QST

devoted entirely to

amateur radio

december 1932
25 cents
Written by amateurs for amateurs, and published by the American Radio Relay League, the amateur's own organization, the handbook is hailed everywhere as the greatest help to amateurs ever published.

Because it starts in at the very beginning of the story and tells what amateur radio is, how to become an amateur, how to learn the code, obtain the necessary licenses and how to build and operate a simple station, it is an invaluable and sympathetic guide for the beginner who has wanted to get in on "ham" radio, but hasn't known how to get started. Because it progresses through working descriptions and building instructions for many varieties of the most modern short-wave receivers and transmitters, power supplies and antennas, and because it goes into all the intricacies of station operation and message handling, it is a necessity for the proficient amateur.

AMERICAN RADIO RELAY LEAGUE
West Hartford, Connecticut
Bradleyunits
Solid Molded Resistors
The Choice of the World's Largest Radio Manufacturers

Don't risk the reputation of your receiver with poor resistors. Standardize on Bradleyunit Resistors because their resistance values are stable under varying conditions of load, temperature and moisture.

Bradleyunit Resistors are made in five sizes, with or without leads, and are R.M.A. color coded for resistance value identification. These solid molded resistors are accurately calibrated and have great mechanical strength. Get an Allen-Bradley quotation on your next order.

Allen-Bradley Co., 104 W. Greenfield Avenue, Milwaukee, Wis.

The New Tapped Bradleyometer

The new Tapped Bradleyometer provides automatic tone correction with volume control. It achieves this result in any one of several audio frequency networks. (See above diagrams.)

A tap on the resistance element is brought out to a fourth terminal. The network necessary to provide tone correction is usually connected between this tap and the grounded or low potential end of the Bradleyometer.

A single-pole line switch approved by the Underwriters' Laboratories and the Hydro Electric Power Commission of Ontario with a rating of 2 amperes, 125 volts, can be provided within the Bradleyometer and is operated by the regular control knob.

Write for complete data on the New Tapped Bradleyometer.

ALLEN-BRADLEY RESISTORS
Produced by the makers of Allen-Bradley Control Apparatus
Collins Power Transformers

In the development of Collins Class B modulated phone transmitters and high powered CW transmitters, it became apparent that none of the transformers previously on the market were satisfactory. The Collins Power Transformers and Filter Chokes listed below were developed to meet the exacting requirements of continuous duty in modern commercial and amateur transmitters.

The larger COLLINS transformers and chokes are mounted in heavy cast frames with pressed steel covers and large porcelain insulators (Mounting A). The medium sized and smaller transformers are mounted in heavy pressed steel cases provided with bakelite terminal boards (Mounting B) or with heavily insulated leads out of the base (Mounting C), for chassis mounting. These mountings are very convenient and attractive in appearance.

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<tr>
<th>Type No.</th>
<th>Secondaries</th>
<th>Mfg. Price</th>
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<td><strong>HEAVY DUTY PLATE TRANSFORMERS</strong></td>
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<td>921. 650–650 v. 300 Ma. d.c.</td>
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<td>960A. 3000–2500 — 2500–3000 v. 1 a. d.c.</td>
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<td><strong>FILTER CHOKES</strong></td>
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Data on Modulation Chokes supplied on request

Transformers for special requirements can be supplied promptly at prices in line with those of standard items. Unless otherwise noted all primaries are for 110 volts 60 cycles. Transformers for other voltages and frequencies are available on special order.

Prices are NET, f.o.b. Cedar Rapids or Chicago.

IMPORTANT: Complete list of COLLINS audio transformers appeared on page 73 in the November issue of QST. Preserve these advertisements for your guidance in ordering, or send 25c in coin for a complete manual on COLLINS Transformers and Transmitting Equipment, with circuit diagrams and design data.

Collins Radio Company
CEDAR RAPIDS, IOWA
devoted entirely to

AMATEUR RADIO

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Editorial and Advertising Offices 
38 LaSalle Road, West Hartford, Conn.

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Title registered at United States Patent Office.
THEY WON’T GIVE YOU MORE ANTENNA CURRENT— BUT they’ll improve your station efficiency just the same.

OFFICIAL A.R.R.L. LOG BOOK
A well-kept log is an essential part of a well-run station. This book, with 39 pages for operating records and 39 blank pages for miscellaneous notes, forms a complete history of your station — your most valuable radio record. Contains list of Q signals, message number sheet, bound-in page of cross section paper for receiver or frequency meter calibration, etc. Size 8½ x 10¾, bond paper, bound in heavy paper covers. One book 40c or three books for $1.00. Postpaid.

MESSAGE DELIVERY CARDS
Neatest, simplest way to deliver a message by mail. Good looking and easy to use. Saves writing an explanation of method in which message was handled. On U. S. stamped postals, 2¢ each; on plain cards (for Canada, etc.) 1¢ each. Postpaid.

MEMBER’S CORRESPONDENCE STATIONERY
Write your radio letters on this A.R.R.L. stationery. It identifies you. Used by most old-timers and prominent amateurs. Excellently lithographed on 8½ x 11 bond paper. Now using heavier 20-lb. stock instead of 16-lb. as heretofore. 100 sheets — 50c; 250 sheets — $1.00; 500 sheets — $1.75. Postpaid.

OFFICIAL A.R.R.L. MESSAGE BLANKS
The proper and most convenient form. Designed by the A.R.R.L. Communications Department to make speedy and accurate handling easy. A great aid to good operating practices which reflect credit on your station. Bond paper, size 8½ x 7¾. Put up in pads of 100 sheets. One pad 35c or three pads for $1.00. Postpaid.
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| Maryland-Delaware-District of Columbia | W3NY | Jack Wagenseller | 2305 N. Pulaski St. | Baltimore, Md. |
| Southern New Jersey | W3GL | H. G. Ginberg | 412 2nd Ave. | Haddon Heights |
| Western New York | W3DSP | Gedney Crock | 213 Hickey Ave. | Syracuse |
| Illinois | W9VR | Fred J. Hinda | 6018 West 34th St. | Berkwyn |
| Indiana | W9TE | Arthur L. Brown | 1511 Spruce St. | Indianapolis |
| Kentucky | W90X | Carl L. Plunnum | P. O. Box 2332 | Louisville |
| Michigan* | W9YV | Kenneth R. Conroy | 7553 E. Robinwood Ave. | Detroit |
| Ohio* | W8AHF | Harry A. Lummens | 2073 West 85th St. | Cleveland |
| Wisconsin | W9FES | Harold R. Karch | 2550 N. 8th St. | Milwaukee |
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| South Dakota | W9DLK | C. G. Miller | 449 N. 5th St. | Redfield |
| Northern Minnesota | W9DOQ | Palmor Andersen | Route 1, Box 270 | Duluth |
| Southern Minnesota | W9ARL | Herman Radloff | R. 2, Box 15 | Sleepy Eye |
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| Louisiana | W5W | F. M. Watte, Jr. | 1621 Allen Ave. | Shreveport |
| Mississippi | W5AYZ | William G. Bodker | 1013 Bratton St. | Jackson |
| Tennessee | W4AKM | F. F. Purdy | 1114 Poplar St. | Kingsport |
| Eastern New York | W2LJU | Robert E. Haubitz | 1080 Hedberg Ave. | Schenectady |
| Indiana | W5JGR | M. J. Gruber | 112 W. 175th Pl. | St. Albanus, L. I. |
| Northern New Jersey | W2CO | Walter A. Cobb | 28 Amper Parkway | East Orange |
| Iowa | W9FID | George D. Hansen | Box 27 | Salford |
| Kansas | W9ELO | R. J. Speetler | 405 Western Ave. | Tonopah |
| Missouri | W9EYPC | C. R. Cannaday | 306 Sixth St. | Monett |
| Nebraska | W9FAM | Samuel C. Wallace | Green St. | Clarion |
| New England Division | W1CTI | Frederick E. Jr. | 19 Merrill Rd. | Norwalk |
| Maine | W1CDX | John W. Singleton | 16 Merrer St. | Wilton |
| Eastern Massachusetts | W1ASI | Joseph A. Mullin | 53 Cordland Rd. | Ashmont |
| Western Massachusetts | W1ASY-WIRB | Karl G. Heston | 227 Main St. | Springfield |
| New Hampshire | W1ATJ | C. W. Hoig | 25 Phillips St. | Claremont |
| Rhode Island | W1BV | N. H. Miller | 41 Beacon St. | Providence |
| Vermont | W1BD | Roy Gale | 4111 Huntington Ave. | Barre |
| Alaska | K7PO | Richard J. Fox | Box 301 | Ketchikan |
| Idaho | W7AYH | Charles K. Thrapp | 1011 East Jefferson St. | Red Lodge |
| Montana | W7ATT-7QT | O. W. Viera | 4835 N. Amherst St. | Portland |
| Oregon | W7AEB | Raymond L. Cummins | 1921 Atlantic St. | Seattle |
| Washington | W7RT | John F. Grubie | | |
| Hawaii | K6CG | C. D. Stulen | Pearl City | Oahu |
| Nevada | W6ED | Linton L. Raemy | 1531 Haena Vista Ave. | Reno |
| Los Angeles | W6HT | H. E. Nahim | Box 903 | Long Beach |
| Santa Clara Valley | W6AMM | Bruce Stone | R. 1. Box 41 | San Jose |
| East Bay | W6ZM | S. C. Houston | 2523 23rd Ave. | Oakland |
| San Francisco | W6WB | 262 Castro St. | 1336 P St. | San Francisco |
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| Arizona | W6BF-EWGQC | Ernest Mernho | 714 Newton St. | Phoenix |
| Palm Springs | K6SA | Newton E. Thompson | 4101 Hamilton St. | Mesa, P. I. |
| San Diego | W6KCP | Harry A. Ambler | Box 246 | San Diego |
| San Joaquin Valley | W6PBV | E. J. Beall | | San Diego |
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| Utah | W8HD | C. S. Hoffmann, Jr. | 126 Washington Ave. | | |
| South Dakota | W6ID | John F. Grubie | 2917 Montgomery Ave. | | |
| Western Florida | W4NP | L. E. Elwell | 1066 Waverly St. | | |
| Eastern Florida | W4NS | Raymond A. Hink | 329 East First St. | | |
| Mississippi | W9FS | Charles W. Davis | 668 Codedge Ave., N.E. | Atlanta |
| Missouri | W5J | R. J. Speetler | 1614 St. Louis Ave. | Ft. Worth |
| West Gulf Division | W5RS | Roy Lee Taylor | 1st Balloon Co. | Fort Sill |
| Oklahoma | W5QO | Emil Gisel | 6726 Ave. Q | Houston |
| New Mexico | W5BW | David W. Halc | 420 West Lead Ave. | Albuquerque |
| Maritime | VE1DQ | A. M. Crowell | 69 Dublin St. | Raleigh |
| Ontario | VE5H | H. W. Bishop | 258 Eggerton St. | Richmond |
| Quebec* | VE2AP | Laurence | 668 Codedge Ave., N.E. | | |
| Prairies | VE2AP | J. C. Stadel | 4334 Westmount Ave. | | |
| Maritime | VE1DQ | A. M. Crowell | 69 Dublin St. | Halifax, N. S. |
| Ontario | VE5H | H. W. Bishop | 258 Eggerton St. | London |
| Quebec | VE2AP | J. C. Stadel | 4334 Westmount Ave. | | |
| Prairies | VE2AP | J. C. Stadel | 4334 Westmount Ave. | | |

