November QST by W5NW brings up a few points. One, very important I believe, is that the W/VE and the DX rules need not be the same. The trouble with just working each "prefix" and have the DX on the same basis, is that 14 QSO's are all that the DX stations need, and how are the W's going to work DX if they get their 14 and close down? Wouldn't be so bad to have the W's do that, then shut up until they hear a new prefix, but don't do that with DX stations or they will all quit on us. Of course, those of us not on the air during the week would have no chance in that kind of a contest, I guess, due to not being on 14 mc. while the W gang is at work.

It was most notable during the VK contest that those not on the edge had little chance. When on the edge here, a kW just makes you a member. A good antenna 70 or 80 feet high lifts you out of the mess a little. A reflector (WVTB) gives you better strength reports, and you run away with the contest. The low power fellow can't compete on the edge, and can't work anyone much if not on the edge. So we pile up more and more on the edge with high power. A good stiff handicap for high power, such as a multiplier of 4 for 50 watts, 3 for 100, 2 for 200, and 1 for above 200, would help spread them out and make up for the choice edge position.

The situation is getting bad, edge QRH is fierce, band from 7150 to 7250 is getting a bad hole (fine for hearing DX though) I am almost to the point of suggesting a 50% penalty for operation in the edge 25 kc., a 25% penalty for being in the next 25%.

If you don't like the watt idea of rating, use the one of tube type, assuming running the pants off them.

| 34A | 382, 211, 205A, etc. | 500 watts per tube |
| 800, 825 | 200 watts per tube |
| 10, 801, 841 (normal size) | 100 watts per tube |
| 802, 59, 46, 47 | 25 watts per tube |

If they can force more watts on the tube, that's OK. Starting with 25 or 50 watts, divide score by input/25 or 50, or divide score by 2 or 4 times power input. That means that 800 watts input has to divide by twice as large a figure as 490; same with 80 watts and 40 watts—etc. I don't mean to suggest both a frequency-discount and a power multiplier, but one or the other, if a large one, will do the trick. The driving stage must be limited to not larger than the final—or I could figure out a way to get plenty of watts through even a burned-out 471.

E. H. Cocklin, W8PM

(Continued on page 68)
The main topic of discussion among amateurs everywhere we have been is the opening of the ten meter band to DX. One of the results of this has been to stimulate interest in improving antenna systems. Fortunately, ten meter arrays are small enough to be easy to erect, and the results are well worth while. As we have mentioned before on this page, many systems which work quite well at lower frequencies are very poor at ten meters. For instance, one of the popular "noise-reducing" antennas proved excellent at frequencies as high as 14 MC., but was quite worthless at 28 MC.

Our reason for stressing this point is that we feel the antenna is the weakest link in the amateur transmitter. Regardless of frequency, in almost every case where something better than ordinary has been used as a radiating system, an outstanding signal has resulted: — such as 6CIN, 6ZH, 6CNE, etc. On ten-meters, 5BDB's "signal squirter" is a notable piece of such gear. We understand a detailed description is being published in QST, so we will not describe it here.

At the airport in Dallas we saw a rather out-of-the-ordinary airplane radio installation. Instead of the conventional location of the receiver and transmitter in the tail of ship and operated by remote control, essentially all of the gear was located in the cockpit for direct operation. A concentric transmission line then ran to the tail of the plane, at which point an antenna coupling unit tied in to a trailing wire antenna.

At the same airport we saw another installation that interested us particularly. Two remotely located HRO receivers were operating without remote control. They had been tuned in three months before and left running night and day. No retuning had been necessary. All of which is additional proof of our contention that the small frequency drift of the HRO is remarkable. To be fair, we must share the credit with the transmitters, which obviously were holding frequency to close limits.

9LD uses one crystal and a precision electron-coupled oscillator. This combination allows him to slide gracefully around the band for calling purposes without running the danger of sliding out. We thought this a pretty nice system (that is, for the fellow with adequate frequency measuring equipment), until we later saw 9DRD's method of using a Hollister A-cut crystal with a single-knob-control frequency shift for the same purpose. Two of his variable frequency crystal units give almost complete coverage of the twenty meter phone band without any danger of getting too near either edge. The method of accomplishing this desirable end seems to be somewhat of a secret at the moment, but knowing Herb we expect that the details will transpire through the pages of QST pretty soon.

James Millen
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Correspondence Department
(Continued from page 68)

28-Mc. Bonus?

Editor, QST:
Had a swell three way tonight on ten, and I mentioned the idea that there should be a great big DX contest staged on 28 mc. VK5YP and W6DOB both agreed, and VK5YP said it would meet great favor with W.L.A. LU9BV, W8IXS and ZS1HF have seconded our motion. It will put a lot of new stations on ten, and that is all it needs to get an idea what the band acts like.

I'm all hepped about ten! I think it has possibilities of all kinds. Boy, the way the VE's and the Europeans push background out of my receiver at times is unbelievable. While every one is on edge give an early announcement of a big ten meter DX contest. February would be swell, it's usually a crazy month with DX. I know from experience, this ten meter band is the same as twenty only it has a greater skip packed into a shorter time duration which means all kinds of things can happen that don't on twenty.

Frank Lucas, W8CMX

Editor's Note.—italics ours. The biggest difficulty noted here with 10-meter contests is that the cyclic band conditions every so often bring a spell when results are entirely nil. This has led to the adoption of the "annual" type contest such as announced in November QST for the whole year 1936 in the belief that consistent progress was being made by this route. Plans are now being made for A.R.R.L.'s (March) International DX Contest. Last year a bonus was given depending on the number of bands on which DX was worked which stimulated 28 mc. attempts greatly. Should we do it that way this year? Or would an extra bonus or multiplying factor for 28 mc. only be an acceptable part of our 1936 DX contest? A postal card to A.R.R.L. Hdq. will give us your views.

Thought Transference

629 W. 41st Drive, Los Angeles, Calif.

Editor, QST:
Noted with interest was the letter of Mr. L. L. Cook, At Sea, M.S. Santa Barbara in the August issue. He brings up a subject that has impressed experienced radio operators, commercial and amateur, with its frequency of occurrence; it can be taken lightly, or in a philosophical and psychic manner. How many commercial operators have turned in for the night, slept fitfully, finally got up, and on turning on the receiver heard themselves being called, an SOS, or some event of interest. It has happened innumerable times.

The Department of Psychology at Duke University has been carrying on experiments in psychic science, thought transference, etc. Some of their results can be read briefly in "Forum," etc. They feel there is something to it as it happens too frequently in a given number of experiments to be explained as casual. The mathematics of probability tend to prove such events are possible. The uncivilized persons of the earth believe in and follow hunches and feelings — failure to heed such warnings sometimes meaning death. Perhaps the operator at sea away from noise, the amateur at home in the quiet of his room, feel and translate these premonitions, hunches, etc. How about some of you experienced ops — commercial and amateur — speaking up?

—Joseph Dockendorf, W6JTC

Decadence

3131 Moran St., Sioux City, Iowa

Editor, QST:
Though I've never gotten around to becoming an active amateur, I've followed the activities of hamdom with avid interest ever since the day back in 1924 when I found some old copies of QST among a bunch of mags which I was collecting for a school paper drive. I devoured their contents and became a ham in spirit if not in fact. Hams were dyed-inkwet enthusiasts then; but now they seem to be slipping into decadence along with literature and govern-
in all sizes, shapes, and for all requirements. The coupon will bring you full data... Weston Electrical Instrument Corporation, 602 Frelinghuysen Avenue, Newark, New Jersey.
SAY YOU SAW IT IN QST—It Identifies You and Helps QST

Editor, QST:

Up until a short time ago I was what might be called an honest to goodness satisfied ham, willing to go along minding my own business, and having been given the privilege to sit down at my desk and rag chew with some other fellow miles and miles away meant more to me than complaining about whether we should say QSA 5-7 or RST 599X or whether the signal strength report should go to 5 or 9. It grips me every time I hear the fellows complain about reports, when there are other things they might complain about that are of much more importance. If the fellows want to snap it up a bit, then why not do so as F. E. Handy suggests, and leave off the letters RST and just give the numbers, and if they want to use QSA 5-7 why not use it? We all know what it means. Anyway let’s do something about it and settle it once and for all.

—C. E. Mahr, W3PUJ

Viewpoint

9, The Mead, Beckenham, Kent, England

Editor, QST:

I feel I must write and champion the letter from Dr. E. E. Burger, W9CHH, which appeared in the September issue of QST.

Amateur radio throughout the whole world is a very comprehensive hobby. By that I mean that there are so many different outlets; there are six popular bands on which anyone who has obtained his operator’s license should be able to transmit and receive with efficiency, whether ‘phone or c.w. If the 80-meter ‘phone band is particularly crowded one night, what sane reason is there to start a “hate” against everyone causing it? If a ham two blocks away is using 500 watts and we can’t hear much else, then there are still five other bands on which it is possible to have enjoyable contacts. In the unusual event of six hams a block away all crowing off the air on the six bands, then we still have radio as a hobby in the constructional sense, or we can visit some of our radio friends. After all, had it not been for amateur radio we should not have made these friends.

W9CHH rightly says that the trend of science has given us frequency stabilization and extremely selective crystal receivers. Hams would have much more right to complain if the present day number of amateurs throughout the world were operating under 1925 conditions. Where would DX or even local contacts be then? The answer is, I think, that the hams who have come into the game during the last four years and who are the chief complainers, would not have been radio amateurs, because it would not have been possible.

I know there are many people who are never happy unless they are grumbling, but before they get all het-up next time and rush into print and give the beginner a wrong impression of us all, let them think how lucky they are with the natural growth of our hobby to enjoy it.

Now let’s see if I can raise that W6. Perhaps QRM will

—H. A. Maxwell, W9WHY

A Zedder Chats

University of Otago, New Zealand

Editor, QST:

I wish to express appreciation for all the good things that one has garnered from time to time from your excellent journal, QST. My own rig expresses this perhaps more eloquently than any words of mine, and, curiously enough, all the stunts introduced into the outfit work first time!

So I thought it was about time I said so and expressed thanks.

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—A Zedder

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

Book Review

Making a Living in Radio, by Zeh Bouck. 222 pages, including three appendices and a comprehensive index, 25 illustrations. Published by McGraw-Hill Book Co., Inc. Price, $2.00.

"... One's training as an amateur provides the finest foundation for any sort of radio work—from listening to . . . .
neering (italics the author's). The amateur is exceedingly well-informed on radio because to him learning is a pleasure. His heart, as well as his ambition, is wrapped up in radio. His training is a pretty good feeling between W's and ZL's and most of us could not wish for anything better than a W ragchew.

Finally I am lost in admiration of your 20-meter 'phones . . . .

—(Dr.) R. B. Dodd, ZL4FX

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

Kansas State Convention

For the second consecutive year Capt. W. A. Beasley, W9FRC, of the Kansas National Guard, was elected outstanding Kansas amateur at the tenth annual state A.R.R.L. convention at Topeka, October 5th and 6th. The Topekan, secretary of the Kaw Valley Radio Club, convention host, whose amateur experience totals nearly twenty-one years, was awarded for the second time in as many years the traditional Kansas Wouff-Hong trophy, made from wood from the lower foreyard of the famous U.S.S. Constitution —“Old Ironsides.”

To Clifford W. Johnson, W9BUY, of Independence, was awarded a special plaque upon which was mounted the rotor of a rotary spark gap, with plate inscribed in recognition of his sponsorship of the first annual Kansas amateur convention, held at Independence.

Approximately 200 OM’s, OW’s and YL’s from six states—Kansas, Missouri, Nebraska, Iowa, Colorado and Oklahoma—attended the two-day session, with its two banquets, roundtable sessions for ‘phone and c.w. operators, and special meetings for the A.A.R.S., the U.S.N.C.R., the pioneer Kansas convention gang, and the CX7 Association, including operators connected with the annual schedules with the Kansas National Guard encampments at Camp Whitside, Port Riley.

Speakers included Brig. General M. R. McLean, adjutant general for Kansas, who paid high tribute to the service of the radio amateur in the National Guard, Army Amateur and Naval Reserve nets and in general communication; H. H. Stephens, superintendent of the largest shops on the Santa Fe railroad, and president of the Topeka Chamber of Commerce; H. W. Kerr, W9DZ/1-WP, of Little Sioux, Ia., Midwest division director; O. J. Spetter, W9FLG, Topeka, S.C.M. and A.A.R.S. head for Kansas; Ray Solstad and Marvin Hogg, W9BHK, Junction City, Kan., who demonstrated a high-frequency aircraft transmitter and receiver; Jules Herbeveau, W9STM, of NBC, Chicago, talking on “Co-ordination Between Broadcast Engineering and Programs”; J. W. McDonell, radio inspector, Kansas City, Mo., on “F.C.C. Regulations and
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Relays, W. E. type "E" high res. multi-contact. $1.75

Decimeter, Kolski, Bureau Standards type "C", 300 to 10,000 meters. $35.00

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Roller-Smith 0-10 milliammeter, 3 inch flush mounting. $1.95

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Ammeters, D.C. portable, new Weston model 45, 3 scale 0-1-3-15-30 volts. $4.00

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Factors not interfere with your antenna. The busy times calls for heroic action, my good man. Get "CENTRALAB," the serviceman's friend if you would save the goil.

Thousands of servicemen, everywhere, know the secret of smooth, noiseless controls... CENTRALAB.

For "better than ever before" results use CENTRALAB RADIOHMS for replacement... a small stock service practically all makes.

Northwestern Division Convention

The tenth annual Northwestern division convention, held in Spokane on August 24th and 25th at the Hotel Spokane and Liberty Lake, was, to the convention committee ably commanded by W. L. Miller, W7AAN, merely the climax to three years of intensive planning and preparation, but to the rest of us who were there it was a distinctive and unique experience—one of the finest ham conventions ever held.

The program—miracle of miracles—was carried off almost precisely on schedule. At 10:30 Saturday morning the business meeting was called to order. Even at that early moment the success of the convention from an attendance standpoint seemed assured, for all during the previous day and evening OM's, XL'L's, and YL's had been registering from all over the division. More than 150 were assembled at the opening session, which, following an address of welcome by Chairman Miller and responses, was featured by the reading of Director Gibbon's annual report by Alternate Director A. L. Smith of Missoula. Clinton B. De Soto of A.R.R.L. Hq. then briefly discussed the A.R.R.L. in general terms. At this point one of the pronounced highlights of the convention appeared—Dr. Eugene C. Woodruff, director of the Atlantic Division and chairman of the Cairo Committee, discussing the work, functions, and plans of the Committee. The assembled amateurs listened intently to this exposition, filled as it was with information not hitherto generally known, until noon, when, following routine announcements, the meeting was adjourned.

Concurrent with the Dutch luncheon in the Silver Grill was a code speed contest held at Kinnan's business school, won by W7ABX, and the assembly of the YF's for the afternoon mati-
When the Schooner *Seth Parker* "encountered the most serious hurricane of the past twenty-two years off Tahiti," every man in her crew was glad Captain Phillips Lord had chosen BURGESS Batteries to power the *Seth Parker's* radio.

Captain Lord gave us this dramatic account of the reliability of his BURGESS Batteries: "Our radio equipment was badly damaged, but thanks to material like the Burgess Batteries which we had in our field amplifier and our receiving equipment, we were able to keep our emergency set in operation so we were at all times in communication with H.M.A.S. *Australia* and the U.S.S. *Ontario*. Our Burgess Batteries had been used for over a year on all of our broadcasts from the Schooner to the United States, yet when extreme need arose and an S.O.S. had to be sent, they still functioned perfectly."

If you want batteries with longer life and power to meet emergencies, ask for BURGESS, and look for the familiar black and white stripes on the batteries you buy. BURGESS BATTERY COMPANY, Freeport, Illinois.
The tube with the highest ratio of Transconductance to Interelectrode Capacitance

A design characteristic which is mainly responsible for the extraordinary performance of these tubes at ultra high frequencies. Plate power outputs as high as 400 watts have been obtained from a single tube at five meters.

There are many other brilliant engineering refinements and radical design developments incorporated in the structure of these tubes as well as the entire line of Amperex Carbon Anode Tubes. They are described in an attractive folder containing tube data and characteristics which will be mailed to you on request.

A partial list of Amperex Tubes suitable for Amateur and Experimental work is listed below:

<table>
<thead>
<tr>
<th>Model</th>
<th>Plate Power Output</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>HF200</td>
<td>400 Watt</td>
<td>$24.50</td>
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<tr>
<td>211-H</td>
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<td>17.50</td>
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<tr>
<td>203-H</td>
<td>175 Watt</td>
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<td>211-C</td>
<td>150 Watt</td>
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<td>211-D</td>
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<td>15.00</td>
</tr>
<tr>
<td>830-B</td>
<td>50 Watt</td>
<td>10.00</td>
</tr>
<tr>
<td>801</td>
<td>25 Watt</td>
<td>3.25</td>
</tr>
<tr>
<td>872-A</td>
<td>Mercury Rectifier</td>
<td>17.50</td>
</tr>
<tr>
<td>866</td>
<td>Mercury Rectifier</td>
<td>4.00</td>
</tr>
</tbody>
</table>

**New Crystal Microphones**

Several interesting new microphones of the popular crystal type have appeared upon the amateur horizon recently.