* Officials appointed to act until the membership of the Section choose permanent SCM's by nomination and election.
PARTS FOR HIGH & ULTRA H.F. WORK

NATIONAL Company makes a full line of variable condensers, coil forms, coil and tube sockets, H.F. chokes, dials and accessories for H.F. work: also complete receivers and converters, including the AGS (finest Short-Wave Communications Receiver made.) Send for FREE Catalogue Q-12.

NATIONAL MIDGETS FIT YOUR EVERY REQUIREMENT

Whatever the MIDGET CONDENSER you need for high-frequency work, there is a NATIONAL MIDGET that fills the bill.

We made and patented the first 270° Straight Frequency Line (Equicycle) Plate Midget in 1928. Everyone knows how much easier tuning this gives, how it spreads out the stations over 50° more dial space. This isn't a boast—it merely indicates the experience behind the NATIONAL Line of Midget Condensers. NATIONAL Midgets are up to the minute in design and performance. As each new H.F. development or improved material has become available, it has been incorporated in NATIONAL Condensers.

NO SHORTED TURNS IN NATIONAL MIDGETS

Years ago we recognized that efficient H.F. Condensers should have no shorted turns, and years ago we began making all NATIONAL H.F. Condensers without shorted turns. In fact we had ceased even to mention this feature, but we mention it again because it is a basic feature of NATIONAL H.F. Condenser design. All two-bearing NATIONAL Midgets have the insulated front bearing—result—no shorted turns. Naturally the single bearing types can have no shorted turns anyway.

EXCLUSIVE CONSTANT-IMPEDANCE PIGTAIL

Constant-impedance pigtail, a patented NATIONAL feature, is only one of many advantages that make NATIONAL Midgets such consistent and invariable performers. This exclusive and electrically perfect connection to the rotor eliminates the noise, crackle, and varying impedance (A.C. inductance) of the brush type of contact.

OTHER ADVANTAGES OF NATIONAL MIDGETS

Isolanite, acknowledged high-efficiency dielectric, is used for insulating NATIONAL MIDGETS—reducing dielectric losses to a minimum; assuring uniform condenser performance at maximum level under all conditions of humidity and temperature.

Aluminum plates; thick, polished all over, with wide polished rounded edges, are used in the NATIONAL SEU Ultra-High-Frequency Midgets. Here—where rigidity and extreme stability are essential, where surface losses begin to count, we have chosen a suitable material fabricated in such a way as to give best possible performance. Equally thick plates (and thick plates are needed to give wide round edges) of any other metal, would run up cost and increase weight. In aircraft work this is most important, and there also the non-resonant characteristics of aluminum plates prevent any possibility of microphonic feed-back from plate vibration.

THE NATIONAL 2-SE MIDGET WITH GANGED ISOLATED ROTOR

For high-frequency T.R.F. and super-heterodyne work. Heavy, rigid, permanent, precise in mechanical construction, constant in electrical performance. Rotors are effectively insulated AND isolated from each other. Equipped with standard NATIONAL 270° straight-line-frequency (Equicycle) plates.

ALL CAPACITIES from 50 to 350 mmf. PER SECTION. Standard model has equal capacity each section and is furnished for counterclockwise rotation unless otherwise specified in order. On special order, the 2-SE will be furnished with different capacity sections, at a slight advance in price.

LIST PRICES—STANDARD MODEL—TYPE 2-SE

Type 2-SE 50 to 99 mmf. each section ............. $5.50
Type 2-SE 100 to 200 mmf. each section ............ $6.50

Say You Saw It in QST — It Identifies You and Helps QST
**STANDARD NATIONAL H.F. and ULTRA H.F. MIDGET CONDENSERS**

<table>
<thead>
<tr>
<th>Catalog Type No.</th>
<th>Capacity in Mmf.</th>
<th>Air Gap</th>
<th>Number of Bearings</th>
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*Usual trade discounts apply

1. All shafts 3/4" diameter.

**NATIONAL CO., INC.**

61 Sherman Street, MALDEN, MASSACHUSETTS

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

A directory of the amateur societies affiliated with the League, showing their times and places of meetings, is available upon request.

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IT IS a little early, perhaps, to start reminiscing about 1932 and what it has meant to amateur radio, but already it is apparent that this has been one of the big years in our history. We’ve gone through the throes of another international conference; the number of amateur stations in the United States again registered a great increase; activity on the ultra-high frequencies has been widespread; W6USA, at the Olympic games, brought amateur radio to the attention of hundreds of people from all over the world; director elections have been characterized by more interest and participation of the membership than ever before; we’ve had more contests, more traffic handling, more friendly contacts and a keener interest in amateur welfare.

Particularly gratifying has been the progress along technical lines, both for outstanding articles presented for the first time in QST, and for strictly amateur developments. In the first class we have such contributions as the first publication of basic electron-coupled circuits by Lt. Dow in the January issue, the power supply filter studies in the series by Dr. Dellenbaugh and his co-worker Mr. Quimby, and the tourmaline crystal scoop of Dr. Straube, of Jena University, which represented the initial treatment of this subject in any American journal.

Amateur technical development, both in the adaptation of these subjects to our particular needs as well as along original lines, is likewise a source of satisfaction. Electron-coupled circuits, described by Lt. Dow for their application to transmitters, have been adapted to amateur use by the League’s technical staff for better frequency meters and superhet receivers. In receiver development, in particular, QST’s own lab has set the pace with such contributions as that of Ross Hull’s “unorthodox” receiver, and Jim Lamb’s initial article on stabilizing superhet performance, culminating later in the year in the practical development of the most advanced short-wave receiver to date, the single-signal superhet.

Amateurs everywhere can take pride in the part that their QST has played in first publishing practical information on all these worthwhile developments and in the fact that a goodly share of them, valuable to the entire radio art as well as an asset to amateur radio itself, are of solely amateur origin.

BARRING further deadlock on broadcasting problems, it is likely that the Madrid international radio and telegraph conference will be officially terminated by the time this issue gets to print, and the outcome for amateurs already announced by official broadcast.