A special "Communications-type" diaphragm crystal microphone has been developed specifically for speech transmission. This microphone, which is of the pressure-actuated diaphragm variety with bimorph crystal element, has a rising characteristic which is 10 db down at 60 cycles and 10 db up between 2000 and 2500 cycles, reaching normal response (rated at -60 db at standard zero level and sound pressure of 10 bars) at about 400 and 4500 cycles. It is stated that the rising response characteristic concentrates the speech power in the intelligibility frequencies, the medium frequencies which contribute to the speech articulation, resulting in crisp, clear speech. A flat response characteristic appears not to be desirable for the most effective utilization of a given amount of voice power in communications work, for then the greater...
**REMARKABLE PRICE REDUCTIONS**

On LEEDS Constructional Accessories due to greatly increased demand

**RELAY RACKS**

Our Relay Racks are designed to stand up under the heavy loads of modern transmitter construction. Uprights are made of 5/8" stock, 1 1/4" wide. Welded angle supports, cross braces and sturdy cross bars insure extreme rigidity. LEEDS Racks unlike any units on the market, are designed for panel mounting according to Bureau of Standards specifications.

**Table Rack**
- Type RAD 36" high, 20 1/2" wide, with a complete set of panel mounting holes...

Shipping weight 30 lbs.

Type RBD rack 3'-9" high, 20 1/2" wide, in 1/2" deep, with a complete set of panel mounting holes... $7.45

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National HFO communication receiver in stock. Table model in cabinet, with tubes and coils covering from 1.7 to 30 mc...

$167.70

HFO Power supply ... $18.90

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RCA 852’s $16.40

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Ten complete designs for public address amplifiers in the other book. It includes one for every purpose, from 3 Watts to 30 Watts output, tried and tested designs that you can build, with complete parts lists for each.

These books should be in every amateur's technical library. They are invaluable for reference purposes. Just 22 cents in stamps brings them both to you. Send for your copies today.

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amount of the side-band power is concentrated in the low-frequency components, which are relatively unimportant from the standpoint of intelligibility. The new type microphone, it is claimed, will, in effect, approximately double the useful side-band power for speech, which is equivalent to squaring the effective modulation percentage. It should be operated into the relatively low impedance of $\frac{1}{2}$ megohm, to limit bass transmission. Greater over-all speech-amplifier gain will be required, since the higher frequencies inherently possess less amplitude than the low. In appearance, the new microphone, which is manufactured by Shure Brothers Company and is called their Model 70S, is similar to other low-priced crystal microphones.

A double-diaphragm microphone is another new crystal type. Acoustic energy is applied simultaneously to the two diaphragms, both flexing the crystal, resulting in increased output. The diaphragms are less than one inch in diameter, which results in very little sound-wave distortion, no cavity resonance, and no pressure doubling at the higher frequencies. This method of construction increases the capacitance of the active elements, resulting in less loss in long cable lines. The response curve shows that the output (into a 5-megohm load) is flat within 2 db from 20 to 6000 cycles, with a rise to approximately 10 db at 10,000 cycles, occasioned by the natural period of the crystal. This rising characteristic offsets frequency distortion in line, amplifier, modulator and receiver, as well as "tone control mania" or even the more legitimate use of the tone control to suppress static and other noises. The output level is approximately -64 db at 8-inch speaking distance. The unit construction is very rigid and is not subject to damage through mechanical jarring. This feature, together with uniform frequency response, results in decreased feedback effects. It is regularly supplied with a two-wire shielded cable, enabling push-pull connection or connection to a de-coupled grid circuit with a supplementary ground, resulting in less hum, tube and resistor noise. Due to the small size of the unit, which is described as the Model K-2, it works well for close-talking purposes, since it is not overloaded acoustically. This type is a product of Astatic Microphone Laboratory, Inc., Youngstown, Ohio.

Another new type of construction is employed in Shure Brothers new "Spheroid" non-directional high-output microphone. The microphone is of the single-diaphragm type, horizontally mounted, contained in a sphere 2½ inches in diameter. Sound actuates the diaphragm through a horizontal annular slot; because of this symmetry of construction, pick-up is uniform in all directions. This non-directivity aids the frequency response, as well, since all frequencies impinge upon the diaphragm on the same plane. The crystal itself is a new development of the Brush people, called the "Gra-foil Bimorph," cantilever supported and driven by a small shaped dural diaphragm. The various features of the design—"stream-lined"
Newark’s

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Our new program available to all Amateurs. Deferred payments on receivers. SPECIALS at unheard of prices. NEWARK’S guarantee on all merchandise listed below.

<table>
<thead>
<tr>
<th>Type</th>
<th>Cash Price</th>
<th>6 Months Time Payment</th>
<th>10 Months Time Payment</th>
<th>Down Payment</th>
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<tr>
<td>NATIONAL HRO — less power supply and speaker</td>
<td>$167.70</td>
<td>$175.34</td>
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<td>$37.70</td>
</tr>
<tr>
<td>NATIONAL HRO — with power supply, less speaker</td>
<td>$183.60</td>
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</tr>
<tr>
<td>NEW SUPER SKYRIDER — less crystal — Model SO</td>
<td>$79.50</td>
<td>$86.10</td>
<td>$87.90</td>
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</tr>
<tr>
<td>NEW SUPER SKYRIDER — with crystal — Model SX9</td>
<td>$89.50</td>
<td>$96.30</td>
<td>$98.10</td>
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</tr>
<tr>
<td>RCA - ACR- 136</td>
<td>$69.50</td>
<td>$75.90</td>
<td>$77.40</td>
<td>$19.50</td>
</tr>
</tbody>
</table>

Time payment plan on other receivers on request. Send your down payment with your order. Set is shipped as soon as credit is OK’d. Entire transaction approximately one week!

<table>
<thead>
<tr>
<th>Type</th>
<th>Price 6 Months</th>
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<tr>
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<td>$14.02</td>
<td>$15.07</td>
<td>$6.84</td>
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</tr>
<tr>
<td>THORDARSON No. T6877 Heavy Duty choke. 15 henries at 250 M.A.</td>
<td>$1.50</td>
<td>$2.45</td>
<td>$2.25</td>
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</tr>
<tr>
<td>THORDARSON No. T1995B Choke. 18 henries at 200 M. A. 190 Ohms —</td>
<td>$2.75</td>
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</tr>
<tr>
<td>Volts insulation</td>
<td>$1.25</td>
<td>$2.25</td>
<td>$2.25</td>
<td>$1.25</td>
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<tr>
<td>NEWARK PAPER FILTER</td>
<td>70c</td>
<td>90c</td>
<td>56c</td>
<td>20c</td>
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<tr>
<td>NEWARK PAPER FILTER</td>
<td>30c</td>
<td>60c</td>
<td>15c</td>
<td>80c</td>
</tr>
<tr>
<td>WELL-KNOWN PYROHM (Vitreous Enamel) RESISTORS</td>
<td>4c</td>
<td>6c</td>
<td>10c</td>
<td>15c</td>
</tr>
</tbody>
</table>

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Whether it be for General-Purpose use or Specialized Applications... you will find in the Complete *SHURE Line the microphone that will best fit your exact needs. What better proof of performance than the fact that they have been adopted by 35 leading Sound-Equipment Manufacturers — used in thousands of sound and broadcast installations throughout the world!

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**Mrs. Isabelle W. Moody, W7DHF**

UNHAPPY as was the passing of Mrs. A. Skene (Isabelle W.) Moody, 47, well-known, well-respected, and well-beloved operator of W7DHF, on October 3rd, her death was doubly sad in view of its cause: electrocution while operating her amateur radio station. A licensed operator for about two years, she had first garnered radio knowledge and passed the federal examination in order that she might communicate with her two sons, Alfred, W7AOF, who is attending the University of California, and William, W2WVI, an employee of General Electric in New York City. Her activity on the air was not limited to these contacts, however, and she became well known to 20-meter operators throughout the world, maintaining many schedules with the east coast and Canada. She was an ardent enthusiast, sometimes remaining at the operating table from 6:30 a.m. to 11:00 p.m., having her meals served in the room. The fatal accident occurred after a QSO with VE2FQ, on c.w. While changing the transmitter over to 'phone, a deed accomplished by clipping the 3200-volt plate lead around the Class B transformer, she neglected to turn off the high voltage. With this clip in her hand, her leg touched the transmitter frame, and she was evidently immediately electrocuted.

Mrs. Moody was a prominent citizen of Portland, Ore., and received impressive tributes by newspapers and others at her death. She had been identified with numerous civic projects, notably Community Chest work, and was a member of the Town Club and a director in the Girl Scouts. Her tragic death should prove an impressive warning to all amateurs that the equipment employed in their hobby possesses fatal potentialities, not to be lightly regarded or handled without full care.

---

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**Transmitter LEAD-IN INSULATOR**

*Each cone 2¾" high, made of low-absorption, highly vitrified glazed porcelain, with ¼-20 brass, nickel-plated nuts, washers, wingnuts and threaded rod. Cork washers for watertight mounting. White or brown.*

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- 10" rod and bushings for 4' wall - $1.20
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- Porcelain bushings, ½", ¾", 1¼" or 1½" long...5c each

**BIRNBACH RADIO CO., Inc.**

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American Radio Relay League, Inc. WEST HARTFORD . . . . . . CONNECTICUT
Self-Regulating Grid-Bias Supply
(Continued from page 84)

If Class-B stages must also be biased, the same voltage supply may also be used for this purpose. The difference in the design for the Class-B stage lies in the fact that the bias must remain very nearly constant and at such a value as to cut off (or nearly cut off) the Class-B stage plate current when no excitation is applied. This necessitates that the bias supply shall deliver a slightly higher voltage than that required to cause cut-off in the Class-B stage. For the Class-B stage, however, the required bias is only about half of that required for a Class-C stage, so that the same bias potential supply will usually suffice for both types.

To gain the required constancy of bias for amateur transmitter Class-B stages, the resistance \( R \) required may be calculated as before and then divided by about five. The voltage should then be set by the position of the supply tap, as before, except that the bias should not be raised above the plate current cut-off point.

If greater constancy for the bias of the Class-B stage is desired, its “valve action” diode may be changed to a triode of a low plate-resistance type, as shown in Fig. 2. The triode must be able to carry the current drawn by the resistor. If one triode (such as a '45 or '50 or 2A3) will not handle the current, several of them in parallel will do the work.

The current is

\[ I = \frac{E}{R} \]

where \( E \) = the supply voltage and \( R \) = the value of resistance between the supply tap and \( C^+ \).

It will be noted that the triode must be connected in the positive lead; therefore, if more than one stage is to be biased by the same supply, either all must be operated from the same triode regulator and voltage divider; or, if separate triode regulators are used, the amplifier filament circuits must be entirely separate and ungrounded.

From this it may be easily seen that the diode method gives the more simple and fool-proof system of the two. It will supply controlled and protective bias for Class-C stages and nearly fixed bias for Class-B stages, without interaction between the bias acting on the various amplifiers; and only one rectifier-filter circuit is needed.
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AIR-TUNED • VARIABLE COUPLING

1. CONTINUOUS VARIATION OF BAND WIDTH — EXTREME SELECTIVITY TO HIGH FIDELITY
2. PANEL OR INDIVIDUAL CONTROL — POSITIVE COIL SPRING ACTION
3. IMPREGNATED THREE PIE LITZ COILS - ISOLANTITE CORES — HIGH GAIN
4. FOR ANY I.F. AMPLIFIER WITH SCREEN GRID TUBES — 175 AND 465 KC TYPES
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Say You Saw It in QST — It Identifies You and Helps QST
WITH a blare of trumpets (or was it horns?), the 1935 Pacific Division Convention burst into being at 10:30 a.m., August 31st. Before the final registration of the 878th person had taken place, there were VE4's, W4's, W5's, K6's, W7's and W9's among those present, making one of the largest out-of-the-district attendances in addition to the largest divisional convention ever held on the Pacific Coast.

The Hotel Biltmore in Los Angeles had offered its full facilities, which, as the hours passed and the number grew, were vitally necessary for the comfort and pleasure of the many convention-minded hams and their friends.

When the convention was officially called to order by Convention Chairman Charles M. Feay, words of welcome were expressed on behalf of the City of Los Angeles by Mr. F. T. Hawtrey, Inspector in Charge of Communications for the Los Angeles Police Department; and for the Federation of Radio Clubs of the Southwest by General Chairman Phil Snyder.

The first item on the program was a trip to the Acme Brewery, where over 400 hams and their W(x)YL's enjoyed all the samples of the famous beer they could drink. After a sufficient lapse of time, the technical session was opened by Mr. William W. L. Burnett who spoke on the subject "Crystallography," followed by Mr. T. A. McFallough on "Power Performance of Class 'B' and 'C' Amplifiers" and Mr. Frank C. Jones on "The Exciter."

In the early evening, the Army and Navy System's dinners were the next order of the day. Following, the looked-for Frolic, with Nick Harris, the well-known detective, as M.C., was well-attended and enjoyed by all. Perhaps the many prizes that were won by the lucky ones helped to bring that spirit of wonderful geniality into evidence. After the Frolic, at the ghostly hour of midnight, the poor unsuspecting brothers who dared were initiated into the Royal Order of the Wouff Hong. Some lived through it; however, some of those who did will never be the same.

Sunday morning started with a group of meetings covering all phases of ham radio: u.h.f., DX, traffic, c.w. and 'phone. At 10:00 a.m. everybody piled into busses or their own cars and headed for the RCA-Victor Recording Studios in Hollywood where for three hours the gang was entertained royally by RCA who even provided an FB lunch! The balance of the afternoon was devoted to contests and the Open Forum where resolutions were passed calling for the referring to the Investigating Committee of certain matters; requesting the Board of Directors to ask the F.C.C. to show more leniency toward offenders of certain types after a year has passed since the offense; expressing approval of a petition to Congress. As the time was approaching for the main event of the convention, the banquet and the prize drawing, the Open Forum was adjourned until the following morning.

At 7:30 p.m. everybody gathered in the huge Ballroom of the Hotel Biltmore for the banquet;
A cut-away view of the underside of SENTRY BOX showing coil mountings and PERMALINERS. Note the clean wiring and short, rigid leads.

The SENTRY BOX unit includes the tuning condenser and dial mechanism as well as the coils and switch compartments. Separate coils are used for each circuit and no tapped coils are used. Careful design permits shortest possible leads — coils are mounted directly on their respective band change switches. Separate shielded compartments shield the R.F., detector input and oscillator circuits. The result is efficiency and stability of performance heretofore impossible of attainment. Permanence of circuit alignment is assured by the use of the PERMALINER trimmer capacitor — a new air-dielectric trimmer, sealed against moisture and dirt.

MODEL A-82. A production broadcast receiver, yet built like a commercial communications instrument. Eight Metal Tubes • Four Reception Bands • Sentry Box • Permaliners • Stabilized Dynamic Speaker • Sliding-rule Tuning Scale • Noise Control • Lorenote Compensation • CW Oscillator may be added.

$94.50
(Eastern List Price)
Director S. G. Culver with his customary smile acting as Toastmaster. Short talks were given by Mr. Bernard H. Linden, Inspector in Charge, 11th Radio Inspection District, and Mr. Frank "Around-the-World" Andrews of Station KFI. Several prominent persons in the radio field were also introduced. Following the dinner, 140 prizes were distributed to the holders of the lucky tickets.

Monday morning program began with the continuation of the Open Forum where further resolutions were passed calling upon the Board of Directors to move Headquarters to a more central location, and to publish the report of the Investigating Committee. Considerable discussion of the 5-meter bootleg problem also resulted in a better understanding of the situation on that band.

In the afternoon technical session Mr. Wm. L. Comyns developed the subject of "Controlled Carrier Modulation." Mr. J. N. A. Hawkins spoke on "The R. F. Amplifier" and Mr. Ralph O. Gordon told about his "5-Meter Super." Following the technical meeting, visits were in order to the Los Angeles Police Radio Station KGPI, Station KHJ, a newspaper plant, a transformer works and the world-famous Planetarium. Everyone reported having a glorious time at the convention.

Impressions: The large number of ladies attending (over 130) ... the absence of Don Wallace's high-power motion ... the ladies stating that they were really enjoying themselves ... the frenzied effort to keep up with the full program ... the free gasoline for those who drove their cars to Hollywood ... the two new hams who tried to hold two steins of beer apiece while they tried to pick up a pretzel ... the blackness prevailing in the Wouff-Hong initiation ... the rush to get a good spot in the Convention picture ... pasting convention stickers all over the busses ... the Biltmore Lounge, which almost "drank itself dry" ... those hats provided by two of the local jobbers! ... "Gee! Look at the prizes!" ... "Sorry, Om, I won't have time to take in the technical meeting. I have to meet that guy I worked last year." ... "Say, have any of you fellows seen my wife?" ... "You come up to my room after this." ... those whistles and the inevitable napkins ... the Southern California gang really proud and happy to show the whole Pacific Division bunch a good time, it being the last opportunity to do so. On, Pacific and Southern- Western Divisions, together!—W6EQM

15th Annual Central Division Convention

THE first day of the Central Division Convention held at the Hotel Statler, Cleveland, August 30th-31st, opened with about 195 registered. The weather was very bad—cold and rainy. This
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Complete the Circle with 1936 Copies

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

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The only successful regenerative pre-selector commercially built. It won its spurs on these salient points:

1. Tremendous increase in signal strength.
2. Consequent increase in sensitivity.
3. Absolute rejection of image.
4. Considerable increase in selectivity.
5. Decrease of noise to signal ratio.

- Two tuned stages
- Wave length 14-200 meters
- Rapid band changing
- No plug-in coils
- Self contained heater supply
- Smooth electron coupled regeneration.

P-11 is in use throughout the world! It certainly merits your attention. Its cost $19.90 net, less taxes.

PEAK Q - 5 ULTRA HIGH FREQUENCY SUPERHETERODYNE RECEIVER: 2½, 5 and 10 meter. The Peak Q-5 super-het receiver is a high gain, ultra high frequency unit for 2½, 5 and 10 meter. The Q-5 has undergone numerous tests and comes to you as the finest receiver in its class. In operation the Q-5 has the selectivity and sensitivity of the super-het, but lacks the "hiss" found so objectionable in super-regenerative receivers. It gives real superheterodyne performance. Your cost $27.60.

Américans are proud of the industrial achievements that have made their brawn, courage and ingenuity world famous. The chief disease which threatens that supremacy is tuberculosis. It is the greatest cause of death between the ages of 15 and 45. Help protect American manpower from this enemy by purchasing the Christmas Seals that fight it all year round. The seals you buy today may save your life tomorrow.

BUY CHRISTMAS SEALS
The National, State and Local Tuberculosis Associations of the United States

Roanoke Division Convention

On the 5th and 6th of October, the Charlotte Amateur Radio Association, Inc., sponsored the annual convention of the Roanoke Division, with headquarters in the Hotel Charlotte. Saturday morning saw a buzz of activity in and around the hotel. Registration began at 8 a.m. and by the opening of the convention at one o'clock approximately two hundred names were on the register. The convention was officially
THE NEW RME-69 SSS RECEIVER
FINGER-TIP CONTROL!

Two large five-inch dials, operated with exceptional ease and smoothness, constitute the tuning mechanism of the 69.

The left hand dial is calibrated in megacycles covering a continuous range of frequencies, beginning at 550 kilocycles and going through the ten meter amateur band. This range is divided into six band scales, selection being made with the lower center knob on the front panel.

The right hand dial affords the very essential electrical bandspread over an arbitrary range of frequencies chosen by the operator. The adjustment ratio is ample, even for ten meter reception using the series crystal filter. The large knobs aid materially in the tuning process and naturally add to the general appearance.

The R-meter is in the circuit at all times, reading the variations in signal strength of the incoming carrier. It gives a continuous minute to minute check on your communication signal. The meter is calibrated in decibels as well as in arbitrary R-1 to 9 values.

Despite its simple operation this instrument has an exceptional degree of flexibility. The variable audio beat control, the monitor send-receive control (the variable resonator adjustment for automatic peaking of the receiver, — everything built into the RME-69 will completely satisfy your ambition to own one.

See your dealer for a demonstration, or write us for Bulletin No. 69 containing complete information.

RADIO MFG. ENGINEERS INC., 306 First Ave., PEORIA, ILL.
EIMAC

A TRULY "GREAT" TUBE WITH STILL GREATER CAPABILITIES

New Ratings
EIMAC 50T
Fil. Volt. 5.5-5.25
Max. Plate Cur. 125 MA
Max. Plate Volts 3000
Plate Dissipation 75 Watts
Price $13.50

At leading dealers

EITEL-MCCULLOUGH, INC.
SAN BRUNO, CALIF.

"HAM" SPECIAL Standard Type Teleplex
A highly efficient code teacher using heavy specially prepared waxed paper tape, having two rows of perforations. Write for Free folder Q.T.
DEALERS — Correspondence invited with dealers for protected territories.
We are the originators of this type instrument

TELEPLEX CO,
76 Cortlandt St., New York City

MEMORANDUM

✓ You need a copy of the new twice-as-big 1936 Handbook.
✓ You need a binder for your 1935 QST's — and another for 1936.
✓ Xmas suggestion — give a membership subscription or a new Handbook.

DECEMBER, 1935

opened by E. P. Mallard, WA4CXG, president of the Charlotte Amateur Radio Association who introduced Mr. Charles Drury, WA4BFB, the master of ceremonies. Mr. Drury in turn presented the Hon. Ben E. Douglas, Mayor of the City of Charlotte, who welcomed those present on behalf of the city. The first speaker was Dr. E. C. Woodruff of Pennsylvania State College, who gave an extremely interesting technical talk. The technical talks were interspersed with stunts, much to everyone's amusement. Next on the program was Mr. Roy C. Corderman who gave a talk on "Something New in Crystals." The speakers who followed and their subjects were Mr. G. H. Moore of the Duke Power Company, "A Circuit for the Suppression of Electrical Interference," and Mr. R. N. Eubank, chief engineer of WRVA, "A New Antenna Tower." The ladies attending the convention were excused at the beginning of the technical talks and enjoyed a theater party and other entertainment. At 5:30 the gang attended a Dutch supper and chewed the rag until seven o'clock at which time all assembled for an enjoyable session of League affairs and technical talks. Mr. K. B. Warner and Mr. A. A. Hebert were eagerly received by the gang and gave everyone the information they desired about the League. Mr. John L. Reinhartz, of R.C.A., held the attention of the gang so well with his subject that when the dance started at 9:00 p.m. a bunch of the fellows skipped the dance in order to continue with Mr. Reinhartz in another room. Dancing and an elaborate floor show held sway until midnight, at which time a number of League members were initiated into the Royal Order of the Wouff Hong.

Sunday morning the meetings of the A.A.R.S. and the N.C.R. held its members' attention, while non-members visited local broadcast and ham stations. The ladies were taken on an interesting sight-seeing trip and entertained with a unique doll show. At one o'clock Mr. H. L. Caveness, director of the division and master of ceremonies for the day, opened the banquet. Short talks from the speakers table were made by Messrs. John L. Reinhartz, Roy C. Corderman, K. B. Warner, Dr. E. C. Woodruff, A. A. Hebert, R. N. Eubank, E. P. Mallard, Gordon S. Smith, E. J. Gluck, H. S. Carter, and Bannie L. Stewart. The following resolution was presented by Mr. E. J. Gluck and adopted unanimously by the assembly:

"WHEREAS, this Roanoke Division Convention of the A.R.R.L., now in session represents the amateur personnel of the division and
"WHEREAS, there has been some criticism of the officers and directors of the League and their policies,
"Therefore, this convention hereby resolves the following:
"We believe in the officers and directors of the League and believe them to be sincere and capable in its direction.
"We pledge to them our united support and confidence.
"We further request that this resolution be presented to the officers and directors of the League and that it be made public through the League publication, QST."

Due to the fact this was the last Roanoke Division convention that Mr. Hebert would be able to attend, the Roanoke Division presented him with a token of their appreciation and esteem. The convention adjourned about five-
ULTRA MIDGET CONDENSERS

Ultra High Frequency, Ultra Small Size, Isolantite insulated, these new condensers are ideally suited for use in padding and neutralizing, and for tuning high frequency receivers. They are particularly suitable for Fixed-Tuned exciter stages of band-switching transmitters.

A balanced-stator model is also available, in which two stators act upon a single rotor. Connections are usually made to the two stators only, eliminating the rotor contact, shortening leads, and reducing minimum capacity. For ultra high frequency work these advantages often outweigh the disadvantage of having only ninety degree rotation.

The small size of the new Isolantite Ultra Midget Condensers simplifies efficient layout and effective shielding. They can be mounted inside small coil-shield cans. The shaft extension is long enough for a conventional knob or dial, but may be readily cut off at the groove provided for this purpose. (See arrow at left.) A hexagon head is provided so that adjustments can be made with a socket wrench when the shaft is not used.

The new condensers can be mounted either by the angle foot shown above, or by spacers and bolts direct to the panel, as illustrated below.

<table>
<thead>
<tr>
<th>Capacity</th>
<th>Symbol</th>
<th>Single-Spaced</th>
<th>Net Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>UM-15</td>
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<td>.75</td>
</tr>
<tr>
<td>35</td>
<td>UM-35</td>
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<td>.96</td>
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<tr>
<td>75</td>
<td>UM-75</td>
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<td>UM-100</td>
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<td>1.14</td>
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<table>
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<th>Capacity</th>
<th>Symbol</th>
<th>Double-Spaced</th>
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<tbody>
<tr>
<td>25</td>
<td>UMA-25</td>
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<td>$1.11</td>
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<th>Capacity</th>
<th>Symbol</th>
<th>Balanced Stator, Single-Spaced</th>
<th>Net Price</th>
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<tbody>
<tr>
<td>25</td>
<td>UMB-25</td>
<td></td>
<td>1.11</td>
</tr>
</tbody>
</table>

NATIONAL CO., INC. Malden, Mass.

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

Oftentimes in the construction of amateur and experimental equipment it is necessary to provide terminals on a metal panel. General Radio Panel Terminal Insulators are designed for this use. They are self-centering and consist of two moulded bakelite insulators and two special jack-top binding posts with extra long studs. These insulator assemblies are available in two models, Type 274-Y with black bakelite insulation and Type 274-Z with yellow (low-loss) bakelite. They are priced, complete with two binding posts: Type 274-Y ... 60 cents and Type 274-Z ... 70 cents.

General Radio
Cambridge Massachusetts

Standard Frequency Transmissions

<table>
<thead>
<tr>
<th>Date</th>
<th>Schedule</th>
<th>Station</th>
<th>Date</th>
<th>Schedule</th>
<th>Station</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dec. 1</td>
<td>C</td>
<td>W6KK</td>
<td>Jan. 10</td>
<td>B</td>
<td>W9XAN</td>
</tr>
<tr>
<td>Dec. 6</td>
<td>A</td>
<td>W6KK</td>
<td>Jan. 15</td>
<td>C</td>
<td>W9XAN</td>
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<tr>
<td>Dec. 13</td>
<td>B</td>
<td>W9XAN</td>
<td>Jan. 17</td>
<td>B</td>
<td>W9XAN</td>
</tr>
<tr>
<td>Dec. 18</td>
<td>C</td>
<td>W9XAN</td>
<td>Jan. 22</td>
<td>BB</td>
<td>W6XX</td>
</tr>
<tr>
<td>Dec. 20</td>
<td>B</td>
<td>W9XAN</td>
<td>Jan. 24</td>
<td>BB</td>
<td>W6XX</td>
</tr>
<tr>
<td>Dec. 27</td>
<td>BB</td>
<td>W6XX</td>
<td>Jan. 25</td>
<td>B</td>
<td>W6XX</td>
</tr>
<tr>
<td>Dec. 28</td>
<td>BX</td>
<td>W6XX</td>
<td>Jan. 26</td>
<td>C</td>
<td>W6XX</td>
</tr>
<tr>
<td>Dec. 29</td>
<td>C</td>
<td>W6XX</td>
<td>Jan. 31</td>
<td>A</td>
<td>W6XX</td>
</tr>
<tr>
<td>Jan. 3</td>
<td>A</td>
<td>W6XX</td>
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<td></td>
<td></td>
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Standard Frequency Schedules

<table>
<thead>
<tr>
<th>Time (a.m.)</th>
<th>Sched. and Freq. (kc.)</th>
<th>Time (p.m.)</th>
<th>Sched. and Freq. (kc.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6:00</td>
<td>7000</td>
<td>4:00</td>
<td>7000</td>
</tr>
<tr>
<td>6:08</td>
<td>7100</td>
<td>4:08</td>
<td>7100</td>
</tr>
<tr>
<td>6:16</td>
<td>7200</td>
<td>4:16</td>
<td>7200</td>
</tr>
<tr>
<td>6:24</td>
<td>7300</td>
<td>4:24</td>
<td>7300</td>
</tr>
</tbody>
</table>

The time specified in the schedules is local standard time at the transmitting station. W9XAN uses Central Standard Time, and W6XX, Pacific Standard Time.

Transmitting Procedure

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

2 minutes—QST QST QST de (station call letters).
3 minutes—Characteristic letter of station followed by call letters and statement of frequency. The characteristic letter of W9XAN is "O"; and that of W6XX is "M".
1 minute—Statement of frequency in kilocycles and announcement of next frequency.
2 minutes—Time allowed to change to next frequency.

W6XX: Don Lee Broadcasting System, Los Angeles, Calif., Harold Perry in charge.

Schedules for WWV

Each Tuesday, Wednesday and Friday (except legal holidays), the National Bureau of Standards station WWV will transmit on three frequencies as follows: noon to 1:00 p.m. E.S.T., 15,000 kc.; 1:15 to 2:15 p.m., 10,000 kc.; 2:30 to 3:30 p.m., 5000 kc. On each Tuesday and Friday the emissions are continuous unmodulated waves (c.w.); and on each Wednesday they are modulated by an audio frequency. The audio frequency is in general 1000 cycles per second.

Missouri State Convention

After months of preparation, the first day of the Fifth Annual Missouri State Convention, Saturday, September 7th, dawned brightly and noisily in Joplin, Mo. About 11:30 order was established, and a welcome address to the group was delivered by Earl Brown, secretary of the Joplin C. of C., with a response by W6CJR, Dewey Mills of Mt. Vernon.

Say You Saw It in QST — It Identifies You and Helps QST
To most people, one millionth of an inch is beyond comprehension ... yet every Bliley LD-2 Crystal is checked in terms of these units for thickness and surface deviation on the precision electrical micrometer gauge shown at the left.

The thoroughness of the mechanical operations in manufacturing Bliley LD-2 Crystals is reflected in their greater activity, increased power output and freedom from spurious frequencies.

Remember, Bliley LD-2 Crystal units within 0.1% of your desired frequency or choice from stock, cost only $4.80 at the nearest Bliley dealer.

The new Bliley fall catalog describes the complete line of Bliley Crystals, Holders and Ovens for amateur and general communication frequencies.

---

**RAYTHEON AMATEUR TUBES**

<table>
<thead>
<tr>
<th>Type</th>
<th>Net Price</th>
<th>Max. Dimen.</th>
<th>Fila.</th>
<th>Pl. Volts—Output</th>
<th>DESCRIPTION TRIODES</th>
</tr>
</thead>
<tbody>
<tr>
<td>RK-10</td>
<td>$3.50</td>
<td>2½&quot;x3½&quot;”</td>
<td>7.5v</td>
<td>450v</td>
<td>Modulator, R. F. Oscillator, Amplifier</td>
</tr>
<tr>
<td>RK-18</td>
<td>10.00</td>
<td>2½&quot;x3½”</td>
<td>7.5v</td>
<td>100v</td>
<td>Thoriated Fil. Isolantite Base</td>
</tr>
<tr>
<td>RK-24</td>
<td>2.25</td>
<td>1½&quot;x4½”</td>
<td>2.0v</td>
<td>180v</td>
<td>Modulator, R.F. Oscillator, Amplifier</td>
</tr>
<tr>
<td>RK-30</td>
<td>10.00</td>
<td>2½&quot;x6½”</td>
<td>7.5v</td>
<td>1250v</td>
<td>High Freq. R.F. Osc., Amplifier</td>
</tr>
<tr>
<td>RK-31</td>
<td>10.00</td>
<td>2½&quot;x8½”</td>
<td>7.5v</td>
<td>1250v</td>
<td>Plate and Grid Conn. Top of Bulb</td>
</tr>
<tr>
<td>RK-32</td>
<td>12.00</td>
<td>2½&quot;x6½”</td>
<td>1250v</td>
<td>7.5v</td>
<td>Zero Bias Class B</td>
</tr>
<tr>
<td>RK-34</td>
<td>3.50</td>
<td>1½&quot;x4½”</td>
<td>6.5v</td>
<td>300v</td>
<td>Modulator, Isol. Base</td>
</tr>
<tr>
<td>RK-100</td>
<td>7.50</td>
<td>2½&quot;x3½”</td>
<td>0.8a</td>
<td>14w</td>
<td>Ultra High Frequency Triode P &amp; G Supp.</td>
</tr>
<tr>
<td>R-841</td>
<td>3.25</td>
<td>2½&quot;x3½”</td>
<td>7.5v</td>
<td>13w</td>
<td>From Top of Hard Glass Bulb</td>
</tr>
</tbody>
</table>

**SHIELDED PENTODES—R. F. Oscillator, Amplifier, Doubler, No Neutralization Supressor Mod. Carrier ¼ Power Shown**

<table>
<thead>
<tr>
<th>Type</th>
<th>Net Price</th>
<th>Max. Dimen.</th>
<th>Fila.</th>
<th>Pl. Volts—Output</th>
<th>DESCRIPTION TRIODES</th>
</tr>
</thead>
<tbody>
<tr>
<td>RK-20</td>
<td>15.00</td>
<td>2½&quot;x8½””</td>
<td>7.5v</td>
<td>1250v</td>
<td>Thoriated Fil., Isolantite Base, Plate Top Conn.</td>
</tr>
<tr>
<td>RK-23</td>
<td>4.50</td>
<td>2½&quot;x6½”</td>
<td>0.8a</td>
<td>12w</td>
<td>Heater Type, Isolantite Base, Plate Top Conn.</td>
</tr>
<tr>
<td>RK-25</td>
<td>4.50</td>
<td>2½&quot;x6½”</td>
<td>0.8a</td>
<td>24w</td>
<td>Heater Type, Isolantite Base, Plate Top Conn.</td>
</tr>
<tr>
<td>RK-28</td>
<td>38.50</td>
<td>2½&quot;x9½””</td>
<td>10v</td>
<td>2000v</td>
<td>Osc., R.F. Power Ampl. Cl. B &amp; C.</td>
</tr>
<tr>
<td>RK-19</td>
<td>7.50</td>
<td>2½&quot;x6½”</td>
<td>7.5v</td>
<td>1250v</td>
<td>Thoriated Filament, Jumbo Isolantite Base</td>
</tr>
</tbody>
</table>
Let's Get Together

Your inquiry about any apparatus will prove to you that it is to your advantage to buy from me. I give you specialized personal service of genuine value that is not available from other jobbers. If you want any apparatus you do not need on apparatus you do not need. So I have used apparatus at big savings too. I stock at lowest prices all amateur apparatus.