For that reason we confine ourselves at this time merely to mention of the fact that at the end of October the outlook appeared favorable for the retention of all our present amateur territory. Our high-frequency bands, at that time, had gone safely through the sub-sub-committees. The long fight on our 1715-kc. band was not yet settled, but seemed at last to be headed for settlement on the Washington shared basis. Other matters, such as I.A.R.U. representation at C.C.I.R. conferences, continuance of our present general regulations, and a host of minor questions affecting amateur operation, which we will learn more about when Secretary Warner writes his story of the battle, were likewise definitely over the first hurdles.

Unless unforeseen circumstances arise, it looks as though we now have an excellent chance of seeing all our territory assignments going through to final adoption. — A. L. B.

December, 1932
IT'S STILL THE SAME OLD GAME

SURE, MR. VAN PAWTHERS WITH AN ESTATE LIKE YOURS YOU MIGHT AS WELL STICK UP A FULL-WAVE JOB. BUT AS I WAS SAYIN'...

GONNA HAVE LIVERWURST FOR SUPPER, MINNIE?

NAW—that's an antenna insulator. The old man's goin' in fer HIGH POWER!
Ham-Band Receivers from B.C. Midgets

Converting a Broadcast Receiver to an All-Wave Superhet for C.W. and 'Phone

By Howard F. Anderson, WIBVS*

This article is intended to bring to the attention of amateurs something that has been neglected too long — the lowly "midget" broadcast set which, as will be demonstrated, can be elevated both cheaply and easily to the status of a darned good short-wave receiver, while still remaining as good a b.c. job as it ever was. Models of both the tuned radio-frequency and superhet type, flooding the market at prices ranging from about $14.40 up, nearly all have features that make them readily adaptable to amateur purposes with less labor and expense than would be involved in building a comparable ham receiver from the baseboard up.

Looking one over to see what we get for our money, we find first a complete "A," "B" and "C" supply built in. Of course some will say that these power packs have too much hum; and, true enough, some manufacturers do not put much into the filter. But an extra 8-µfd. electrolytic filter condenser described in detail. In either case, revamping of the input circuits is the main necessity, the rest of the set being left practically untouched.

General Method for T.R.F. Sets

Most midgets of this type have two stages of tuned r.f. ahead of the detector while the standard type of s.w. set calls for only one. No need to worry on this score, however, because one of the r.f. stages can be omitted quite easily and the socket, tube, etc., of the other put to work at something else, such as in a first audio stage or separate regenerator tube. The tuning condenser associated with this stage can be left idle, as a sort of spare against the future. To put the remaining two to work for ham-band tuning is the problem. These condensers have a maximum capacity of some 350 µfd., and a minimum of about 50 µfd. This is obviously too great a capacity range for the present job and a trick is called for.

When two condensers are connected in series the resulting capacity is always less than that of the smaller condenser. Series capacity arrangements taking advantage of this have been utilized for band-spreading by quite a few amateurs, but usually with the larger capacity fixed and the smaller variable for tuning. In this case, however, we shall leave the small one fixed and tune the large one.

Assuming a 30-µfd. fixed condenser in series with a variable of 350-µfd. maximum and a 50-µfd. minimum, let us figure out the resultant capacities:

\[
\begin{align*}
350 \times 30 &= 10500 \text{ µfd. minimum} \\
350 + 30 &= 380 \text{ µfd. maximum} \\
50 \times 30 &= 1500 \text{ µfd. minimum} \\
50 + 30 &= 80 \text{ µfd. maximum}
\end{align*}
\]

Here we have only 8.8-µfd. change in capacity with an 18.8-µfd. minimum. This will do for some ranges — it does not take much change in capacity to band-spread the 7- and 14-mc. bands.

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* 38 Maple Street, Torrington, Conn.

December, 1932
but in the 3.5-mc. band we shall use a 40-µfd. fixed series condenser instead of the 30. Thus we can spread the bands to any extent we want to, providing we have the proper series capacity and the proper size inductance. It is advisable to use an adjustable trimmer for each coil form so that each coil can have its individual series capacity. This is not at all complicated and works out very well. It is also possible to put the coils into cans to shield each one. Since everything else is shielded, then the only pick-up will be that intended, through the coils.

Next we come to the detector, generally a Type '24-A. This can be made regenerative by any one of the several different methods satisfactory to the amateur building the set. Finally comes the audio end. Most of these sets feed into a pentode from the detector; but a fellow can convert one of the r.f. tubes to a first audio, using resistance coupling. Instead of a '35, however, it is advisable to use a '27 or 56 tube and put a 'phone jack in the output side, leaving the pentode on the speaker for R9 output.

These sets make an ideal foundation kit for an A-1 amateur-band tuned r.f. receiver and, with a little ingenuity, from one of them the ham can make an a.c. receiver that needs no apologies.

CONVERTING THE SUPERHET TYPE

The "midget" superheterodyne can furnish the amateur with a receiver that is of the coming type, for with a little changing it can be made into an ideal short-wave superhet. Let us analyze the circuit that is conventional to most of these sets. It is composed of a tuned r.f. stage with a '35 tube, a '24 first detector, '27 oscillator and one stage of intermediate-frequency amplification with a '35. This stage is tuned to 175 kc. and is followed by a '24 second detector, '47 pentode output tube and a dynamic speaker. The volume control varies the bias on the first r.f., first detector and intermediate-frequency tubes. The

---

FIG. 1 — COMPLETE CIRCUIT OF THE REMODELED "LAFAYETTE" MIDGET SUPERHET

The circuit constants are typical of receivers of this type, but may be somewhat different in individual cases. Components that are additional to the originals are indicated as "Extra."

R1 — Gain control.
R2 — Fixed bias resistor.
R3 — H.f. oscillator grid leak, 100,000-ohm 1-watt (Extra).
R4 — First-detector bias resistor.
R5 — Divider resistor.
R6 — Second-detector bias resistor.
R7 — C.w. oscillator grid leak, 100,000-ohm 1-watt (Extra).
R8 — First- and second-detector screen resistors, 50,000-ohm 1-watt (Extra).
R9 — Second-detector plate resistor.
R10 — Audio grid-coupling resistor.
R11 — Divider resistor.
R12 — Tone-control resistor.
R13 — Audio stage bias resistor.
C1 — Main tuning condensers, each 350-µfd. max.
C2 — Adjustable series condensers, adjustable mica type, one for each short-wave coil. Capacity approximately 30 µfd. for 7- and 14-mc. bands, 40 µfd. for 3.5-mc. band (Extra).
C3 — I.f. transformer tuning condensers.
C4 — Main tuning condensers, each 350-µfd. max.
C5 — Main tuning condensers, each 350-µfd. max.
C6 — Main tuning condensers, each 350-µfd. max.
C7 — Tone-control condenser.
C8 — H.f. oscillator grid condenser, 100 µfd. (Extra).
C9 — Bypass condensers, 0.01 µfd. or larger.
C10 — 10-µfd. by-pass.
C11 — Second-detector plate by-pass.
C12 — Power-pack filter condensers.
C13 — Audio-stage bias by-pass. If none in set, 1.0-µfd. condenser can be used.
C14 — Oscillator coupling condenser, 100 µfd. (Extra).
C15 — Oscillator series condenser and trimmer for broadcast band. In some sets this combination is on grid side instead of ground side.
C16 — C.w. oscillator tuning condenser, adjustable mica type, approximately 100 µfd. (Extra).
C17 — Trimmer on main gang condensers.
C18 — Oscillator coupling condenser, 100 µfd. (Extra).
RFC — Short-wave type r.f. chokes (Extra).

For specifications of coils L4 to Lg inclusive, see coil table (Extra).
E1, E2 — C.w. beat oscillator coils. See text (Extra).
J1 — Circuit-closing telephone jack (Extra).
S — Power switch.
W — C.w. oscillator switch (Extra).
short-wave coils, but the original cans were used for broadcast coils. Cans smaller than 3-inch diameter should not be used on the Pilot coil forms, because the efficiency of the set goes down very fast as the cans become smaller and increase coil losses. The coil table gives the proper number of turns and wire sizes for the different amateur bands.

The primaries for the first-r.f. coils and the plate coils in the first-detector forms are wound on ½-inch wooden dowels and centered inside of the coil forms as shown schematically in Fig. 2. The primaries (antenna or plate coil) are wound so that the ground or "B"-plus end of the winding comes in line with the ground end of the grid coil. Remember also that all shield cans must be grounded. The r.f. stage and first-detector coils are conventional, but the oscillator is modernized to use the electron-coupled circuit.

In order to reduce the tuning range of the main gang condenser a condenser is used in three ganged tuning condensers are each 350-µfd. maximum and about 50-µfd. minimum capacity and have an illuminated dial calibrated in kilocycles. The oscillator has a large series condenser, generally about 745 µfd., for shifting its frequency 175 kc. above the received frequency all the way through the broadcast band, and also has two trimmers to align these condensers on both ends of the broadcast band.