GOOD NEWS: All PR-16 models in stock for prompt delivery shipped prepaid. All receivers shipped on ten day trial. You need send only $5.00 with order.

IN STOCK — IMMEDIATE DELIVERY

The new RME-69s ............................................ $118.80
PR-16s (at last) prepaid .................................... 98.70
National HROs ............................................. 167.70
Breitling 12s complete prepaid ............................ 93.00
Silver 50s complete prepaid .................................. 199.80
Super-Sevens complete prepaid ............................ 49.50
The new Super Skyriders complete prepaid .............. 79.50
RCA AGR-136s complete ................................. 69.50
Super Pros complete ........................................ 194.04
Collins and RGA transmitters

TRADE IN YOUR RECEIVER OR TRANSMITTER

Every inquiry and order is personally attended to by Robert Henry, W9ARA; an active amateur for eleven years; graduate E.E. from M. I. T.; and owner of Henry Radio Shop selling amateur apparatus for seven years. Write for any information.

HENRY RADIO SHOP
211–215 North Main St. Butler, Missouri

"The Crystal Specialists Since 1925"
PIEZO-ELECTRIC CRYSTALS
Guaranteed Accurate to BETTER than .01%
SCIENTIFIC RADIO SERVICE
UNIVERSITY PARK, HYATTSVILLE, MD.

YOU'VE GOT TO BE GOOD!
Just being able to pass license requirements on code speed isn't enough, in this day of competition and ultra-fast operators. You've got to be FAST and ACCURATE
— both on the giving and the taking! TELEPLEX will boost your copying speed tremendously and in a comparatively short time. Still more important to your reputation among other ops — TELEPLEX will help you to care for those but holds in your key techniques! — Habits you can't even detect yourself, unless you can stop your list and listen to your own signal coming back to you! That's what TELEPLEX does — fine your own identical signals right back, imperfections and all. If you did your "hit" sounds like a "W-F" or your "and" like "P-D," TELEPLEX will tell you! Takes in trade apparatus you do not need and in turn operates a key which sends to you. Or you may use tape recorded by the world's best operators. TELEPLEX is the best, most widely used code teacher. We furnish a complete course, send you the Improved MASTER TELEPLEX and give you personal instruction with a MONEY BACK GUARANTEE. Send for new TELEPLEX FOLDER 36 today. IT'S FREE.

TELEPLEX COMPANY
76 CORTLANDT STREET NEW YORK

Time out for lunch was called, and at one o'clock the 'phone and c.w. round tables were scheduled under the leadership of Rev. Fox, W9ESL, and Bert Robbins, W9ENF, respectively. It was finally decided to combine the two meetings, and they ended in the usual vigorous but friendly arguments.

The prefix contest, conducted by J. C. Murphy, W9GLY, the capable treasurer of the Ozark Amateur Radio Association, to whom the financial success of the Convention is due was won by W9OLC, William Hanks of Fulton, Missouri, and the cracker-eating contest Sunday morning was won by Lee Culbertson of Joplin, a hamb- to-be.

On the afternoon program was Clinton B. De Soto from headquarters, who spoke on "The Mechanics of Modulation." This was Saturday's most important contribution to the educational feature of the convention. The always-welcome Midwest Division Director, "Grandpa" Kerr, W9GF, entertained the group for the next hour, followed by the Raytheon representative, Mr. Argento.

Another interim for supper, and then the entertainment feature. Here, through an oversight on the part of the manager, the error in the program announcing a YL and OW Party in place of the dance planned was not corrected, so that this part of the program was slighted by most of the gang. However, those in the "know" reported a very pleasant evening, with Dick Davis' orchestra and Miss Egleston's little dancing pupils doing a lot to help things along. The "stag" held in the Silver Dollar night club across the street from the hotel turned out to be "just another stag," with more headaches than thrills, from all reports next day.

Sunday's technical talk was on new tubes and circuits by Guy Wilson, W9EL, from Radio Laboratories in Kansas City. The Army and Navy discussions were led by W9EFC, F. E. Norwine, Jr., of University City, Mo., State Net Control for the A.A.R.S., and by W9CFL, Lieutenant A. W. Hodge, of Kansas City, U.S.N.R.

Immediately after the group picture was snapped at one o'clock, Mr. De Soto again took the floor, speaking this time on "International Amateur Radio Affairs," with special reference to the expansion of the amateur bands to be discussed at the Cairo Convention and urging wholehearted participation in the Cairo surveys.

At 2:30 the banquet, an excellent example of the Connor chef's ability, was served by black-faced, white-coated waiters in the Empire Ballroom of the Hotel. Grace was said by Rev. Fox. Leo Knaust, WOTGN, president of the O.A.R.A., was toastmaster, and introduced the "notables of Hamdom" and three of the YL's present, Misses Ida Allendorf, W9SRH, and Letha Allendorf, W9ESL, and Bert Robbins, W9ENF, of Pittsburg, Kansas. The prize drawing was efficiently conducted under the management of W9PRO, Jack Williams, and an informal trading bee and auction was held in the rear of the dining hall immediately afterwards. The Fifth Annual Missouri State Convention of Radio Amateurs is History! — W90UD

Say You Saw It in QST — It Identifies You and Helps QST
Troubles can be overcome in 1936 with QST binders priced at $1.50 postpaid. (Not available outside of the United States and Possessions, and Canada).

One set of yearly labels (1919-1938) now provided with each binder.

American Radio Relay League
West Hartford, Connecticut
For perfect control in your tube filament circuits, accepted practice specifies a rheostat in the transformer primary circuit. This hook-up, which prevents unbalancing the secondary, calls for a heavy-duty OHMITE Rheostat. There are no organic materials to smoke or char in these all-porcelain units. They give smooth gradual control!

Stocked in a wide variety of sizes and values. Ask your Jobber or write for Catalog 14.

OHMITE MFG. CO.
New Enlarged Quarters at
4831 FLOURNOY STREET     CHICAGO, ILLINOIS

RADIO ENGINEERING

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

RCA INSTITUTES, INC. Dept. ST-35
75 Varick St., New York     1154 Merchandise Mart, Chicago
Recognized Standard in Radio Instruction Since 1920

PRECISION CRYSTALS

‘X’ and ‘AT’ cut crystals one inch square carefully ground for frequency stability and maximum output. Be sure of your transmitter frequency — use PRECISION CRYSTALS. Guaranteed to be the highest quality obtainable.

‘X’ cut PRECISION Crystals carefully ground for maximum power supplied to your specified frequency accurate to 0.1%, and calibrated to within 0.01% are priced as follows: 1750 and 3500 kc, bands — $3.00 each, 7000 kc. band — $5.00. Add $1.00 to above prices if plugs, dustproof holder is desired. Jacks to plug holder into — $.10 pair.

The ‘AT’ cut crystal recently developed has a temperature coefficient of practically zero and will handle more power than ordinary crystals. ‘AT’ cut crystals ground to your specified frequency accurate to 0.1%, and calibrated to within 0.01% are priced as follows: 1750 and 3500 kc, bands — $5.00 each. Crystals holder — $1.00. Jacks for holder $.15 pair.

Crystals and ovens for commercial use quoted on your request. When ordering your product you are assured of the finest obtainable. Now in our sixth year of business.

PRECISION PIEZO SERVICE
427 Asia Street     Baton Rouge, La.

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 months’ period January 1st to and including June 30, 1935, was as follows:

Copies sold .................................. 42,155
Copies distributed free ..................... 371

Total ....................................... 42,526

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

Subscribed to and sworn before me on this 6th day of September, 1935.
Alice V. Scanlan, Notary Public

Strays

Power Transformer Design Circular

INFORMATION for the Amateur Designer of Transformers for 25- to 60-Cycle Circuits,” by Herbert L. Brooks, is a circular recently made available by the National Bureau of Standards. Design information on transformers ranging from 1 volt-ampere to 10 kilovolt-ampere (1 watt to 10 kilowatts at unity power factor) is given by graphs which eliminate laborious computations. Essential wire data are included, and methods of constructing the coils and assembling the core are explained. Although the method is intended primarily for 60-cycle design, instructions are also given for adapting the procedure to 50- and 25-cycle transformers. The information is directly applicable to step-down filament transformers and medium-voltage plate-supply transformers. The insulation problems involved in higher-voltage step-up transformers are less adequately covered. A helpful feature is a listing of firms from which silicon-steel core sheets and magnet wire can be obtained in small quantities.

Copies of this publication (Circular No. C408) can be obtained from the U. S. Government Printing Office, Washington, D. C., at 5 cents each (cash or money order — no stamps accepted).

A New Receiving System

(Continued from page 87)

stable signals, substantially inaudible on the straight superregenerator were very strong and healthy with the new sets.

HISS NOT TO BE TOLERATED

It should be remembered that this type of superregenerative detector, with the input heavily loaded, may be operated in an extremely sensitive condition with the characteristic hiss or “rush” just above audibility. Indeed, the tube may be superregenerating with no audible hiss whatever. Ordinarily, we operate the receiver in this fashion—cranking the audio gain control over toward maximum. When the going gets very tough because of ignition QRM or very weak signals, we give the superregen. detector more “gas” and back off on the audio control. The

(Continued on page 110)
Build This NEW 18-Watt THORDARSON SPEECH AMPLIFIER

with Special Foundation Unit and Standard THORDARSON Transformers

Here is a speech amplifier specially designed for amateurs, developed in the THORDARSON laboratories by W9SGA and W9UVP, and incorporating the very latest developments. While its cost is low, this amplifier gives the finest professional performance. It provides high fidelity amplification, has exceptionally high gain, a low hum level, and realizes its full-rated power output without distortion.

Write for details on 6-Watt & 30-Watt Models

OUTSTANDING FEATURES

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- Full output without distortion.
- 114.9 D.B. gain with crystal mike.
- Integral pre-amplifier.
- Hum is negligible.
- Input for all types of microphones.
- Over-all gain compensated for any type input circuit.
- Designed for rack or table mounting.

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They're inexpensive, too, and scientifically designed. Years of experience in manufacturing capacitors for leading broadcast and short-wave communication stations and the government are built into them. Big, cumbersome capacitors need no longer use valuable space in your transmitter. Nor do you have to worry about fire—Pyranol won't burn. You can use more voltage—G-E Pyranol capacitors will stand continuous operation up to 10 percent above rated d-c. voltage. They make possible better signals and have longer life. Get them from your dealer. Radio Department, General Electric, Schenectady, N. Y.

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Say You Saw It in QST — It Identifies You and Helps QST
WIRELESS PRACTICE SET

This Wireless Practice Set was designed for those who want an inexpensive instrument to learn the code. Operates from standard dry cell batteries. Two sets connected will operate up to a distance of 1000 feet. List price, $1.75.

SIGNAL's line of Wireless Keys, Telegraph Instruments and Wireless Practice Sets is complete. Send for our bulletin.

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T. R. McELROY

World's Champion Radio Telegrapher
23 BAYSIDE STREET, BOSTON, MASS.

Actually stocked by nearly all "ham" jobbers

MAC KEY @ $7.95
I believe it to be the finest semi-automatic ("bug" type) key built.

JUNIOR MODEL @ $4.95
At last! A low priced semi-auto that really works! Guaranteed!

MAC-AUTO less than $100.00
Completely automatic, all electric, 5 wpm to 200 wpm. Wonderful for schools, clubs, etc.

See my full page in new A.R.R.L. Handbook. 73, Mac.

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CONTROL UNITS FOR THE AMATEUR BANDS

Low frequency drift
High power output
Tube socket mounting
Frequency calibration .03%
May be used with high power oscillator tubes
Fully guaranteed.

Valpey crystals may be obtained from your dealer or by ordering direct.

160, 80 and 40 meter bands $3.00

The Valpey Crystals
377 Summer St., Medway, Mass.

I.A.R.U. News
(Continued from page 60)

12 Kroner . . . . Speaking of Andorra, as we were earlier, PX1A in that country is the highest station in all Europe—10,000 feet above sea level . . . . PX1A, who operates under cover, speaks fluently English, French and Spanish, writes PY1AW . . . . The C.A.V. joined with the members of Masaryk's Flying League and of Czechoslovak Motorists last summer in "pursuing" and capturing a stolen motor by means of airplane and radio . . . . The car ran in a radius of 30 miles; it was "captured" in 90 minutes . . . . Operated by OK1SHX, OK1KK, OK1FF and OK1PP, a 15-watt portable transmitter was used in the plane on 3.5 me . . . . A large amount of public acclaim followed the exhibition . . . .

Special:
Comes now "CQ-PK," official organ of the N.I.A.V.I.R.A. in Netherlands Indies, a multi-graphed sheet running to about 15 pages. Reproduced in surprisingly legible manner are circuit diagrams and technical matters which would do credit to a much more pretentious sheet. A baker's dozen of articles appear in the latest issue to hand, that of August, 1935. All credit to the enterprising leaders of N.I.A.V.I.R.A., a struggling society, lacking in numbers but not in enthusiasm, for this production. Interested amateurs, capable of reading the Dutch language, should communicate with the editor, PK1C8P, Th. A. F. Leyzers vis, V. Heutzboevlevard 2, Batavia-Centrum, D.E.I.

Experimenter's Section
(Continued from page 47)

"The oscillator here is keyed and perfect break-in can be used by holding the signal from the transmitter down to a level comparable to the received signal. This system was sought after primarily for listening to my sending while using a bug, but its other advantages are also important."

(Continued on page 101)
THE NEW 200-R TRANSMITTER
OFFERS
THREE SUPERIOR OPERATING ADVANTAGES

- Band Switching
- Crystal Selection
- Carrier Control

and a host of other constructional features not to be found in standard transmitters at much higher prices. The final stage employs an RK-28 delivering a carrier output of 200 watts on CW and 60 watts on PHONE.

The 60-T Transmitter with band and crystal selection is making a niche for itself in the medium power class.

Write for details and prices on these two outstanding transmitters

Harvey Radio Laboratories, 12 Boylston St., Brookline, Mass.

BIGGER and BETTER VALUES from the RADIO SHACK

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>PRICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pyranol 2MFD-9000 Volt</td>
<td>$2.90</td>
</tr>
<tr>
<td>Filter Condensers</td>
<td></td>
</tr>
<tr>
<td>Int. Plate Transformers</td>
<td></td>
</tr>
<tr>
<td>International Cased Chokes</td>
<td>$13.50</td>
</tr>
<tr>
<td>Standard Relay Racks</td>
<td></td>
</tr>
</tbody>
</table>

OVERALL HEIGHT 76" BASE 15 1/2" WEIGHT APPROX 100 LBS.

Say You Saw It in QST — It Identifies You and Helps QST
RAYTHEON VOLTAGE REGULATOR
Stabilizes AC Voltages to ±1%
Type VR-2
60 WATTS
$27.00

Input may fluctuate from 95-130 volts AC.
Load may fluctuate from 0 to full load. Output will remain 115 volts ±1%. Time constant is negligible. Automatic — no moving parts or adjustments. Sizes up to 2000 watts.

Write for Bulletin DL-48-711Q
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Electrical Equipment Division
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"The presentation is clear and logical. — More general principles are first passed in review, and a return is made later to consider them in detail and to point out their applications in practice." Proc. I. R. E.
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RAMSEY PUBLISHING CO. Bloomington, Indiana

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Over Other Types Is Mainly in Its Sensitivity
No high gain preamplification required. No background noise. No Power Supply. And THE PRICE $30 U. S. PATENTS PENDING
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RADIO RECEPTOR CO., INC.
110 Seventh Ave., New York City

Notes on Regenerative S.S. Receiver
A great many constructors have written to me regarding construction of the S.S. receiver described in May 1934 QST, and in recent editing of the A.R.R.L. Radio Amateur's Handbook. While the Handbook specifications are correct, a typographical error in the article gave an improper value for $R_{16}$, which should be 25,000 ohms, 5-watt, instead of 2,500 ohms. With the lower value too high screen voltage on the second detector and plate voltage on the beat oscillator were applied, making the signals seem very weak. With correct value of all resistors the following voltages measured with a 200-ohms-per-volt voltmeter against ground (chassis) were obtained. The range of values is for the two extreme positions of the volume control $R_3$.