We will apply the method of tuning just described to the r.f. and first detector circuits. But in the oscillator we must track 175 kc. higher than the received signal frequency, all the way across the dial for each band. In order to do this our series condenser must be slightly smaller than the other two.

In this particular set the r.f., detector and oscillator b.c.-band coils were mounted on the center section of the shielding under the chassis. These were removed and Pilot 5-prong sockets were mounted inside the chassis end plates, two on one side for first detector and oscillator and one on the other side for the r.f. stage. Holes were cut in the end plates of the chassis to let the tops of these sockets stick through because there was not enough room to put the set back in the cabinet with the sockets on the outside.

This set was so good on the broadcast band that I hated to spoil it for that purpose. Therefore the original b.c. coils were mounted on the ends of some Pilot 5-prong coil forms cut off to fit them. This type of form was used for all coils. National 3-inch shield cans were used for the series with it, as mentioned previously. Remember that it must be on the grid end of the coil — C2 in Fig. 2. The coil socket connections are arranged so that on the broadcast band none of these condensers are required and the set runs with the original coils which it was designed to use.

Let us assume that you have rebuilt the broadcast coils and mounted them on the coil forms. The first thing to do to tune up the set is to put these coils in their respective sockets. Turn on the set and tune in some station in the neighborhood of 1300 kc. If the set was properly ganged before you took it apart, you should not have to change the trimmers Cw very much, if at all; but start with the r.f. stage and adjust Cw for maximum volume; then go to the first detector and, last of all, to the oscillator. Now retune the set
to about 600 kc. and check the low-frequency trimmer \( C_4 \) for maximum volume. Then return to 1300 kc. If your set has vanes on the outside plates of the main tuning condenser \( C_1 \), move these in or out a little for maximum volume. Do this to r.f., first detector and oscillator respectively. Then move the dial until the next set of vanes is intermeshed and repeat. Do this all the way down to 550 kc. *Caution:* Do not move these vanes too much, because if the set was properly ganged in the first place they will require but very little shift one way or the other. When the set is properly ganged on the broadcast band, do not change these adjustments for any of the short-wave ranges, but *make the new coils match the ganging.*

For preliminary lining up of short-wave coils for bands other than those specified, it is almost an absolute necessity to have a calibrated oscillator which can give out either modulated or unmodulated signals. Also, some kind of visual resonance indicator is necessary. This may be a milliammeter connected in either the grid-return or plate circuit of the calibrated oscillator, the grid connection being that of the familiar “grid-dip” oscillator. First wind the 3500-kc., first-r.f. grid coil, with the series condenser \( C_3 \) in the top of the coil form. Put this coil into the first-r.f. socket and check the frequency range with the calibrated oscillator, without the coil shield and with different values of \( C_2 \). Be sure the r.f. tube is in its socket but the set is not turned on. Also be sure, when you measure this, to take two readings, one with \( C_2 \) at maximum capacity and the other with \( C_1 \) at minimum. This gives an approximation of the range of the coil. Now wind on the antenna coil. Next duplicate the procedure for the grid winding of the first-detector coil. By this process you can make your coils for any range desired by simply choosing the proper series condenser and inductance.

After completing the first-r.f. and first-detector coils, tackle the oscillator coil. Remember the frequency of this coil and condenser combination must tune 175 kc. *above* that of the r.f. and detector coils, all the way through the tuning range. So wind on the grid and cathode coils and check as before, remembering the frequency difference of 175 kc.

For the final precise tuning we can use a modulated signal. Remove the oscillator tube from the receiver. Unsolder the plate lead of the first-detector tube and connect a pair of ’phones in series with it. Put all the coils in their shield cans and put them in their respective sockets. Before proceeding farther, be sure the shield cans are grounded. Of course there must be a small hole in the end of the cans to adjust the series condenser. Turn on the set, let it warm up about a half minute and couple the test oscillator, now adjusted to produce modulated signals, to the antenna. Set it at 3500 kc. Set the main tuning dial at about 575 kc. Listen for the modulated signal on the ’phones and tune the series condenser \( C_2 \) on the r.f. and first-detector coils for maximum volume. Be very careful not to go right by the signal and also be sure to use an insulated screwdriver, of bakelite or hard dry wood, for this purpose. After this is done, resolder the plate lead of the first-detector tube and replace the oscillator tube. After it warms up, tune the series condenser \( C_2 \) in the oscillator coil for maximum receiver output. Here some sort of visual indicator comes in handy. If the test oscillator is modulated with 60-cycle supply, an ordinary low-range a.c. voltmeter connected across the speaker terminals will do the trick. A small milliammeter (0–1 ma.) in the plus—“B” lead of the second detector can be used to indicate resonance with an unmodulated signal, the plate current being maximum at resonance, as suggested in the August and September *QST* articles on the Single-Signal superhet. Let me repeat again: Be very careful when doing this; the tuning is very critical, especially that of the oscillator.

After the set is lined up for 3500 kc., check it on the high-frequency end of the main dial. Repeat the same procedure for all three sets of coils; remembering, of course, to change the calibrated oscillator to 7000- and 14,000-kc. ranges for the other bands.

**FOR C.W. RECEPTION**

Now for the c.w. arrangement. The electron-coupled c.w. beat oscillator is coupled to the screen grid of the second detector through the small condenser \( C_{1b} \). The tube and coil are mounted in the place where the broadcast coils originally were. The principle, of course, is that this oscillator is tuned to produce a beat note of about 1000 cycles with the signal coming through the intermediate amplifier. You will note that there is much less background noise with this
separate beating oscillator in comparison with what you get with an oscillating second detector. The two coils are each composed of 450 turns of No. 30 enamelled wire wound on a ½-inch dowel and are ¼-inch thick. The two coils are put on the dowel so that the two windings are continuously in one direction, starting from the outside of one coil. If you do not get oscillation, turn one coil around on the dowel.

To set this oscillator, put the broadcast coils in the set and tune in WOR on 710 kc., WLW on 700 kc., or some other dependable broadcast station. Turn on the c.w. switch and tune the condenser C16 until you hear a beat note of about 500 to 1000 cycles. By careful adjustment it is possible to get effective “off-set” tuning as described by J. J. Lamb in June, 1932, QST. This finishes this part of it and from now on when you want to hear c.w. signals all you have to do is turn on the c.w. switch.

Continuing to the second detector and audio end, there is no change made here except to put a 'phone jack in the plate circuit of the second detector. This must be insulated from the chassis. Incidentally, you will get a very good signal here for headset reception — even though a screen-grid detector is feeding the 'phones. The tone control is a useful feature and can be used to reduce noise from static and also to reduce interference from high-pitched heterodynes on the 'phone bands when the speaker is used.

A suggestion: Before you start to tear a set apart to rebuild it, be sure to make a diagram of the original wiring and to familiarize yourself with the whole layout, as each manufacturer has his own and every one is different. It is better not to start at all than to make a mess of it. Of course if you rebuild a tuned r.f. set, the layout will not be as complicated as for a superhet.

To remove paint from aluminum or enamel from wire, submerge the article to be cleaned in a concentrated lye solution and let it soak. After the paint has come loose, wash off the metal with hot water.

December, 1932
An All-Purpose 56-mc. Station

Full Constructional Details of a Class B-Equipped Five-Meter Outfit

By Ross A. Hull*

It is only natural that, in the early period of 56-mc. experiment, a great deal of utterly hay-wire equipment should have been put to work. Most of the tests were run off on the spur of the moment and the necessary gear usually was thrown together with products of the junk box. To-day it is different. A year of solid practical work has given us a fair idea of what constitutes an effective 56-mc. station. To-day we can go ahead with the construction of a five-meter outfit with the same confidence that we in providing that degree of flexibility so desirable in an all-purpose station.

In studying the general layout it will be well first to examine the outline circuit given in Fig. 1. It will be seen that all metal work is inter-connected and serves as the negative filament, negative plate and positive bias connection. The positive filament lead runs through to the two switches mounted on the receiver, one of which controls the receiver, the other the transmitter tubes and microphone. To allow operation in the field or in a 'plane, it was considered desirable to plan for a 6-volt "Hot-Shot" as filament supply. Hence, Type '30, 49 and '31 tubes are used. The three '30's in the receiver and the three 49's in the modulator are grouped in series to run off the six volts. The two '31's of the oscillator are also in series, with an external resistor to give the necessary two-volt drop. The cable between the oscillator and modulator is a home-made affair with old '99 tube bases serving as plugs. The cables between the

The three units of the 56-mc. station in an unnatural pose. When operated in an automobile, the oscillator could be on the ceiling, the modulator in the rear and the receiver on the dash.

have in building apparatus for any other work.