<table>
<thead>
<tr>
<th>Tube</th>
<th>Plate</th>
<th>Screen Grid</th>
<th>Cathode</th>
</tr>
</thead>
<tbody>
<tr>
<td>R.F.</td>
<td>170-180</td>
<td>60-85</td>
<td>0-30</td>
</tr>
<tr>
<td>1 Det.</td>
<td>170-180</td>
<td>10</td>
<td>0-25</td>
</tr>
<tr>
<td>H.F. Osc.</td>
<td>170-180</td>
<td>75-85</td>
<td>0</td>
</tr>
<tr>
<td>L.F.</td>
<td>165-175</td>
<td>67-70</td>
<td>3</td>
</tr>
<tr>
<td>C.W. Osc.</td>
<td>75-85</td>
<td>7-10</td>
<td>0</td>
</tr>
<tr>
<td>2 Det.</td>
<td>150-170</td>
<td>75-85</td>
<td>0</td>
</tr>
</tbody>
</table>

In the September, 1935, issue of QST, W9NQV describes an effective means of adding a stage of audio amplification to the receiver, although this should not be necessary unless loud speaker reception of weak signals is desired on 20 and 10 meters where the gain is not as great as on the lower-frequency bands. A simple expedient which will increase the gain considerably on these bands is to use a 57 first detector in place of the 58, and to use the 40-meter coil on 20 meters and the 20-meter coil on 10 meters in the separately tuned r.f. stage.

Satisfactory coils for 10-meter reception can be wound on the small-sized National isolantite forms. $L_4$ and $L_5$ are each 3 turns spaced to one inch length of winding and $L_3$ is tapped one turn from the ground end, both coils of No. 18 enameled wire. $L_2$ is composed of 3 turns of No. 36 d.s.c. wire close-wound ¾ inch from bottom of $L_4$. The holes in these forms make all these spacings readily attained.

—R. W. Woodward, W1EAO

The Young Squirt's Epistle
(Continued from page 40)
over the transom and putting both feet through a couple of meters.

Your ilk, he said, getting up, are just the sort that gum up the air, and if you are hankering after trouble, just go on the air again without a filter, son. With that he moves toward the door. And another thing, he adds, don't say anything against the Old Man.

I snatched up a book, which was the nearest thing in reach, and threw it at him so hard I slid under the bed and got all tangled up in some wire. He ducked and I heard him grunt as he
Write for Bulletin 103 describing ISOLANTITE Holders, "AT" Cut Crystals, etc.

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For the
AMATEUR

USE Electrad "Variohm" Dividers and get exactly the right plate, screen and suppressor voltages for those new pentodes. Five sizes from 25 to 200 watts to suit all power packs. 85c to $3.75 each list.

Write Dept. Q12 for Complete 1936 Catalog of Resistors for All Purposes

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

103
picked it up: "Wireless Course in Twenty Lessons," he grated. You ain't changed none. And then he was gone before I could get untangled and give him the piece of my mind that I had been holding in reserve. But here's the point: That old fossil could have passed for you, he was so dad-ratted onery. If he had taken off that muffler I could have then noted whether he had yore foliage. What I want to know is, was it you? If it was, just remember that you will have to grow up some more before you can get the best of me in an argument, and this Sherlock Holmes stuff ain't going to get you nowhere. I can put it over you like a tent, just like I did this time.

Yours,

THE YOUNG SQUIRT

Utility Type Switchboard
(Continued from page 18)

The F85, its pre-selector, and an SRR super-regen receiver are supported on shelves in the rear, their fronts being let through windows cut in the panel as shown. Incidentally, if you make up a panel and then decide later that you require a different layout, you can throw the original panel away and make up a new one without much trouble and at very slight expense. The chasses on which the various transmitter units are assembled are mounted on shelves in the rear of the board.

Be sure and provide plenty of jacks to which to connect the receiver outputs, matching transformer inputs and outputs, motors, and loud speakers, so that the rig will be as flexible as possible.

Mounting the switchboard across the corner of a room as shown in Fig. 1 is desirable because it gives more room in the rear in which to work. Put in plenty of service outlets in the rear of the board so that the trouble-light and soldering iron may be moved about as required. Double outlets which can be mounted on the uprights with wood screws can be obtained for 15 cents and do very well.

One very helpful, if not desirable, feature which has become evident with this type of construction is that the board can become quite haywire in the rear when schemes are being tried out and still preserve a fairly respectable appearance from the front.

The All-Around Signal Squirter
(Continued from page 17)

proved here in action. On one occasion we were QSO "Three Mud Ducks" and had the old simple antenna in use for a check. Things not being what they might be, the inquiry came from W3MD as to whether we had the "Bull's Horns"
Announcing

RADIOLAB AIR DERBY
Fun? Oh Boy! PRIZES!
The tops!

FIRST PRIZE

14 Other Major Prizes

Here’s the ‘Dope!

- In an effort to express our appreciation of the patronage you have so generously given Radiolab and the manufacturers of our ham equipment, we are co-sponsoring this contest. And what a contest!

- Our Fall Ham Bargain Bulletin is being released simultaneously with appearance of this announcement. You must receive this bulletin to participate in the contest. If you have received our Fall Bargain Bulletins in the past, this Fall edition will reach you approximately December 1; if you have not received past issues, write us now so that your name will be registered and a bulletin sent in time for the contest. Every copy of the Ham Bargain Bulletin is numbered. Your number will be found on the address sticker to the right of your name. That is your number in the contest and there are other stations who have been assigned this same number. We have a record of every station’s number here at Radiolab.

- The object of the contest is for you to locate and list as many stations as possible who have the same number as yours. We are sending a Bargain Bulletin to every amateur on our mailing list (about one-half the Hams in U.S.A.) and guarantee at least 100 stations have been assigned the same number you have. It’s been a lot of work but now we are all ready for the fun.

- The contest is short and snappy and will test your operating skill and ingenuity. Anything goes as long as you abide by the simple rules. Here are a few suggestions: CQ for your number, thus CQ56.

- Organize a network for exchange of numbers. Keep a record of every number you find, even though it is not yours, and trade your list with other stations. Make your CQ’s and contacts short and eliminate QRM. Above all else don’t get discouraged — this is a tough contest and remember a score of 10 points may be a high one.

- We hope we have devised a contest here that will appeal to every ham and only regret that we ourselves are automatically eliminated from participating in the fun. Every one of you fellow amateurs who receives a Bargain Bulletin is registered and in the contest, no formal entry, no acknowledgment is required. Read the simple rules and get your rig ready for the big event.

Full list of Prizes — Your Registration Number is in the — Watch for it!

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Twice-as-Big
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WILL MAKE THE IDEAL
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Simply send in your order now with name and address of the person or persons to whom it is to be sent, giving the name of the donor. We'll do the rest—see to it that the new HANDBOOK reaches destination on or before December 25. A suitable gift card will be sent with each copy. Swell idea, huh?

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IMMEDIATE DELIVERY ON THE NEW
1936 RME-69 RECEIVER
DOWN PAYMENT—ONLY $30.00
See Page 91 for Complete Details

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THE NEW and IMPROVED
Completely shielded I. F. Crystal Unit. Designed especially for the S.S. RECEIVER.

INTEGRATED in new receivers by leading set manufacturers.

Supplied in 3 freq. 525 Kc. 500 Kc. and 465 Kc.

See it at your dealer's or write for descriptive literature.

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Thick cut, low drift "AH" cut crystals are from 2 to 40 times as stable as the X or Y cuts. Supplied within 10 Kc. of specified frequency or choice of dealer's stock.

1700-3500 Kc. 7000-7300 Kc.

"AH" 10 $3.35 $3.90
"AH" 2 5.30 5.90
"AH" 2 8.90 12.90

The number following "AH" is the drift in cycles per °C. per 1000 Kc. ORDER FROM YOUR DEALER—OR DIRECT

HIPower CRYSTAL CO., 2035 W. Charleston St., Chicago, Ill.

106 Say You Saw It in QST — It Identifies You and Helps QST
headed in his direction. We had to answer that the Signal Squirter was not on the transmitter. A couple of minutes' delay and the Squirter was put in service—and the QSO was finished without further interference. Which, after all is said and done, is what we are looking for.

Was it worth the effort of three months of hard work and experimentation, failures and all sorts of other discouragements? (To say nothing of the sarcastic remarks from neighbors who don't have all the sympathy for amateur communication that they might—except when they want to talk to some of their friends or relatives.) The answer is YES; a thousand times, YES. If a tornado blows along tomorrow and takes the whole thing with it—we, we have the experience and it would take only a little time to get another up and in working order. We are sold on the system and the results are so far ahead of what we had hoped for that we are all set, at least until such time as some one of the brethren of our great fussing fraternity can tell us how we may add means for tilting the rotatable assembly to give control of the angle of vertical propagation. But then, if that were done, we would have to have a boy stand by and fan us while we pushed the buttons to tilt and rotate. For fear that the boy might not be handy some time when we wanted to go through the various contortions, and since we don't see how to do it anyway, let's just forget that part for the time being—and have a bit of fun on the air for a change.

28-MCP WAC Accomplished

(Continued from page 11)

U. S. districts, using about 50 watts input to a push-pull final stage, fed from an 80-meter crystal oscillator and a series of doublers to ten. His antenna consists of two half-waves stacked vertically and fed in phase through a quarter-wave matching transformer and twisted pair transmission line. His seems to be an ideal part of the world for ten-meter work with Europe and America, particularly, since the north-south transmission path appears to be much more consistent than east-west. We hear him working Europeans when none can be heard or are very weak here. The J's are quite consistent on the West Coast, but are heard very rarely in the East and Middle West, the only reported instances of reception in these districts being by W3F AR, W4AGP and WSCRA. There are lots of W1's, 2's, 3's, 4's, 5's, 6's, and 9's that need only Asia for that ten-meter WAC! The 6's and 7's, on the other hand, have found Europe and Africa the chief stumbling blocks.

As this is being written it appears that the peak of this DX period has passed, but it may be only a temporary lull. That, in fact, is one of the things that makes "ten" so fascinating to some hams and gives the opposite type a pain—you never know what's going to happen, or when. Luckily there are enough of the inquiring type to
Meet the Family—
of Johnson Transmitting Tube Sockets,
every one worthy of the name it bears.

- You'll find in them, firm contacts of phosphor bronze, smooth acting, never failing; bases of fine, smoothly glazed low absorption porcelain; heavy metal shells to provide adequate support to valuable tubes.

Of course, you already know the parents,
No. 211 “50 watt,” and No. 210 “Navy, or UX, base,” and their first cousins 211FB and 210FB for vertical panel mounting. Precocious youngsters are the No. 216 Giant 5 Prong socket for the RK28 and RCA803, and the twins, the 215 Socket Set for “250 watt” tubes, featured by the Safety Cup plate terminal.

Prices are really low — for example, the No. 211 “50 watt” size has lately been reduced to $1.75 list; the No. 216 is $2.50, and the No. 215 only $3.50.

The full Johnson line also includes porcelain Stand-off, Thru-panel, Antenna, and other Insulators; type “Q” Antennas; Plugs and Jacks; type “D” Variable Condensers; “Hi-Q” Transmitting Inductors; and other items described in Bulletin 960.

Available at usual discounts from numerous Johnson distributors.

Export Office: 25 Warren St., New York
Cable Address: “Simontrico”

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MANUFACTURERS OF Radio Transmitting Equipment
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C-87,...4.20 C-SW3...3.30

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A
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New Mac-Kay
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Speed-a-bug
$5.70

Heavy Duty 866's, Each.......$1.29
80-160 X Crystals.......1.50
Billey BC2 Holders.......1.00
Isolantine Top 10's.......1.14
Crackle finish black paint, 1/2 pint....$6.69

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ALL TYPES IN STOCK

NATIONAL
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ABOVE ARE NET PRICES LESS COILS AND TUBES

NEW RCA AMATEUR TRANSMITTERS AND TRANSCEIVERS
Amateur net prices, f.o.b. factory, for the various units and assemblies are given below. Prices are subject to change or withdrawal without notice. Prices are less tubes, crystals, microphones, and all other accessories except one set of coils for one amateur band.

NET PRICES TO AMATEUR
ACT-40 (Complete phone and CW transmitter) ........ $935.00
ACT-40-A (Antenna Unit) ................................ 37.50
ACT-40-R (R-F Unit) .................................. 110.00
ACT-40-M (Modulator Unit) ............................. 84.50
ACT-40-C (Metal Cabinet) ................................ 20.75
Extra coils for 40 watt transmitter, per set .... 7.50
ACT-800 (Complete phone and CW transmitter) .... 475.00
ACT-800-A (Antenna Unit) ............................... 49.50
ACT-800-P (R-F Power Amplifier Unit) .............. 99.50
ACT-800-M (Modulator Unit) ............................ 99.50
ACT-800-S (Power Supply Unit) ......................... 96.50
ACT-800-C (Metal Cabinet) .............................. 34.50
Extra coils for 800 watt transmitter, per set ... 7.50
ATR-819 — Transceiver complete, less accessories . 19.95

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How to Become a RADIO AMATEUR
Your introduction to amateur radio
The standard elementary guide for the prospective amateur, giving, in simple terms, complete constructional information for an inexpensive station with the necessary dope on operating practices.

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Gives you the dope
that you need
Nearly 200 typical license exam questions and answers, where, how and when to apply. In fact, all the dope on amateur licensing procedure as well as the text of the regulations and extracts from the basic radio law.

AMERICAN RADIO RELAY LEAGUE. INC.
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Say You Saw It in QST — It Identifies You and Helps QST
LEARN RADIO

New Courses Now
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fully, 300 licensed graduates placed in past 4½ years in broad-
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Oldest, largest and best equipped school in New England. Equipped
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ment telegraph or telephone license.

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BELIEVE IT OR NOT—PROMPT DELIVERY ON
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D E L A W A R E R A D I O S A L E S C O.,
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WILLARD E. WILSON—W3DQ

“Q L Z — Q L Z — Q L Z - Q L Z” OPERATORS
Save Your Fist
with the AUTOMATIC
ROBOT RADIO KEY

Price $10
Postpaid

Gardiner-Levering Co.

A New Receiving System
(Continued from page 98)

A New Receiving System

receiver, idling, then has about the same amount
of hiss as the conventional lower-frequency super-
het but it has, into the bargain, the astonishing
ability to squash ignition noise.

Just in case there should be any misunder-
standing about it, we would mention that neither
of these receivers is intended to represent the
ultimate in the design of ultra-high frequency
equipment. They are essentially experimental
models built to investigate the merit of this
particular approach to the receiver problem.
Their operation in practice is more satisfactory
than any other type of ultra-high frequency re-
ceiver we have handled and, speaking in terms of
ham communication, they have permitted a very
striking improvement in the Hartford-Boston
60-mc. link which has been in operation daily for
more than a year.
Where to buy it

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

ASTATIC
Crystal Microphones and Pickups

ASTATIC MICROPHONE LABORATORY, Inc., YOUNGSTOWN, O.

Pioneer Manufacturers of Quality Crystal Products

CHICAGO, ILL.
Allied Radio Corporation
833 West Jackson Blvd.

CHICAGO, ILL.
601 W. Randolph St.
Pioneer Automotive Supply Co.

CHICAGO, ILL.
901-911 W. Jackson Blvd.
Wholesale Radio Service Company, Inc.

KANSAS CITY, MO.
1012-14 McGee St.
Burstein-Applebee Company

MINNEAPOLIS, MINN.
1124-26 Harmon Place
Lew Bonn Company

E. F. JOHNSON COMPANY

E. F. JOHNSON COMPANY

THRESHOLD PRODUCTS

WASECA, MINN.

U.S.A.

CHICAGO, ILLINOIS
2073 West 85 Street
Northern Ohio Laboratories

CHICAGO, ILLINOIS
520 S. State Street

CHICAGO, ILLINOIS
901-911 W. Jackson Blvd.
Wholesale Radio Service Company, Inc.

CLEVELAND, OHIO

DETOUR, MICHIGAN

GRAND RAPIDS, MICH.

LA CROSSE, WIS.

MOLINE, ILL.

WINNIPEG, CAN.

BENGSTON'S Rodie Store

RADIO PRODUCTS

E. F. JOHNSON COMPANY

DETOUR, MICHIGAN

GRAND RAPIDS, MICH.

LA CROSSE, WIS.

MOLINE, ILL.

WINNIPEG, CAN.

BENGSTON'S Rodie Store

RADIO PRODUCTS

E. F. JOHNSON COMPANY

DETOUR, MICHIGAN

GRAND RAPIDS, MICH.

LA CROSSE, WIS.

MOLINE, ILL.

WINNIPEG, CAN.

BENGSTON'S Rodie Store

Electrical Supplies, Ltd.

131 South 6th St.

1420 5th Ave.

310 Ross Ave.

NATIONAL COMPANY, INC., MALDEN, MASS.

BUTLER, MISSOURI

211-215 N. Main Street

Henry Radio Shop

CHICAGO, ILLINOIS

415 S. Dearborn Street

Chicago Radio Apparatus Company

CHICAGO, ILLINOIS

550 S. State Street

Midwest Radio Mart

CHICAGO, ILLINOIS

926 W. Madison Street

Newark Electric Company

CHICAGO, ILL.

901-911 W. Jackson Blvd.
Wholesale Radio Service Company, Inc.

FARGO, N. D.

123 Broadway

Deloet Electric Supply Company

KANSAS CITY, MO.

1012 McGee Street

Burstein-Applebee Company

MINNEAPOLIS, MINN.

1124-26 Harmon Place

Lew Bonn Company

OMAHA, NEBRASKA

2855 Farnam St.

Radio Accessories Company

ST. LOUIS, MO.

627 Pine Street

Gordon Radio Company

CHICAGO, ILLINOIS

19 S. Wells St.

Hinds & Edgerton

NATIONAL COMPANY, INC., MALDEN, MASS.