The particular equipment to be detailed in this article was originally built for test work during the recent eclipse. Its first assignment was as W10XN in the auto-gyro — a job which it performed without a single mark to its discredit. Since then, the outfit has been installed in automobiles, on a roof-top, out in the fields and indoors without once failing to perform at the first click of the switch. Its reliability, its convenience in operation, its light weight and its economy of battery supply make it a desirable rig for almost any sort of 56-mc. work. We have no hesitation in providing full details of it to fulfill the current demand for the design of an efficient 56-mc. station.

Unlike some of the early five-meter gear, this affair is built up in four units — power supply, oscillator, modulator and receiver-control — inter-connected by three cables. The arrangement may appear awkward and complicated, but actually it is entirely practical and almost invaluable in providing that degree of flexibility so desirable in an all-purpose station.

In studying the general layout it will be well first to examine the outline circuit given in Fig. 1. It will be seen that all metal work is inter-connected and serves as the negative filament, negative plate and positive bias connection. The positive filament lead runs through to the two switches mounted on the receiver, one of which controls the receiver, the other the transmitter tubes and microphone. To allow operation in the field or in a 'plane, it was considered desirable to plan for a 6-volt "Hot-Shot" as filament supply. Hence, Type '30, 49 and '31 tubes are used. The three '30's in the receiver and the three 49's in the modulator are grouped in series to run off the six volts. The two '31's of the oscillator are also in series, with an external resistor to give the necessary two-volt drop. The cable between the oscillator and modulator is a home-made affair with old '99 tube bases serving as plugs. The cables between the

THE UNITY-COUPLED PUSH-PULL OSCILLATOR

Arranged so that its tank is a single turn well out in fresh air, this oscillator gives a performance superior to that of the older rigs. The ends of the tank coil are soldered to the condenser stator lugs.

*Acting Editor, QST.
modulator and receiver and from the modulator to the power supply are Yaxleys.

In building the outfit, one might well start with the oscillator. This unit is, by the way, perhaps the most efficient 50-mc. oscillator we have run across. Its circuit, given in Fig. 2, is nothing more than one of the simpler variations on the "unity-coupling" theme. The main tank is cabled. With well-separated supply leads, the oscillator did not seem to mind whether there was a by-pass or not. The fitting of cabled leads, however, started the oscillator off on a program of acrobatics which could be halted only by the addition of the by-pass condenser. The antenna coil (not shown in the circuit diagram but visible in the photograph) is mounted on two small National isolantite insulators.

The only problem in the construction of the oscillator is folding the small aluminum base. It measures 2½ x 3½ inches on top and is 2 inches deep. Probably the best plan is to work up the layout on paper, then transferring it to the sheet of aluminum. Along the lines on which the aluminum is to be folded, the rear or inside surface should be scratched deeply. This will allow clean sharp bends to be made. Holes for the two-tube sockets and for the cable socket at the rear should be drilled after the base has been folded. An ordinary expanding bit or a washer cutter does the trick splendidly if well lubricated. Threading the grid coil is the only other matter requiring much care. The process will be greatly simplified if it is completed before the plate supply tube is soldered to the center of the tank coil.

Construction of the modulator might well come next. Its three tubes and three transformers are mounted on a folded aluminum "channel" measuring 12 inches long, 3½ inches wide and 1½ inches deep. The layout of the parts and the wiring between them should present no difficulties. The only two possible "snags" are in the wiring of the various tube grids and in the connections to the three cable sockets. The speech amplifier in the unit is one of the Eveready 49's arranged for Class A operation by connecting its "C" and "P" terminals together. With 135 volts on its plate, it requires approximately 20 volts of bias. Because the drop in the modulator fila-
ments opposes this bias, a 22½-volt unit will prove suitable. The two 49 modulators are, of course, connected for Class B operation. In this case, the “C” and “C” terminals are connected together and the tubes are operated without bias. The completed modulator is relatively large, quite heavy and fairly expensive. It is capable of doing an excellent job of modulating, however. With only the 135 volts of plate supply and about 8-ma. drain when idling, it is capable of an undistorted output of 3.5 watts — which is something. Other simpler modulators could be arranged (such as a pair of Class A Type ’33’s). They could not be expected to give a comparable performance, however, and they would certainly be much more wasteful of plate current. We believe the Class

[Diagram of the Circuit of the Modulator Unit]

FIG. 3 — THE CIRCUIT OF THE MODULATOR UNIT

The internalss of the super-regenerative receiver. The tubes, left to right, are audio amplifier, interruption frequency oscillator and detector. Microphone and head phone pin jacks, battery cable plate and shielded antenna lead all face the camera.

B affair to be well worth its weight even in the case of "plane work.

The receiver is obviously the most complex portion of the outfit though it is fundamentally quite straightforward. In the original set we made use of an unusually small audio transformer (make unknown) which measured 1½ inches square and 2 inches long. This enabled the complete receiver to be built to occupy a space 2½ x 4½ x 8½ inches. But there is no air space. A larger audio transformer would certainly call for increased case dimensions.

The chassis of the receiver is folded 1/16-inch aluminum. The rear portion is just an inch deep, but the section three inches back from the front panel is formed to provide a step two inches high. Supported on this step is a piece of ½-inch bakelite carrying the tuning condenser and coils. The space under the step is occupied by the audio transformer, supply cable plate and control switches. The radio-frequency choke is also tucked away in this particular spot. The three sub-base tube sockets, the interruption frequency oscillator inductances and a couple of fixed condensers slip in the remaining spaces under the chassis. Along one side is mounted a strip of bakelite containing four pin jacks. Holes in the aluminum, large enough to give good clearance of the jack heads, allow the insertion of headphones and microphone.

The weird-looking dial is the result of crossing National and General Radio. The knob and vernier came from a National

[Diagram of How the Receiver is Wired]

FIG. 4 — HOW THE RECEIVER IS WIRED

A Type A dial — the dial itself from a G.R. of the small type. The mix-up was undertaken because of the desire to retain the large knob and vernier without being obliged to make the set 4 inches wide.

1 From information received after this article was written it is understood the Silver-Marshall transformers are no longer available. Equivalent transformers can be obtained, however, from the Clough-Brengle Co., 1134 W. Austin Ave., Chicago, Ill.
The circuit of the receiver, given in Fig. 1, will be found quite similar to those of super-regenerative sets previously described. Prolonged experiment has failed to disclose the desirability of any radical change in this type of set. This receiver, like its predecessors, puts up an excellent performance. It operates smoothly and with high sensitivity across the entire tuning range, notwithstanding the lack of a “regeneration” control.

Upon completion of the oscillator, modulator, receiver and associated cables, it is advisable to fit up some sort of battery box. It might well be provided with a connector plate for the supply end of the battery cable. It is desirable, also, that a closed-circuit 'phone jack be arranged in the box so that a plate milliammeter may be plugged in series with the positive high-voltage lead. A six-volt “Hot-Shot” will readily supply the necessary .31 amperes for filaments. At 135 volts, the usual 30 to 35 ma. of transmitter plate current can be provided by the smallest size “B” batteries should the weight problem be a really serious one. Larger batteries or an eliminator are naturally much more desirable.

With everything ready to shoot, the filament circuits should first be given a thorough check with the plate supply disconnected. Then, with a flash-lamp bulb in series with the negative “B” lead for protection, the transmitter may be switched on. Should it be operating normally, the plate current of the oscillator alone, without any antenna load, should be about 7 or 8 ma. Upon tuning the oscillator to a suitable antenna, this current should rise to about 28 or 30. The normal plate consumption of the speech amplifier-modulator unit, when idling, should be about 8 or 9 ma. The meter needle will hit peaks of about 50 ma. when the modulators are fully excited and working into the loaded oscillator. With normal speech, the modulator unit will handle the full output of an ordinary single button microphone. For 'plane work (when the operator is usually shouting close to the microphone) it will be necessary to reduce the gain (by putting a potentiometer in the grid circuit of the speech amplifier) unless some form of low output mike is used. In our own 'plane work, the input tube was given the full output of one of the old-time Navy anti-noise aircraft microphones.

The receiver should present no problems of adjustment other than spacing of the coil turns to give the desired band coverage. If the receiver works, there will be a loud rushing noise all across the tuning range. If it fails to work, there will be chiefly silence. There are no half measures in these 56-mc. super-regenerators.

The antenna problem is one that will have a different solution in every location. In the 'plane we used a half-wave long feeder (made of untwisted pair threaded through 2-inch wooden spreaders) feeding a quarter-wave rod worked against the frame of the ship. On the automobile, we are in the habit of using a quarter-wave feeder hitched to the bottom end of a vertical half-wave copper pipe. At home, we hook on the big antenna and juggle it until resonance is indicated at the desired frequency.