BUTLER, MISSOURI

211-215 N. Main Street

Henry Radio Shop

CHICAGO, ILLINOIS

520 S. State Street

Midwest Radio Mart

CHICAGO, ILLINOIS

833 W. Jackson Blvd.

Allied Radio Corporation

CHICAGO, ILLINOIS

415 S. Dearborn Street

Chicago Radio Apparatus Company

CHICAGO, ILLINOIS

926 W. Madison Street

Newark Electric Company

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901-911 W. Jackson Blvd.

Wholesale Radio Service Company, Inc.

CINCINNATI, OHIO

633 Walnut Street

Steinberg's, Inc.

CLEVELAND, OHIO

2073 West 85 Street

Northern Ohio Laboratories

Listings on this page do not necessarily imply endorsement by QST of the dealers or of other equipment sold by them.

111
A directory of suppliers who carry in stock the products of these dependable manufacturers.

DAYTON, OHIO
Burns Radio Company
140 E. 3rd Street

DES MOINES, IOWA
lows Radio Corporation
1212 Grand Avenue

DETROIT, MICHIGAN
Radio Specialties Company
171 E. Jefferson Ave.

GRAND RAPIDS, MICH.
Radio Distributing Company
335 Market Street, S. W.

INDIANAPOLIS, IND.
State Distributing Company
316 N. Illinois Street

KANSAS CITY, MO.
Burstein-Applebee Company
1012 McGee Street

KANSAS CITY, MO.
Radio Laboratories
1515 Grand Avenue

MILWAUKEE, WIS.
Radio Parts Company
332 W. State Street

MINNEAPOLIS, MINN.
Law Bonn Company
1124-26 Harmon Place

OMAHA, NEB.
Radio Accessories Company
2855 Farnham Street

PARIS, FRANCE
J. C. Belouzet, De TisnY, 6, Avenue Hoche

PEORIA, ILLINOIS
Klaus Radio & Electric Company
707 Main Street

ST. LOUIS, MO.
Walter Ashe Radio Company
1100 Pine Street

WINNIPEG, CAN.
Electrical Supplies, Ltd.
310 Ross Ave.

CLEVELAND, OHIO
Northern Ohio Laboratories
2073 West 85 Street

CLEVELAND, OHIO
Cleveland Distributing Co.
1301 Superior Avenue

DETROIT, MICHIGAN
Radio Distributing Company
129 Selden Avenue

DETROIT, MICH.
Radio Specialties Co.
171 E. Jefferson Ave.

FLINT, MICH.
Shand Radio Specialties
203 W. Kearsley St.

GRAND RAPIDS, MICH.
Radio Distributing Co.
235 Market Street, S. W.

KANSAS CITY, MO.
Burstein-Applebee Company
1012 McGee St.

LA CROSSE, WIS.
SOS Radio Supply Co.
131 South 6th St.

PEORIA, ILL.
Klaus Radio & Electric Company
707 Main Street

BUTLER, MO.
Henry Radio Shop
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CHICAGO, ILL.
Midwest Radio Mart
520 S. State Street

CHICAGO, ILL.
Newark Electric Company
926 W. Madison Street

CHICAGO, ILL.
Allied Radio Corporation
833 W. Jackson Blvd.

CHICAGO, ILL.
Midwest Radio Mart
520 S. State Street

CHICAGO, ILL.
Wholesale Radio Service Company, Inc.
900-911 W. Jackson Blvd.

CINCINNATI, OHIO
Steinberg's, Inc.
633 Walnut Street

CINCINNATI, OHIO
Steinberg's, Inc.
633 Walnut St.

CINCINNATI, OHIO
Keuss Radio Stores, Inc.
111 East 5th Street

CLEVELAND, OHIO
Northern Ohio Laboratories
2073 West 85 Street

CLEVELAND, OHIO
Goldhammer, Inc.
610 Huron Road

COLUMBUS, OHIO
Hughes-Peters Electric Corp.
178 N. 3rd Street

November 1938 Radio News
Where to buy it

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

DAYTON, OHIO
Burns Radio Company 140 E. 3rd Street

DES MOINES, IOWA
Iowa Radio Corporation 1212 Grand Avenue

DETROIT, MICHIGAN
Aitken Radio Corp. 1326 E. Congress Street
Radio Distributing Company 190 Selden Avenue
Radio Specialties Co. 171 E. Jefferson Ave.

DETROIT, MICHIGAN
Radio Specialties Co.

FARGO, N. D.
Dakota Electric Supply Company 123 Broadway

GRAND RAPIDS, MICH.
Radio Distributing Company 235 Market Street, S. W.

MINNEAPOLIS, MINN.
Low Bonn Company 1124-26 Harmon Place

PEORIA, ILL.
Klaus Radio & Electric Company 707 Main Street

YOUNGSTOWN, OHIO
Ross Radio Company 325 West Federal Street

CHICAGO, ILL.
Midwest Radio Mart 520 S. State Street

CHICAGO, ILL.
Newark Electric Company 226 W. Madison Street

CHICAGO, ILL.
Allied Radio Corp. 833 W. Jackson Blvd.

CHICAGO, ILL.
Wholesale Radio Service Company, Inc. 901-911 W. Jackson Blvd.

CLEVELAND, OHIO
Goldhomer, Inc. 610 Huron Road

DES MOINES, IOWA
Iowa Radio Corporation 1212 Grand Ave.

DETROIT, MICH.
Rissi Bros. 5027 Hamilton Ave.

DETROIT, MICH.
Radio Specialties Co. 171 E. Jefferson Ave.

ST. PAUL, MINN.
R. R. & G. W. Baumen Co. 2168 Ann Arbor St.

CHICAGO, ILL.
Midwest Radio Mart 520 S. State Street

CHICAGO, ILL.
Wholesale Radio Service Company, Inc. 633 Walnut Street

CINCINNATI, OHIO
Steinberg’s, Inc. 5027 Hamilton Ave.

CLEVELAND, OHIO
Goldhomer, Inc. 610 Huron Road

DETROIT, MICH.
Aitken Radio Corp. 1326 E. Congress Street

DETROIT, MICH.
Rissi Bros. 5027 Hamilton Ave.

FARGO, N. D.
Dakota Electric Supply Co. 123 Broadway

Microphone Headquarters

SHURE BROTHERS COMPANY
CHICAGO, ILLINOIS

United
TRANSMITTING TUBES

CHICAGO, ILL.
Newark Electric Co. 226 W. Madison St.

CHICAGO, ILL.
Midwest Radio Mart 520 S. State St.

CLEVELAND, OHIO
Northern Ohio Laboratories 2073 West 85th St.

DETROIT, MICH.
Radio Specialties Co. 171 E. Jefferson Ave.

FLINT, MICH.
Wilke and Sessions 711 W. Dayton St.

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Improvement! Model-S
"GO-DEVIL"
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The Precision Built
Automatic
Transmitting
Key

Not a Miniature
Imitation
Size 8" x 31/2" x 21/2" high
Parts Machined—Not Stamped
Patented Double Lever Design
Single or Double Ratio Lever Movement
Positive Contact Adjustments
Phosphor Spring Bronze Vibrator
Super-Flexibility
Crackle Enamelled Base-Brass Parts
Lacquered

Prompt Delivery
From Stock
$7.80 Descriptive Literature on Request

Ask Your Dealer
But Insist on Seeing the GO-DEVIL
GO-DEVIL INSTRUMENT CO.
263 Mill Street
Poughkeepsie, N. Y.

Panels—Bakelite—Rubber—Aluminum
All Sizes Cut to Order
Bakelite Tubing & Rods
Drilling, Engraving or Special Work
Aluminum Cans—Stock sizes. Special sizes, made to order.
Aluminum Chassis—Threaded brass studs for 6/32 screws.
Length from 1/4" to 6"—price 5c to 50c.

Insulating bushings for all shafts
Couplings in brass or Bakelite—15c
Bakelite tubing threaded to specifications

United Radio
MFG. CO. Est. 1923
191 Greenwich St., New York

Durable as a Battleship

New Insulated Metallized Resistors

Radio's most important resistor development! Insulated against shorting—humidity—open—breakage. Famous Metallized resistance principle. See them at your jobbers. Write for catalog.

International Resistance Co.
Toronto, Canada Philadelphia, Pa.

With the Affiliated Clubs

(Continued from page 46)
directly by radio impulses from over the edge of the horizon. All battle exercises are possible with this radio controlled vessel.

More than one hundred amateurs were present at this meeting of the Oakland Radio Club and a vote of thanks is extended to the officers and members of the Naval Reserve for giving us a quick insight into the present workings of Uncle Sam's Navy, both ashore and afloat.

—H. J. Burchfield, W6JTV.

Get Acquainted!

Clubs are excellent places to get acquainted with radio amateurs and to participate in interesting discussions on our hobby. At A.R.R.L. headquarters there are recorded the addresses of the several hundred amateur radio clubs affiliated with the League, their places and times of meetings. Why not drop in at your local club and "meet the gang"? Address the Communications Manager (enclosing 3¢ stamp, please) for data on affiliated clubs in your vicinity.

Miscellany

The Des Moines (Iowa) Radio Amateurs Association will hold regular classes for beginners, both in theory and code. Details may be obtained from the secretary, T. S. Berry, 1615 49th St., Des Moines, Iowa. . . . The Finger Lakes Transmitting Society would like to exchange copies of its paper, "The Bug," with other club publications. Address the society at 39 Mattie St., Auburn, N. Y. . . . W3DK, secretary of the Washington (D. C.) Radio Club, writes that the W.R.C. was formerly known as the Suburban Radio Club and, according to a newspaper clipping he dug up, was founded in January, 1909! . . . The daily occupations of the new officers of the Ottawa Amateur Radio Transmitting Association are interesting! VE3PL, president, is a paleontologist with the National Museum; VE3MA, vice-president, is astronomer at the Dominion Observatory and keeps tabs on radio time signals; VE3MX, secretary-treasurer, is R.I. and interference investigator for the Dept. of Marine; VE3ABH, technical adviser, does radio engineering work for the National Research Council. The Association has obtained a club room in the Citizen Building, through the kindness of Mr. T. D. Finn, managing editor of the Ottawa Citizen. . . . The New Orleans Radio Club elected officers: W5JW, pres.; W5EDY, vice-pres.; W5AOZ, sec'y-treas.; W5DXK, activities mgr. The N.O.R.C. was host to Mr. and Mrs. J. L. Reinartz, W1QP, on October 16th. . . . The amateur programs from W9XAZ, 31.6 mc., continue on the schedules announced on page 45, November QST. The Milwaukee clubs are doing fine work on these broadcasts as well as obtaining regular publicity for amateur radio in the local papers. . . .

—E. L. B.
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 typographic arrangement, such as all or part capital letters be used which would tend to make one advertisement look like another.
(3) The Ham-Ad rate is 15¢ per word, except as noted in paragraph (6) below.
(4) Payments must be in full must accompany copy. No cash or contract discount or agency commission will be allowed.
(5) Advertising shall be subject to the second and third months following publication date.
(6) A special rate of 10¢ per word will apply to advertising which, in our judgment, is obviously non-commercial in nature and is placed and signed by a member of the American Radio Relay League. Thus, advertising of bona fide surplus equipment owned, used, and for sale by an individual or a group, or making invitations for special equipment, if by a member of the American Radio Relay League.

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


METER and many other radio repairs. Low prices. Estimates free. Quick repair service—broadcasting equipment, all electrical instruments. Sound Engineering Corp., 2200 Kinzie, Chicago. RADIO, engineering, broadcasting, aviation and police radio, servicing, marine and Morse telegraphy taught thoroughly. All expenses low. Catalog free. Dodge's Institute, Byrd St., Par Va, Ind.

CRYSTALS—Y cut, 160-80, Within 5 kcs. $1.35 postpaid. W2JKN, 2030 Montrose, Chicago.


HAMAPPARATUS to sell or trade? List your swaps with us. Send for list. 110 volt a.c. relay 30 Amp. (each contact) SPDT $1.50, 4PDT$2.50. 4PDT 50¢. Amateur Exchange, 6341 Broadway, Chicago.

SELL 1 kilowatt Thordarson 2000 volt transformer, Radiotron 592, Vibroplex, Filament transformer, receiver, 4-147s. neon transformers. 13-147s. motor transformer, 1-2.5kva, 2-1 kw. Lincoln, Blackwell, Okla. SELLING out. W9ARE.

WANTED—Master Teleplex cash—W3EIN.


RADIO (Amateur Radio's fine technical monthly) $2. year (25¢ single) from WSDED, Holland, Michigan.

HAM apparatus to sell or trade? List your swaps with us. Send for list. 110 volt a.c. relay 30 Amp. (each contact) SPDT $1.50, 4PDT $2.50. 4PDT 50¢. Amateur Exchange, 6341 Broadway, Chicago.

SELL 1 kilowatt Thordarson 2000 volt transformer, Radiotron 592, Vibroplex, Filament transformer, receiver, 2-147s. neon transformers, 1-2.5kva motor transformer, 1-2.5kva, 2-1 kw. Lincoln, Blackwell, Okla. SELLING out. W9ARE.

WANTED—Master Teleplex cash—W3EIN.

SAY YOU SAW IT IN QST—It Identifies You and Helps QST

POWER transformer Westinghouse 11½ kw. RCA power amplifier, dynamic speaker, phono-motor, pick-up, 7 tube Crosley a.c. and Airline d.c. broadcast receivers. Current transformers giving 213½ volts. $100, receiver, W6FQ, 715 South 2nd Ave., West, Newton, Iowa.

SELL out, swap National Radio Institute course advanced radio servicing; also used Communications Course. W6FQW, Melrose, Mass.

FIRST ten dollar money order takes slightly used dependable 300 watt generator. Yance Harmon, Marysville, Kentucky.

QSL's with your photograph. Hundred. 90¢. Samples. W9DGS, Jamestown, N. Dak.

QSL exudes, two color, color cards, message blanks, stationary, stationery service. Write for free samples to-day, W1BEF, 16 Stockbridge Ave., Lowell, Mass.

ELEVEN hundred pages, accurate, practical "hot" technical and operating data $4.00 (in big, better "R/9")! Send dollar bill for five issue trial. Ample technical staff includes Jayenay Hawkins, Kruse, Smith, Goote, Perrin, others. Enlarged; new departments; calls heard; etc "R/9", 7400 Beverly, Los Angeles.


OSCOLOCPE neon tube, $4., as described in Oct. 35 QST, page 48. Cathode ray results. W6CQH.

TRADE: Emerson 800 volt motor generator either AC or DC—FREE—made with ease. Also Martin six string mahogany guitar with case. Cost $95. Want Weston meters—high power matching components. Satisfaction guaranteed. W2QIU.


FOR sale: Medium and high power transmitter. $100—1200 watts. Need large tubes. W5EFY, Avon, Ohio.

WANTED—Master Teleplex cash—W3EIN.

SELL transformer Westinghouse 1½ kw, RCA power amplifier, dynamic speaker, phono-motor, pick-up, 7 tube Crosley a.c. and Airline d.c. broadcast receivers. Current transformers giving 213½ volts. $100, receiver, W6FQ, 715 South 2nd Ave., West, Newton, Iowa.

SELL out, swap National Radio Institute course advanced radio servicing; also used Communications Course. W6FQW, Melrose, Mass.

FIRST ten dollar money order takes slightly used dependable 300 watt generator. Yance Harmon, Marysville, Kentucky.

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SELL transformer Westinghouse 1½ kw, RCA power amplifier, dynamic speaker, phono-motor, pick-up, 7 tube Crosley a.c. and Airline d.c. broadcast receivers. Current transformers giving 213½ volts. $100, receiver, W6FQ, 715 South 2nd Ave., West, Newton, Iowa.
Send postpaid $1.25, or FREE folder, blanks 50¢, holders 50¢. Faberadio, Sandwich, AO-DC SW3, 20, 40, 80 bandspread, power pack, tubes.

"FREE" hand 2Cwatt crystal transmitter, power supply and crystal included $28.75. R. Stimpson, Skowhegan, Maine.


So MUCH for so little!

Popular product . . . extraordinary demand . . . mass production schedule . . . increased economy . . . lowest prices. That's the reason for a llenulne oil-filled X•mittlng Condenser at give-away price.

- Pure linen paper dielectric . . . reinforced winding prevents plate flutter.
- Oil-impregnated sections . . . oil-filled hermetically-sealed metal container . . . cool operation.
- High tension pillar terminals . . . conservative ratings . . . maximum service life.
- 1000, 1500 and 2000 v. ratings.

NEW Catalog Just Issued. Covers complete condenser and resistor line. Also sample copy of Research Worker. Sent on request.

A Dependable Power Supply
for PORTABLE TRANSCEIVERS

Five- and Ten-Meter Fan and Pioneer Model "E" Dynamotor offer the ideal power supply for their portable sets, Input 6, 12 Volts, output 100 Watts, 1000 volts at maximum output. Write for full information on Dynamotor and the new Gas Engine Driven Generators.

PLANT-ENGINEERED PRODUCTS.

SUMMER SPECIAL.

FOR sale. Six 750 volt, 150 watt generators, $11. each. Also a few other generators and motors. Wilmot Auto Supply Company, 1790 Wilmot St., Chicago.

AUTOMOBILE call letter plates. $5# pair. W9AIN, Evansville.


RCA-860's—a pair (new). Also Thordarson transformer, type 2200—3000 volt c.t., 900 ma. Reasonable for cash. Make offer. W4AKY.

CLASS B transformers—Universal for two or four 40s, 210a, 800s, RK18s, etc., $7.75 pair postpaid. 70 watts audio from 400, 100 watts from 10a. Write for details. W8UD, Douglas, Mich.

Buy high grade equipment and parts, A cut crystals, new broadcast receivers; for Graflex series two, Leica, Contax or other high grade cameras. No junk wanted and no junk offered. Herb Hollister, W9DRD, Merriam, Kansas.

FREE folder, blanks 50¢, holders 50¢. Faberadio, Sandwich, Illinois.

CALLBOOKS—new prefixes, thousands of late W, VE and new DX coils, in the winter 1935 Radio Amateur Call Book. Send 50¢ (or a whole year for 4 for $4. (In foreign countries $1.35 and $4.35.) W9WO—610 S. Dearborn, Chicago.

NEW walnut cased d.c. meter, 1000, 1500 and 2000 volts eac side, 2½ V, 10 amp. C.T.; 40 lb. 500 ma choke, 10 and 30 pears, 90 ohms. New and guaranteed by maker two years. Cash offer. W1BVI.

WILL sell or exchange for cash a 200A six foot all steel transmitter which includes all Cardwell and Thordarson parts. Write for details or appointment. W2ZN.

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WILL sell or exchange for cash a 200A six foot all steel transmitter which includes all Cardwell and Thordarson parts. Write for details or appointment. W2ZN.

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WILL sell or exchange for cash a 200A six foot all steel transmitter which includes all Cardwell and Thordarson parts. Write for details or appointment. W2ZN.
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.

<table>
<thead>
<tr>
<th>CHICAGO, ILLINOIS</th>
<th>KANSAS CITY, MISSOURI</th>
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<tbody>
<tr>
<td>Allied Radio Corporation</td>
<td>Burstein-Applebee Company</td>
</tr>
<tr>
<td>833 West Jackson Blvd.</td>
<td>1012-14 McGee Street</td>
</tr>
<tr>
<td>Complete standard lines always in stock — W9NRV- W9BC- W9RZI</td>
<td>&quot;Specialists&quot; in supplies for the Amateur and Servicemen</td>
</tr>
<tr>
<td></td>
<td>Radio Laboratories</td>
</tr>
<tr>
<td></td>
<td>1515 Grand Avenue</td>
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<tr>
<td></td>
<td>Amateur Headquarters in Kansas City</td>
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<th>CHICAGO, ILLINOIS</th>
<th>KANSAS CITY, MISSOURI</th>
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</thead>
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<tr>
<td>Chicago Radio Apparatus Company</td>
<td>Radio Laboratories</td>
</tr>
<tr>
<td>415 South Dearborn Street (Est. 1921)</td>
<td>1515 Grand Avenue</td>
</tr>
<tr>
<td>W9RA and W9PST — Amateurs since 1909</td>
<td>Amateur Headquarters in Kansas City</td>
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<tr>
<th>CHICAGO, ILLINOIS</th>
<th>LOS ANGELES, CALIFORNIA</th>
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<tr>
<td>Mid-West Radio Mart</td>
<td>Pacific Radio Exchange, Inc.</td>
</tr>
<tr>
<td>520 S. State Street</td>
<td>729-31 South Main Street</td>
</tr>
<tr>
<td>All standard lines carried in stock</td>
<td>Most completely diversified stock of amateur equipment in the West</td>
</tr>
</tbody>
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<tr>
<th>DENVER, COLORADO</th>
<th>MILWAUKEE, WISCONSIN</th>
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<tbody>
<tr>
<td>Inter-State Radio &amp; Supply Co.</td>
<td>Radio Parts Company, Inc.</td>
</tr>
<tr>
<td>1639 Tremont Place</td>
<td>332 West State Street</td>
</tr>
<tr>
<td>Amateur Radio Headquarters in the Rocky Mountain Region</td>
<td>Complete stock Nationally Known products</td>
</tr>
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<tr>
<th>DETROIT, MICHIGAN</th>
<th>MINNEAPOLIS, MINNESOTA</th>
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<tbody>
<tr>
<td>Radio Equipment Sales Co.</td>
<td>Electric City</td>
</tr>
<tr>
<td>14036 Woodward Ave., Highland Park</td>
<td>1607 Hennepin Street</td>
</tr>
<tr>
<td>A complete stock of amateur, shortwave and service parts</td>
<td>Headquarters for standard lines of amateur and servicemen parts</td>
</tr>
</tbody>
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<tr>
<th>DETROIT, MICHIGAN</th>
<th>ST. PAUL, MINNESOTA</th>
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<tbody>
<tr>
<td>Radio Specialties Company</td>
<td>Lew Bonn Company</td>
</tr>
<tr>
<td>171 E. Jefferson Avenue</td>
<td>2484 University Avenue</td>
</tr>
<tr>
<td>Ham Supplies — National &amp; Hammarlund Sets and Parts</td>
<td>Rex L. Munger, W9LIP, Sales Engineer</td>
</tr>
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<tr>
<th>DETROIT, MICHIGAN</th>
<th>SAN FRANCISCO, CALIFORNIA</th>
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<tbody>
<tr>
<td>Rissi Brothers</td>
<td>Offenbach Electric Company, Ltd.</td>
</tr>
<tr>
<td>5027-31 Hamilton Ave. at Warren</td>
<td>1452 Market Street</td>
</tr>
<tr>
<td>W8XKO Manager Amateur Department</td>
<td>&quot;The House of a Million Radio Parts&quot;</td>
</tr>
</tbody>
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<tr>
<th>FRESNO, CALIFORNIA</th>
<th>TORONTO, CANADA</th>
</tr>
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<tbody>
<tr>
<td>Ports Manufacturing Co.</td>
<td>A &amp; A Radio Service Supply</td>
</tr>
<tr>
<td>3265 E. Belmont Ave.</td>
<td>101 Queen Street, West</td>
</tr>
<tr>
<td>Wholesale: RCA-Thordorson-Bliley. All Standard Lines</td>
<td>Canada's foremost radio supply house</td>
</tr>
</tbody>
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Say You Saw It in QST — It Identifies You and Helps QST
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.
OUTSTANDING!!
Gross Crystal Holder

WHITE CERAMIC commercial type crystal holder — priced at less than ordinary holders. Adjustable pressure, dust proof, no tools required to open. Takes crystal to 1¼" square. Plug standard ¾" spacing. Most efficient job yet! - $1.00

HALLICRAFTERS
SUPER-SKYRIDER

Complete with 9 Metal Tubes...$79.50
Same as above, With Crystal...$89.50
See Technical Article P. 38 Aug. QST.

TAYLOR
TRANSMITTING TUBES

825 Carbon Plate 40 Watts 750 V.
203-A Carbon Plate... 12.50
203-B Metal Plate.... 7.50
HD203-A Carbon Plate... out of stock.

STEEL AND ALUMINUM
RACK PANELS
BLACK CRYSTALLIZED LACUERER
FINISH

STANDARD MOUNTING 19" long 1½" thick

Steel
Panels
Price
1½"... $1.50
3¼"
$2.25
5½"
$2.25
7"...
$3.50
8¼"...
$4.50
10½"
$6.50
12½"...
$8.50
14"...
$10.50
15¼"...
$12.50
17½"...
$14.50
19¼"...
$16.50
21"...
$18.50

RELAY RACKS

Constructed of very heavy gauge steel (about 1½" thick). Finished thruout in Black Shrink Lacquer — Complete with all panels. Panels ¾" thick.

Type R4: — with 4 panels 8¾" x 19".
Overall size 21½" wide, 20" high. Price... $10.45

BARR DB3 TRANSCEIVER

less tubes, batteries and accessories. Bulletin on request. $16.20

RCA-DeForest
856 Tubes
852 Tubes

Largest stock of BLILEY CRYSTALS in New York.
BC2 Crystal Holders...$1.00
BC3-40-80 M Mounted Crystals..3.95
LD2-40-80-160 M Mounted Crystals...$4.80
(Exact in stock or within 10 KC)

NEW!! HOYT BAKELITE CASE HOT WIRE ANTENNA METER
3¼" Across Flange, Mounts through 3½" hole. Scale Length 1¼". Ranges: 0/1; 0/3; 0/5 Amps. $3.50

GROSS Cased Power Transformers

650 v. ea. side C.T. 350 ma. file. 2-7½ v C.T. and 1½ v will give 500 v with choke input using 83 or 323 tubes. You can run your entire R.F. and C.T. and 1½ v
5700 v. ea. side C.T. 350 ma. file. 2-7½ v C.T. and 1½ v will give 500 v with choke input using 83 or 323 tubes. You can run your entire R.F. and C.T. and 1½ v
(ideal job to give 750-1000-1250 v D.C. with choke input) $8.75
850-1500 v. ea. side of C.T. 400 watts. $12.50
1500-2000 v. ea. side of C.T. 800 watts. $17.70

GROSS CB-25 & CB-100
30 and 100 Watt

Phone-CW Transmitters

Very specially priced Write for data on these and other Gross Transmitters

GROSS C C TRANSMITTER—OUTPUT 25-30 WATTS

The "CW-25" transmitter kit due to its low cost makes it possible for anyone to own a modern crystal controlled station. A schematic hook-up and parts layout sheet as well as tuning instructions are furnished, thus enabling the most inexperienced operator to wire and put the set on the air, for real results. The "CW-25" is supplied with a shrivel finished sturdy metal chassis under which all parts are mounted, making the wiring and components dust-proof. A plug-in crystal holder is furnished with the kit. Only one milliammeter is required for tuning the transmitter and each stage is provided with a jack for this purpose. The "CW-25" uses one '47 as crystal oscillator, one '46 as buffer or doubler and two '46's in the amplifier stage, set of three coils supplied with kit for 20, 40, 80 or 160 band. Additional coils 75c each.
Complete kit, less tubes and crystal...$1.95

P-25 POWER SUPPLY — for CW-25 transmitter with matching chassis — $11
450 volts at 200 MA, choke input — complete kit, less tube...

20% DEPOSIT WITH ALL C. O. D. ORDERS REMIT BY M. O. INCLUDE POSTAGE Cable Address: GROSSINC

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

Say You Saw It in QST — It Identifies You and Helps QST 119
JEFFERSON Presents

New Ruggedness in Filament Transformers

THE new Jefferson Filament Transformers are designed with such margins of safety and quality that they more than meet the requirements of the radio amateur and experimenter.

In addition to liberal design, which makes for good regulation, judicious use of highest grade mica and porcelain insulation insures long life and perfect performance under every condition of service.

Adaptability to all needs is provided by the listing of multiple secondary transformers as well as by the construction of the more popular designs in either open or enclosed style mountings.

Attractive appearance has been stressed in design in keeping with typical quality construction throughout.

Jefferson Features include:
- Full secondary voltages under load
- Rigid test limits
- Adequate Insulation
- Conservative rating and construction which includes modern coil impregnation, varnish treatment and bake, high grade silicon steel, convenient terminals.

Write your wholesaler for the Jefferson catalog today. It includes a complete line of parts for amateur work.

JEFFERSON Filament Transformers

<table>
<thead>
<tr>
<th>Catalog No.</th>
<th>Capacity V.A.</th>
<th>SECONDARY</th>
<th>Tubes</th>
<th>Size</th>
<th>Wt. Lbs.</th>
<th>Price</th>
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<tbody>
<tr>
<td>464-211</td>
<td>13</td>
<td>2.5 C.T.</td>
<td>5.25</td>
<td>1500</td>
<td>27, 2A3, 82, etc.</td>
<td>2 ½ x 3 x 1 ½</td>
</tr>
<tr>
<td>464-221</td>
<td>25</td>
<td>6.3 &amp; 5 C.T.</td>
<td>4.</td>
<td>1500</td>
<td>80, 71, 523, etc.</td>
<td>2 ½ x 3 x 2 ½</td>
</tr>
<tr>
<td>464-241</td>
<td>30</td>
<td>2.5 C.T.</td>
<td>12.</td>
<td>7500</td>
<td>82, 66, 27, etc.</td>
<td>4 x 3 ½ x 2 ½</td>
</tr>
<tr>
<td>464-281</td>
<td>70</td>
<td>10. C.T.</td>
<td>7.</td>
<td>5000</td>
<td>03A, 11, etc.</td>
<td>4 x 4 ½ x 2 ½</td>
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<tr>
<td>464-271</td>
<td>40</td>
<td>7.5 C.T.</td>
<td>6.5</td>
<td>2000</td>
<td>800, RK18, etc.</td>
<td>4 x 4 ½ x 4</td>
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<tr>
<td>464-261</td>
<td>70</td>
<td>10. C.T.</td>
<td>8.</td>
<td>5000</td>
<td>03A, 11, etc.</td>
<td>4 x 5 x 4 ½</td>
</tr>
<tr>
<td>464-291</td>
<td>100</td>
<td>5. C.T.</td>
<td>20.</td>
<td>8000</td>
<td>822, 72A, etc.</td>
<td>4 x 8 x 4 ½</td>
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COMBINATION TYPES

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<tr>
<td>464-191*</td>
<td>64</td>
<td>2.5 C.T.</td>
<td>1.75</td>
<td>1500 V.</td>
<td>For 59 Class &quot;B&quot; Amplifier</td>
<td>4 ½ x 3 ½ x 3 ½</td>
<td>5</td>
</tr>
<tr>
<td>464-231</td>
<td>38</td>
<td>7.5 C.T.</td>
<td>2.5</td>
<td>2000 V.</td>
<td>'81, '10, etc.</td>
<td>4 x 3 ½ x 2 ½</td>
<td>6</td>
</tr>
<tr>
<td>464-301</td>
<td>50</td>
<td>2.5 C.T.</td>
<td>5.</td>
<td>5000 V.</td>
<td>66 Bridge Type Rectifier</td>
<td>4 x 3 ½ x 3 ½</td>
<td>4</td>
</tr>
<tr>
<td>464-251*</td>
<td>74</td>
<td>7.5 C.T.</td>
<td>6.5</td>
<td>3000 V.</td>
<td>800, RK18</td>
<td>4 x 3 ½ x 4</td>
<td>6</td>
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</tbody>
</table>

*—Has primary tap for 110 Volts

JEFFERSON ELECTRIC COMPANY, Bellwood (Suburb of Chicago), Illinois
Canadian Factory: 535 College Street, Toronto

JEFFERSON Transforms

QST for December, 1935, CENTRAL Edition
It is significant that amateurs who yesterday were complaining about QRM, now devote their rag-chews to praise of their new HROs. To these men, interference has become merely a sporting handicap, not a barrier to pleasure or DX.

For the HRO is a highly developed instrument for pulling in signals wherever you are, whenever you want to listen. Nothing was left undone that might improve this ability, no pains were spared to make it convenient and precise.
RCA Radiotron passes on to the amateur the considerable savings now resulting from increased volume and increased manufacturing efficiency.

At the new low amateur's net price of $16.40, the famous RCA 852 becomes an even more outstanding value than ever before. Tried, proved, and trusted in all parts of the world, this favorite is now brought within the price range of many amateurs who hitherto have felt they could not afford it.

The RCA 866 at half its former price is a truly great value. At this attractive price you can afford to use only the best. Take advantage of these new low prices now.

AMATEUR RADIO SECTION
RCA RADIOTRON DIVISION
RCA Manufacturing Co., Inc., Camden, New Jersey, a subsidiary of the RADIO CORPORATION OF AMERICA
AMATEUR RADIO STATIONS

VE2VD, Toronto, Ont. .......... 62, May
W1FX, South Brewer, Maine ... 40, Sept.
W2CBO, Scotia, N. Y. ....... 46, Dec.
W9DQ, Oklahome, Ok. ....... 49, Oct.
W2HBK, New York City ....... 62, May
W2HCF, Albany, N. Y ....... 57, Mar.
W3BYK, Camden, N. J ....... 58, Mar.
W3DD, Androscoggin, Me. ... 31, Jan.
W9RS, Harrisburg, Pa. ....... 44, June
W5DAQ, New Orleans, La. ... 50, Oct.
W6CHD, Walnut Creek, Calif. 45, Dec.
W7TJ, Los Angeles, Calif. ... 47, Aug.
W7PT, Oakland, Calif. ....... 49, Oct.
W6USA, San Diego, Calif. ... 46, Nov.
W7BJS, Rock Springs, Wyo. ... 57, March
W7BYW, Buhl, Idaho ........ 61, May
W7EAN, Seattle, Wash. ...... 61, May
W8BHT, Elmhur, N. Y. ....... 61, May
W8BO, West Hazleton, Pa. ... 57, Apr.
W8EDR, Toledo, Ohio ....... 58, Mar.
W8EHA, Harrison, Mich. ....... 41, Sept.
W8HWR, Utica, N. Y. ....... 42, Feb.
W9REZ, Wichita, Kansas ....... 57, Apr.
W9JTD, St. Louis, Mo. ....... 51, Oct.
W9KIF, Indianapolis, Ind. ... 42, Feb.