The antenna ordinarily used for reception may be any elevated piece of wire. In the 'plane we used a twelve-foot wire dropped overboard. A definite improvement in interference from the engine ignition was obtained by making the first six feet of this length a piece of shielded wire with the shield grounded. As any 56-mc. worker well knows, there is an almost infinite number of antennas possible. And most of them, for one reason or another, work.
Modulating the Screen-Grid R.F. Amplifier

How It Behaves With Grid, Screen-Grid and Plate Modulation

In Two Parts—Part I

By H. A. Robinson, W3LW

With the more rigorous requirements of present day radio transmitters in regard to frequency stability, it becomes an absolute necessity to employ master-oscillator power-amplifier transmitter arrangements for radiotelephony. In order to reduce reaction on the oscillator it is the usual practice to modulate the final or one of the intermediate r.f. amplifier stages.

With the advent of the screen-grid power tube there became possible a considerable degree of simplification in the design and construction of this type of transmitter. Critical neutralizing adjustments can be forgotten and a greater degree of flexibility results. However, in the case of the r.f. amplifier stage in which the modulation is to take place, the triode with the troublesome neutralizing control has held sway. Perhaps many amateurs have wondered why this situation should exist and it is the purpose of this paper to review briefly the relative advantages and disadvantages of the screen-grid tube as the modulated r.f. amplifier.

The increasing emphasis upon higher modulation percentages tends toward a more careful and critical adjustment of the neutralizing condenser in the case of a triode. This is evident when one considers that for complete (100%) amplitude modulation of the r.f. carrier, the output must fall to zero when the modulating signal swings the plate voltage of the modulated tube to zero. This can only occur with a perfectly neutralized triode or a screen-grid tube (well shielded) in this stage.

In radiotelephone transmitters designed for rapid changing of frequency (portable, aircraft, amateur equipment, signal generators, etc.) single control tuning adjustment is highly desirable and the critical neutralizing cannot be tolerated. The use of the screen-grid tube in the modulated r.f. stage is the ideal solution of this problem.

EXPERIMENTAL SET-UP AND METHODS

In order to determine the advantages of the screen-grid tube as a modulated r.f. amplifier, an experimental set-up, employing a very stable (high-C Hartley) Type '10 master oscillator and a Type '65 screen-grid modulated power amplifier was constructed as shown in the photograph. The Type '65 s.g. tube was selected for this study because of its general availability and considerable usage in amateur circles as a straight r.f. amplifier, as well as the ease of obtaining the required plate and screen supplies and r.f. excitation. The use of the relatively high-power master-

* Abridgment of graduate thesis, Moore School of Electrical Engineering, University of Pennsylvania.

** Silver Lake Farm, Willow Grove, Pa.
oscillator tube with separate power supply and adequate shielding resulted in a negligible degree of reaction of the screen-grid amplifier upon the oscillator, a frequency shift of less than 1 part in 10,000 (0.01%) being observed when the plate or screen voltage of the modulated amplifier was varied from zero to normal value. A carrier frequency of 3906 kc. was employed and the resulting frequency modulation was negligible.

The screen-grid modulated stage was arranged so that various methods of introducing the modulating signal could be applied conveniently and their relative advantages and disadvantages investigated. The schematic diagram is shown in Fig. 1. The experimental procedure consisted in varying the d.c. voltage supplied to one or more electrodes (plate, grid or screen) and obtaining a characteristic curve showing the radio-frequency output as a function of that particular electrode voltage. These curves, all of which were taken with a constant value of radio-frequency excitation on the control grid (measured with a peak v.t. voltmeter), are referred to as "r.f. modulation characteristics." The operation of the modulated stage can be predicted from these characteristics and the degree of modulation and accompanying distortion can be predetermined for any given modulating audio signal input. It should be noted, however, that this statement is true only so long as the impedances in any of the electrode circuits are substantially the same for the modulating frequency as for d.c.

This method of determining the performances of the modulated r.f. stage is applicable to the usual modulating arrangements employed in amateur practice but care should be exercised in obtaining the modulation characteristic to insure that the r.f. excitation is constant and that the voltages on the electrodes, other than the one where the modulating signal is to be introduced, remain constant or vary only in the same manner as they will when modulated at audio frequencies.

MODULATION CHARACTERISTICS AND DISTORTION

It is quite apparent that the ideal r.f. modulation characteristic is one in which the r.f. output (current or voltage) is a linear function of the voltage of the electrode upon which the modulating signal is impressed. For example, with plate modulation (the usual amateur practice) in which the audio modulating signal is applied in the plate circuit, the ideal modulation characteristic is one in which the modulated amplifier output tank current (or r.f. current in a coupled load circuit such as an antenna) varies linearly with the d.c. plate voltage both higher and lower than the normal unmodulated value, over a range extending to the peak value of the modulating input voltage at the highest desired modulation levels. Specifically, for complete (100%) plate modulation, the ideal modulation characteristic should be linear for a plate voltage range from zero to twice the normal unmodulated value, as shown by "A" of Fig. 2. It should be noted that this curve passes through the origin, requiring perfect neutralization when a neutralized triode is employed. It is further evident from these considerations that the required a.c. modulating signal should have a peak voltage equal to the normal d.c. plate voltage on the modulated r.f. amplifier.

The more usual form of modulation characteristic encountered in amateur practice is similar to that of curve "B" in Fig. 2. A characteristic of this form could easily be obtained from an imperfectly neutralized triode modulated amplifier in which there is r.f. output even with zero d.c.
plate voltage. The flattening of the characteristic for the higher values of d.c. plate voltage results from saturation, over-excitation, etc. Such a modulation characteristic would result in the flattening of both the positive and negative loops of the modulated r.f. output wave for high percentages of modulation and there would be distortion.

At this point it might be well to clear up the much abused and over-worked idea that any radiotelephone transmitter which shows a 22.6% rise in the antenna current (as measured on a thermocouple meter, r.m.s. value) is being modulated completely (100%). This relation is true only under the following conditions:

1. The average r.f. carrier amplitude remains unchanged during modulation.
2. There is sine-wave (pure tone) modulating signal input.
3. The modulation characteristic is linear.

That the average value of the r.f. carrier amplitude can change with the modulation level is apparent from one illustration: In a Class B modulator the load on the power supply unit increases with the modulation level; hence, unless the power supply has excellent regulation and if the modulated r.f. stage receives its plate supply from the same source, the mean plate voltage on the modulated tube will decrease with increasing modulation level, with accompanying decrease in the average value of the carrier amplitude.

The requirements that the modulating input voltage be sinusoidal and that the modulated tube have a linear modulation characteristic are apparent when one considers that this figure of 22.6% rise was calculated upon the basis of a sine-wave modulated output.

To verify the correctness of the performance predicted from the r.f. modulation characteristics, the modulated r.f. output was rectified by a linear rectifier and, after suitable amplification, applied to one element of an oscillograph, another element of which recorded the wave form of the modulating input signal. This set-up is Fig. 3.

The oscillograms which follow were obtained by this means. Fig. 4 shows the characteristic of the linear rectifier which employed a Type '71-A as a diode. In all the oscillograms, the traces indicated by a "V" show the modulating input voltage, (60-cycle a.c. being employed for convenience) while the traces marked "I" show the rectified modulated r.f. output current. The data showing the conditions under which the oscillograms were obtained are compiled in Table I — given in Part II of this article.

**GRID MODULATION**

Typical modulation characteristics for grid modulation are shown in Fig. 5, Curve 1 being obtained for a lightly loaded plate tuned circuit, while Curve 2 shows the effect of an increased load. There is a limited region of linearity of r.f. output current and control-grid voltage, this region being more extended for greater loading of the tank circuit. This linear portion is but slightly affected by the change of screen-grid and excitation voltages, being but slightly displaced towards the higher negative bias region for increasing values of these factors.

In practice the audio modulating signal input is impressed at J (Fig. 1) and the oscillograms of Fig. 6 show typical results obtained for conditions similar to those under which Curve 2 of Fig. 5 was obtained. Both traces show the flattening of the negative modulation loops in agreement with the departure of the modulation characteristics from linearity. Trace 2 was taken for an excessive audio signal input. This method of modulation, when carefully adjusted, permits a modulation capability of the order of 60% without excessive distortion, this degree of modulation being ob-

(Continued on page 90)
Boosting the Output of the Low-Power Transmitter

Practical Information on Using a 4-Tube Oscillator

By F. J. Fink, W9FJY*

The ham who wishes to add a little more kick to the old rig without going to great expense should be interested in the transmitter described below.

Briefly, the set consists of four Type '10's in a push-pull parallel tuned-grid tuned-plate circuit; in other words, the ordinary push-pull circuit with two '10's operating in parallel on each side of the plate and grid tank circuits. The rig possesses excellent stability and puts out a husky wallop, considering its size.

The photograph gives an idea of the appearance of the transmitter, which is built breadboard fashion. It differs from the usual breadboard set, however, in that the breadboard is mounted vertically on the wall of the shack instead of horizontally on a table. This accounts for the unusual positions taken by the oscillator tubes.