AMATEUR REGULATIONS AND LEGISLATION

Canadian Regulations Revised ..... 67, May
China's Domestic Regulations Prohibit Traffic ..... 66, Mar.
Dr. Joliffe Discusses Cairo Arrangements ..... 36, Oct.
Licenses ..... 44, Mar.
License Notes ..... 25, Nov.
New Regulations ..... 27, July
Philippine Regulations ..... 50, June

ANTENNAS, TRANSMISSION LINES

A Garage-Top Mast (Exp. Section) ..... 48, July
A New Antenna System for Operating Control of Broadcasting Stations (Goodall) ..... 9, Feb.
A Space-Saving Adjustable Antenna (Eubanks) ..... 48, Mar.
Adjustable-Length Antenna (Exp. Section) ..... 44, Aug.
An antenna with a Tuned-Pair Feeders (Graham) ..... 22, Jan.
Correction ..... 104, Mar.
Antenna Directivity (Exp. Section) ..... 50, May
Antenna Filter for Reception (Exp. Section) ..... 50, May
Antenna-Filter Variant (Exp. Section) ..... 44, Aug.
Antenna Supports (Exp. Section) ..... 74, Mar.
Changing the Antenna Direction Characteristics (Exp. Section) ..... 49, Nov.
Double-Feeding Antenna and Bucking Circuit for Duplex Operation (Seeley) ..... 28, Jan.
Getting Cooperation in the Antenna System (Goodall) ..... 98, Mar.
Guying Antenna Masts (Exp. Section) ..... 45, Aug.
Inexpensive Feeder Separators (Exp. Section) ..... 59, Mar.
Matched-impedance Coupling to the Zepp Antenna (Hardin) ..... 23, Feb.
More on the Practical Operation of Transmitting Antennas (Potter and Goodman) ..... 21, Apr.
Raising a Sectionalized Tower (Exp. Section) ..... 48, June
Real Results With a Simple Reflector System (Smith) ..... 16, May
Shifting Antenna Directivity by Phase Switching (Griffin) ..... 30, Oct.
Standing Wave Locator (Exp. Section) ..... 30, July
The All-Around 14-mc. Signal Squitter (Mims) ..... 12, Dec.
The V-Doubler Noise-Reducing Receiving Antenna (Crossland) ..... 29, May

ARMY-AMATEUR RADIO SYSTEM

A.A.R.S. ..... 44, Mar.
A.A.R.S. ZAK Contest (Corderman) ..... 69, May

BEGINNERS

 Beginners, QRZ and Restrictions (Wad) ..... 47, Feb.
 Arr: Basic Practice ..... 48, June; 49, Aug.
 Code Practice Schedules ..... 60, Nov.

BOOK REVIEWS

Making a Living in Radio (Housie) ..... 72, Dec.
Measurements in Radio Engineering (Terman) ..... 96, Nov.
Practical Radio Practice (Nagel and Hornung) ..... 106, Nov.
Radio Design Practice (Millen) ..... 76, Occt.
RJ 8 to the Rescue (Haarslag) ..... 58, June
The Cathode Ray at Work (Rider) ..... 96, Nov.
Twenty-Fifth Anniversary Year Book, Radio Club of America ..... 96, May

CALLS HEARD


COMMUNICATIONS DEPARTMENT

Beau-Pounders League ..... 55, Jan.; 55, Feb.; 65, Mar.
84, Apr.; 71, May; 49, June; 80, July;
54, Aug.; 52, Sept.; 63, Oct.; 60, Nov.
Breaking into Traffic (Masson) ..... 71, May
Official Broadcasting Stations ..... 60, Nov.
Supplements ..... 63, Apr.; 70, May; 81, June; 60, July
The A.R.R.L. Experimenter's Log ..... 69, Nov.
The New Southwestern Division (K.B.W.) ..... 11, Oct.
Wanted, Volunteers! ..... 49, Aug.
Why Is an ORS? (Castle) ..... 48, Sept.

CONTESTS AND TESTS

1.75-mc. DX Tests ..... 47, Feb.
1955 R.E.F. Cup Contest ..... 47, Feb.
A Consistent Antipodal Experimental Circuit (Seaton and Lacey) ..... 18, Nov.
Amateur Contests at Brockton Fair ..... 49, Nov.
A.R.R.L. Copying Bee Results ..... 22, June
Canada-U. S. A. Contact Contest (Ann.) ..... 48, Nov.
Canada-U. S. A. Contact Results ..... 40, Jan.
Combined VK/2L International DX Contest ..... 46, Oct.
DX-Contact Highlights ..... 33, May
Five-Hundred Dollar Amateur Competition ..... 15, Apr.
Flashl Winners in VK Contest ..... 10, Dec.
Grunow Competition ..... 10, Dec.
Phone-C.W. QSO Party Results ..... 20, Feb.
Phone-G.W. QSO Contest ..... 20, Feb.
Results, A.R.R.L.'s 1935 DX Contest (Batley) ..... 24, Sept.
Sixth A.R.R.L. Sweepstakes Contest (Handy) ..... 38, Nov.
The 1934 Sweepstakes (Batley) ..... 68, May
The Seventh International Relay Competition (Handy) ..... 34, Feb.
The VE QSO Contest (Cunningham) ..... 57, May
Third Annual A.R.R.L. Field Day Contest to Test Portables ..... 22, June
VK-Contact Results (Cunningham) ..... 58, June

CONVENTIONS AND HAMFESTS

13th Annual Central Division Convention (Re-Porty) Cleveland ..... 58, Dec.
16th Pacific Division Convention (Report) Los Angeles ..... 96, Dec.
FEATURES, FICTION AND VERSE
A Burlesque (Connors) ................................ 49, July
A Tribute to Amateurs (Tillotson) ........... 20, May
Jim—a Tug at Your Memory (Flippin) .... 26, Apr.
Matched Impedence (Turnonanoff) ..... 43, May
C to D (Dol, Jan) ................................. 90, Mar.
Shooting the Works (Hausch) .................... 55, Jan.
That's What Little Hams Are Made Of ......... 73, May
The Young Squirt's Fourth Epistle to the Old Man. 40, Dec.
What I've Learned (Burk) .......................... 56, Jan.
Yours Very Truly—Goodnight (Hauke) ........ 30, Nov.

FIVE METERS
(See POWER SUPPLY)

FREQUENCY CALIBRATION AND CONTROL
Schedules for WWV ................................ 68, Feb.; 94, May; 100, Oct.
WWV/H Standard Frequency Program .................. 102, Nov.

HAMDOM

I.A.R.U. NEWS
48, Jan. 55, Apr.; 81, July 57, Oct.
59, Mar. 57, June 45, Sept. 49, Dec.
A Short History of the Radio Society (Mahle) ..... 64, May
Australia ........................................... 51, Nov.
Bolivia ............................................. 49, Sep.
Stepping into MX Land (Okinashi) ............. 48, Aug.
Sweden ............................................. 46, Sep.
WAC during 1931 .................................. 60, Mar.

KEYING
A Simple Remote Control System (Exp. Section) ............ 44, Aug.
Blocked-Grid Keying (Exp. Section) ............... 7, Nov.
Chirpless Keying With Pentodes (Exp. Section) .................. 51, Apr.
Evaluating the Kenwood Keying System (Exp. Section) ......... 15, Jan.
Improving the Tube-Circuit Keying System (Exp. Section) ...... 41, Dec.
Binaural-Relay Circuit (Exp. Section) .......... ........... 41, Dec.
Keving System (Exp. Section) ............... 45, Aug.
More on Eliminating Thumps (Exp. Section) .................. 55, Mar.
15-20-Kilocycle Circuits (Exp. Section) ................ 65, Apr.
Sliding Bug Weight (Exp. Section) ............... 72, Jan.
Suppressor-Grid Keying (Exp. Section) ............... 39, Feb.
Washing Out the B.C. Interference (Exp. Section) .......... 69, Aug.

METERS AND MEASUREMENTS
A Multi-Purpose Test Circuit (Kirk) ................. 35, Oct.
A Self-Induced V.T. Voltmeter of High Sensitiv- ity (Duncan) ................................. 42, Oct.
A Simple Photographic Recorder for the Experimen-
ter (Hull) ........................................... 27, Mar.
An Authority of Milliameters (Dunc) ............... 27, Mar.
A Field-Strength Meter (Exp. Section) .............. 54, June
Milliammeter Switching for Grid and Plate Cur-
rents (Exp. Section) .................................. 41, Dec.
Phone Monitor and Modulation Meter (Exp. Section) ........ 54, Mar.
Phone-Meter V.T. Voltmeter (Exp. Section) ...... 41, June
Remanentizing Resistive Milliammeters (Exp. Section) ....... 55, Oct.
Using a Voltmeter as an Ohmeter (Exp. Section) ........ 42, June

MISCELLANEOUS
A Homemade World Time Clock (Newell) ........ 48, Oct.

EMERGENCY AND RELIEF WORK
Alaskan Service ................................... 52, Aug.
Amateurs Aid in Haiti Earthquake ............... 52, Aug.
Amateurs Locate Stranded Yacht ................. 89, Feb.
Amateurs on the Job in Florida Hurricane .... 43, Feb.
Amateurs Against Agitation (Dec) .............. 45, Feb.
B.C. Hams Prove Their Mettle ................. 66, Mar.
Emergencies, Maryland-Delaware-Virginia .... 60, Apr.
Flood Emergency Circuits (Exp. Section) ........ 50, Aug.
Flood Emergency Work .......................... 54, July
Minnesota/Wisconsin Emergency ............... 70, May
Missouri/Mississippi/East (Exp. Section) ....... 56, Apr.
More on B.C. Emergency .......................... 61, Apr.
More on the Duluth Sleet Storm (Johnson) ..... 46, June

EXPEDITIONS
Amateurs Around the World by Plane (Wilson) .... 11, Mar.
Andes-Amazon Expedition .......................... 63, Oct.
Bel-Commercial Expedition—G.0.46 ............. 77, Oct.
Bohne Morrissey, W10XF .......................... 49, Aug.
The Equipment on the "Morrissey" (Meo) ........ 16, Oct.

EDITORIALS
Automobile Ignition Interference (K. B. W.) .... 7, Jan.
Bootleg 50-mc. Stations (K. B. W.) ............... 7, May
Improved Amateur Regulations (K. B. W.) .... 7, Aug.
Improved Radio Reception (K. B. W.) ............. 7, Dec.
Interference and Receivers (K. B. W.) ............ 7, June
License Renewal Trouble (K. B. W.) ............... 7, Feb.
"Lost" Licensees (K. B. W.) .......................... 7, Oct.
Monitoring Policy of the F.C.C. (K. B. W.) .... 7, May
QRM (K. B. W.) .................. 11, Sept.
Short-Wave Broadcasting (K. B. W.) ............... 9, Mar.
The Board of Directors (K. B. W.) .............. 9, Nov.
The Board of Directors Meeting (A. I. B.) .... 7, Apr.
The "Good Old Days" ................................ 9, Mar.
The New Southwestern Division (K. B. W.) ....... 11, Oct.
Thievery of Amateur Apparatus (K. B. W.) .... 7, Jan.

POWER SUPPLY
A.K. Power Supply (Exp. Section) .................. 14, Nov.
A.O. Power Supply (Exp. Section) ............... 14, Nov.
A.K. Power Supply (Exp. Section) .................. 14, Nov.
A.O. Power Supply (Exp. Section) ............... 14, Nov.

FIVE METERS
(See ULTRA HIGH FREQUENCIES)
TRANSMITTERS—MEDIUM AND HIGH POWER
A Compact "200-Watt" Transmitter (Webb) .... 16, Apr.
A Compact High Power Transmitting Set (Gray) .... 9, June
A Flexible E.C. Controlled Transmitter (Learned) .... 35, Sept.
A Four-Band Exciter (Hollister) .... 21, July
A General Purpose 50 Watt Transmitter (Grammer) .... 16, Jan.
An RK-20 Tri-Tet Transmitter for Three-Band Operation (Grammer) .... 30, Apr.
Band Switching in the Universal Exciter Unit (Southworth) .... 28, Jan.
Do You Want a Kilowatt? (Miz) .... 8, Apr.
Four Bands with Two Tubes (Gow) .... 18, Aug.
What's in a Circuit? (Grammer) .... 19, Oct.

TRANSMITTING—CRYSTAL CONTROL
Better Crystal Stability without a Heater Oven (Dillard) .... 36, Jan.
Cutting Quartz Crystal Plates (Locanski) .... 35, Sept.
Grinding and Finishing Quartz Crystal Plates (Locanski) .... 28, Feb.
High-Frequency Crystals of New Type Cut .... 23, Nov.
New All-Metal Crystal Holder .... 94, May
Practical Operating Advantages of Low Temperature-Frequency Coefficient Crystals (Baldivis and Bekovoy) .... 26, Jan.
Speeding Up Rough Grindig (Exp. Section) .... 58, May

TRANSMITTING—GENERAL
A Frequency-Lock Multi-Vider (De Young) .... 32, Sept.
Automatic Carrier Switching (Exp. Section) .... 39, Feb.
Automatic Protection with Grid Leak Bias (Exp. Section) .... 54, Oct.
Band Switching in the Universal Exciter Unit (Southworth) .... 38, Feb.
Caliper Coupling (Exp. Section) .... 34, Apr.
Crystal-Locked Hartley Oscillator (Exp. Section) .... 54, Mar.
Doublet Receiving Antennas and Bucking Circuit for Duplex Operation (Secely) .... 28, Jan.
Eliminating Hum Modulation (Exp. Section) .... 44, Jan.
Filament Voltage Regulator (Exp. Section) .... 44, Jan.
Harmonic Suppression (Exp. Section) .... 54, Apr.
Incandescent Lamp Stubby Racks (Van Duyne) .... 18, Dec.
More Effective Link Coupling for R.F. Power Amplifiers (Foreman) .... 34, Apr.
Neutralizing the Final (Exp. Section) .... 53, Oct.
Note on the "R" Circuit (Exp. Section) .... 43, Jan.
Power Supply for Multi-Stage Transmitters (Exp. Section) .... 43, Jan.
Push-Pull-Push Oscillator Circuits for 15-Watt Second Harmonic Output (Brown) .... 53, May
QRP (Grammer) .... 40, Nov.
R.F. Return Circuit in Interstage Coupling (Friend) .... 50, Mar.
Remote Control, Push-to-Talk (Exp. Section) .... 48, July
Self Regulating Grid-Bias Supply for Multi-Stage Transmiters (Friend) .... 44, Jan.
Suggestions Wanted (Exp. Section) .... 24, Dec.
Time Delay Relay Using a 45 Tube (Exp. Section) .... 60, May

TUBES
A New 100-Watt Type Zero-Bias Transmitting Tube (Ford) .... 27, June
A New Hot-Cathode Gaseous Discharge Amplifier and Oscillator (Nelson and Le Van) .... 28, June
Acorn-Type Pentode Announced (42, May
Blue 6 (Jv in Tubes) .... 69, Jan.
Data on the Metal-Sheil Receiving Tubes .... 35, July
New Class-B Tubes With 125-Watt Output Rating .... 15, Mar.
New High-Power Transmitting Pentode .... 28, July.
New Type Metal-Sheil Receiving Tubes Announced for Summer Appearances .... 30, May
Operating Notes on the New Pentodes .... 21, Feb.
The 803—High-Power Pentode .... 30, Aug.

ULTRA-HIGH FREQUENCIES—APPARATUS
A New Receiving System for the Ultra-High Frequencies (Hull) .... 10, Nov.
A New Type Ultra-High-Frequency Transmitter (King) .... 31, Dec.
An Experimental Station on Wheels (Selvidge) .... 23, Mar.
Another Successful 50-mc. Transmitting Antenna .... 28, Jan.
Design for Higher Performance in the Super-Regenerative Receiver (Fyler) .... 11, July.
Progress in Ultra-High-Frequency Gear (Hull) .... 30, May.
R.F. Indicators for Ultra-High Frequencies (Exp. Section) .... 49, July.
Reducing QRM on 56-mc. (Hadlock) .... 27, Oct.
Stabilizing the Ultra-High-Frequency Transmitter (Hull) .... 13, Feb.
Stepping Up the Output of the High-Stability 56-mc. Transmitter (Conrad) .... 14, Apr.
Two-Band U.H.F. Transceiver (Exp. Section) .... 44, Sept.

ULTRA-HIGH FREQUENCIES—TESTS
28-mc. Communication Continues .... 18, Nov.
28-mc. WAC Accomplished .... 11, Dec.
Air-Mass Conditions and the Bending of Ultra-High Frequency Waves (Hull) .... 13, June.
Five-Meter Signals Do the Impossible .... 17, Aug.
Hartford-Boston Link Established on Two and One-half Meters (Hull) .... 16, Mar.
International 38-mc. Communication Again! (Grammer) .... 9, May.
Progress on the Ultra-High Frequencies (Hull) .... 35, Jan.
Stratosphere Balloon Radio Tests .... 38, June.
Ten Meter Activity Increasing .... 20, Aug.
W1XR (McKenzie) .... 32, July.
W2MO, Portable, Sets the Pace on 56-mc. (Dieckman) .... 31, Oct.

WHAT THE LEAGUE IS DOING
24, Jan. 51, Apr. 26, July 24, Oct.
22, Feb. 18, May 27, Aug. 25, Nov.
44, Mar. 23, June 25, Sept.
Minutes of 1039 Board Meeting 34, June.

WITH THE AFFILIATED CLUBS
24, Jan. 50, Apr. 42, July 37, Oct.
42, Jan. 50, Apr. 37, Oct.
5, Mar. 49, Dec.