The board is a piece of 4-ply oak veneer measuring 12 inches by 36 inches, trimmed with wooden strips. The two antenna series condensers are mounted at the top, with the parallel condenser just below. Next come the G-R-type insulators on which the antenna coils are mounted, with the plate tank coil fastened to a similar pair of insulators just below. The plate tank tuning condenser, C1 in Fig. 1, is next in line, and is the one with the white dial in the photograph.

The tube sockets are mounted on small wooden pieces which act as miniature shelves, one being placed at each side of the board with the grid coil and its stand-off insulator mountings between. There is one tube socket on the top and one on the bottom of each of these shelves. Immediately below the grid coil is the grid tuning condenser, and below the latter is the plate milliammeter, with the plate r.f. choke off at the left. The power connections are brought in to a number of Fahnestock clips mounted in a row at the bottom of the board. The complete circuit diagram is given in Fig. 1.

No special precautions were taken in constructing the set other than judicious selection of apparatus and care in placing the grid and plate tank coils and their associated condensers so that fairly short leads are obtainable. Possibly in some sets it might be advantageous to use parasitic suppressors (either a non-inductive resistance of about 100 ohms or a small choke of ten turns or so wound on a pencil) in the grid leads to the tubes, but they have not been deemed necessary in this particular layout because there has been nothing abnormal in the operation of the transmitter. Tuning the set is exactly like that of any ordinary push-pull oscillator, and there are no critical adjustments in the process.

This four-tube arrangement has the advantage that in case of failure of one or two tubes, it can go right ahead working as an ordinary push-pull tuned-plate tuned-grid outfit. On the other hand, if a couple of spare tubes are kept for emergencies, they can be put to work with the regular pair to get more power simply by the addition of two sockets to an already-existing transmitter.

One point that must be taken into consideration is that the power supply must be capable of handling the extra load. The filament transformer which lights the '10's in the transmitter has to furnish 5 amperes. Many power transformers have two filament windings, each of which will handle two '10's or the equivalent, and in that case the two windings can be connected in parallel to furnish the necessary power. This may mean that an additional filament transformer must be purchased for the rectifier tube or tubes, but since the use of mercury-vapor rectifiers will be a practical necessity for such a set, probably the extra transformer would be needed anyhow. As used at W9FJY the set takes 150 milliamperes at 650 volts, which is not asking a great deal of the oscillator tubes. There is absolutely no indication of tube heating, and the signals are perfectly steady.

Four '10's should easily handle 250 milliamperes if the power transformer can stand the gaff. A load of this size calls for either an 83 or a pair of '66's.

To prevent chirps the power supply should have good regulation, which in turn means that
a transformer of ample rating must be used. A choke-input filter is also desirable from this standpoint if the transformer voltage is high enough to permit its use.

The transmitter has only been used on the 3500- and 7000-kc. bands, but specifications are given in Fig. 1 for 14-mc. coils as well. Since the input and output capacities of each pair of parallel tubes are in series across the circuit, the total is equivalent to a single tube and should, therefore, cause no trouble on this score.

Other types of tubes than Type '10's also may be used in the set. Four '45's with a power supply capable of delivering 200 milliamperes at about 400 volts should put out quite a respectable signal; in fact, equivalent to that from a push-pull '10 outfit at the inputs ordinarily used on those tubes. By the addition of two neutralizing condensers the transmitter also can be made into an amplifier which when adequately excited will deliver even more power than it will as an oscillator.

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Many publishers, as you probably know, have a very strict change-of-address policy, requiring as much as five or six weeks' advance notice if they are to be held responsible for delivery of the current issue of their publications. Recognizing *QST*'s intense reader interest, we have never established such a policy, believing each reader should receive every copy of *QST* even though in many cases the fault of non-delivery is not ours. We plan to hold to this policy, but your co-operation, particularly in view of the direct expense now involved, will be appreciated.

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About This 56-mc. Band

A Brief Review of Recent Work—The Story of an Expedition on the Pacific Coast

IT WOULD be utterly futile to attempt a comprehensive report of recent happenings on the 56-mc. band or to outline the present status of the game. A year ago, we could do it. To-day, it would be about as easy a job as reviewing activity on the 3500-kc. band. Around Long Island and in New Jersey there are actually hundreds of stations working. Fifty 56-mc. contacts in one night, it is said, do not represent an extraordinary feat. Stations are not packed together so closely in other parts of the country but few centers would seem to have been immune to the 56-mc. serum. And the United States do not hold a monopoly in the field. On the Continent, in England, Australia, South Africa and China, the old super-regenerators are doing their stuff. Amateurs all over the world would seem to be climbing the nearest hills, working forty or fifty miles and experiencing their first real thrills since the original trans-ocean contacts.

Sad to relate, however, we really don’t know a great deal more about the behaviour of 56-mc. signals than we did a year ago. We know that reliable contact is assured within the range of visibility; we have learned that it can often occur at slightly greater distances than that; we have knowledge of a definite “night effect”; we have experienced various forms of fading; we know that brief snatches of signals are often heard over very long distances. We do not know, however, what makes the wheels go ‘round. We would have an awful time, for instance, explaining why signals from the Empire State station in New York can be heard consistently in Hartford when the range is probably three or four times that of visibility. Some day, of course, we’ll have it all worked out. In the meantime we will just have to realize that there is a great deal more to ultra-high frequency work than at first meets the eye.

Though it may be impossible to write a complete history of recent doings on the band, we at least wish to record some of the outstanding work we have heard about.

First on the list comes the splendid work of Arthur E. Bent, W1COO, who made several trips to the top of Mount Washington, New Hampshire. His greatest DX for prolonged and reliable two-way contact was with Clarence C. Margerum, W1AQM-W1CVJ at Mount Wachusett, near Worcester, Mass., — a distance of approximately 125 miles.

The second longest reliable two-way circuit, as far as we know, was that set up by Floyd Vanderpoel, W1BEP-W1WR, at Sedgwick Mountain, Connecticut, and John M. Murray, W2AMD-W2ZZV, at the Catskill Mountain House, N. Y. — a distance of 75 miles. Many hours of solid duplex ‘phone were run off on this link during two week-ends, the plate supply at each end being nothing more than 135 volts of “B” battery.

The next step in the way of DX probably brings us to the excellent station of T. F. Cushing, W1OF-W1AWW, on Mount Wilbraham, near Springfield, Mass. Operated by a group of Springfield amateurs on every-week-end for the last seven or eight months, this station appears to have contacted almost every city in Connecticut over distances up to about 60 miles.

Then, we must mention the work of the Bloomfield Radio Club, Bloomfield, N. J.; the Atlantic Radio Club, Pleasantville, N. J.; the South Jersey Radio Association, Audubon, N. J. These groups have contributed greatly to the 56-mc. cause.

From this point on, it becomes impossible to mention calls or results. A 12-inch thick file of miscellaneous reports gives proof that many hundreds of stations are now using 56-mc. for ordinary routine communication around town and over distances up to 40 or 50 miles. These reports prove, too, that the band is still a marvel-

December, 1932
ous field for experimental work. "Night effects," "freak" long-distance signals, unexpected changes in polarization—all are reported but none of them in sufficient detail to serve as real contributions to our knowledge. It is obvious that we have only scraped the surface of 56-mc working. More comprehensive and much more careful experimental work is needed desperately.

And now we quit preaching to allow the presentation of the first story of 56-mc activity which has reached us from the Pacific coast—an excellent picture of the fun that five-meters can provide.

—R. A. H.

Pacific Coast Amateurs
Dig Into 56 Mc

By R. G. Martin, W6ZF-W6ARD-W6AYC

This is the story of one of the first five-meter expeditions in these parts—an expedition which resulted in a magnificent round of thrills.

On the evening of October 8th, a group of twelve members of the Associated Radio Amateurs of San Francisco started to locations, pre-arranged for them by the writer. Equipment was loaded into autos for the trips to Mt. Hamilton, 75 miles from San Francisco (undertaken by Dick Barrett, W6GDQ, and James Welch, W6WC), and to Mt. Tamalpais, some fifteen miles from San Francisco, with two good hams, Doc Watson, W6GDW-W6CLW and Alan Whittaker, W6SG at the wheel. Jack Stevens, W6PW, and Warner Hoby, W6MV-W6FMV, attired in regular sea-farin’ clothes, made the boat ride to Yerba Buena Island, in San Francisco Bay. Tom Watson assisted our able-bodied SCM, Clayton Bane, W6WB, and Byron Goodman, W6CAL-QV were at Twin Peaks, in San Francisco. And at the control station, W6AYC, Bill Tracey, W6AKU, Eddie Hoetzl, W6DZV, and the writer, stood a hot and heavy trick. This station was located on the roof of the Examiner Building in a nicely furnished penthouse.

The elevation at Mt. Hamilton was 4000 feet. Dick Barrett and Jimmy Welch deserve a lot of credit for making that long trip by auto, setting up the equipment and making the score of 71 miles duplex to Mt. Tamalpais. "The duplex was better than the average telephone circuit," Dick and Jimmy quoted, "and we heard W6CLW loud enough to walk 15 to 20 feet away from the phones and hear them with ease."

Control-station W6AYC went on the air at 6:30 p. m. Back-ground noise was terrible. We were situated in the heart of the business district and the interference from motors, street cars, automobiles, and other electrical appliances was at times unbearable. To top that off, KUP, the San Francisco Examiner’s Press Station QRM’d us at times in about six or seven spots on the band. But even through all of this racket, we managed to make two-way clicks with all the other stations with a good degree of success. The transmitter was a push-pull affair, employing two 45’s, with approximately 300 volts on the plates and modulated by a pair of 47’s. The transmitting antenna was a 100-foot wire semi-vertical, hung from the 85-foot pole on the top of the penthouse, 15 stories above ground. This system was worked against ground, with quite fair results. Several receiving antennas were tried—and the final stand was made with a short wire, rubber covered, strung out the window, about 18 feet and tied around a flower pot sitting in the roof garden. Later in the evening the wire was blown down and when we came out to take it down, found we had been using a wire laying on the floor of the roof garden.

Our first contact was with W6GMY at Yerba Buena, about one mile away. We made our second contact with W6QV, Twin Peaks, two and a half miles west of us. We lost them shortly in the QRM. That was at 8:03 p.m. At 8:07 p.m. we called W6QV, Twin Peaks, and told him W6CLW on Mt. Tamalpais was calling him, and QV immediately turned to CLW for a hookup. Then at 8:11 p.m. W6GMY, Yerba Buena, called us with information regarding CLW, Mt. Tamalpais, and attempted to hook up us, but we couldn’t get across to Tamalpais, evidently because the steel buildings around us were blocking us out. But we could hear them perfectly. We hooked them later on in the evening. Then at 8:31 we heard W6GMY working W6GDQ at Mt. Hamilton—what a thrill—working two-way with Hamilton, some sixty miles south of us. Then five minutes later QV and GDQ clicked. Another thrill. Then the thrill of the evenings work— we heard GDQ, Mt. Hamilton, calling CLW, Mt. Tamalpais. We waited for him to sign off. Would he make it to Mt. Tamalpais? Those seconds seemed like hours. At last CLW answered him, said GDQ was R9-QSA5, asked to try duplex—it worked—contact! And a record 71 mile airline between two fixed points. Then at 9:08 we called GDQ and clicked! Another thrill—we didn’t expect to get through as well as we did but he had previously.
told GMV we were coming through fine. For nearly 45 minutes we carried on with him, handling two messages, and talking about everything in general. Then at 9:53 p.m. we clicked with QV again. They were much better that time and we exchanged greetings with Bane, Goodman and Watson who said they were just about freezing to death on the tops of the Peaks. Then we worked CLW for a few moments, got Doc to QRT until we could clear GDQ at Hamilton, 60 miles away. Boy, oh boy, what a feeling of accomplishment and satisfaction. When we closed up for the night, we all vowed, 56 megacycles for ever!

But let us describe the other stations. W6QV located on Twin Peaks, two and a half miles west of the control station, 925 feet in the air, had a 100-foot pole on the very top to tie antennas to. The transmitter was a pair of 71's in push-pull, modulated with a pair of 47's in parallel and about 230 volts on the plates, supplied from a bunch of heavy duty "B" batteries. The filament was run from storage battery. The receiver was the typical super-regenerative job made famous by QST. The equipment had to be carried 150 feet up a steep side to the top of the hill, as driving a car up a mountain side, especially the last 150 feet was entirely too perilous for the gang. An 8-foot vertical "Zep" antenna was used for transmitting, a 40-foot piece of wire for receiving. Upon placing the receiver into operation, all the other four stations were heard with R3 signals. Several stations in Oakland were also heard. At 8:00 p.m. a short CQ was rewarded with an answer from the control station and they established their first contact. From then on until 10 o'clock, QV was as active as a beehive, contacting Hamilton, Tamalpais, Yerba Buena, and other stations in Oakland. Upon contacting Mr. Hamilton QV, like the other stations, went into a jamboree. Signals were R9 at both ends.

W6GMV at Yerba Buena Island was manned by Jack Stevens, W6PW and Warner Hobby, W6MV-GMV, who, arriving aboard a naval tug boat, were met at the dock with all the gala reception usually afforded two scientists about to embark on some perilous journey. After the installation of the gear and a madly eaten dinner, the crew raced up some umpty-ump flights of stairs to the top of the hill and then 259 steps more to the tower-top. The first blast from the receiver occurred at 6:30 p.m. From then on until 9:00 p.m. two-way contact was had with every station of the group. Their transmitter was of the QST type — employing a pair of '45's modulated with '47's and "B" battery supply at about 235 volts. The receiver was a la QST.

On Mt. Tamalpais, elevation 2406 feet, was W6CLW. This mountain is 11 miles north of San Francisco and one of our scenic tours of California. The tower on the very tip-top is used by the State Fire Marshall. From it, to the northeast, one can see the State Prison, San Quentin. To the east, the cities of Oakland, Berkeley, Richmond, El Cerrito, Alameda and Hayward are visible. To the north is the famous Redwood highway. To the south, the Golden Gate, the city of San Francisco and Twin Peaks, where W6QV was. On that evening one could also have seen Doc Watson, W6DW-CLW and Alan Whittaker, coaxing a DeSoto up the dusty mountain road, with their load of equipment, stopping at the toll gate, presenting their passes to the watchman, arguing that they should retain the pass for future dates, but losing out in the end. Their transmitter employed a pair of '71's and modulated with '47's, with about 250 volts of "B" batteries on the plates. Their antenna was a Zepp of three waves long. The receiving antenna was a short piece of wire about three feet long.

It was with many doubts and forebodings that W6GDQ listened for perhaps a weak tiny R2 or R3 signal from San Francisco if any at all. Imagine the surprise and thrill when W6GMV, Yerba Buena Island, came roaring in a good QSA5-R9, and could be heard at least 15 feet from the phones. When Mt. Hamilton finally got the transmitter on the air and gave out a hopeful CQ, it was still more surprising to hear Yerba Buena come right back and give them a QSA5-R9 too. From then on it was a simple matter to QSO in rapid succession the various other stations as quickly as they were able to put their transmitters on the air and call CQ. The big thrill of the evening was the QSO between Tamalpais and Hamilton, 71 miles airline distance apart.

The transmitter at Hamilton consisted of a pair of '45's in a push-pull TNT circuit, with about 350 volts on the plates of the tubes with 40-m.a. plate current.

In conclusion, we were all certain that longer distances could be handled with just the same success as we have had on the tests. The Associated Radio Amateurs plan several long hauls, between Mt. Lassen, and Mt. Tamalpais, and possibly Mt. Diablo. The distance is approximately 250 miles airline between the first two points and approximately 215 miles between Diablo and Lassen. Then the next expedition probably will be to Bear Mountain, from which the gang have hopes to work Mt. Diablo, some 300 miles airline distance.

We would extend our thanks to Mr. O. W. Tuttle of the San Francisco Examiner, for his kindly assistance and cooperation in obtaining (Continued on page 88)
Gadgets, Notions—Try These

Switching the Plate Meter

IT IS common practice when a single milliammeter is used to read currents in several stages in a transmitter to use a system of plugs and jacks. However, when only two circuits are to be metered, as in a straight m.o.p.a. transmitter, the job can be done much more conveniently using a double-pole double-throw switch, as the accompanying diagram from Richard R. Turner, W3HJ, shows.

The meter is placed in the negative lead, and the switch automatically closes the center-tap to one tube when the meter is switched to the other. W3HJ uses a Yaxley jack-switch, which looks neat on a panel and takes up little space.

The same idea can be used to make one meter read both grid and plate current on a single stage when a separate milliammeter is available for each stage.

Inexpensive Stand-Off Insulator

A STAND-OFF insulator which can be made from a cast-off tube socket of the metal shell type, a glass towel rod and a little cement is shown in the drawing. The prongs should be removed from the socket, leaving only the shell and base, then the glass rod is centered in the socket and cement poured in. The cement should be quite rich—practically all cement and little sand. Care should be taken to keep the rod aligned until the cement has hardened.

One advantage of this type of insulator is that it can be made in almost any length desired. R. B. Newhauser, W9HWO, suggested the idea.

Split-Stator Pilot Midget

ONE popular method of band-spreading in ham receivers calls for the use of a tuning condenser with two stationary-plate sections. The job of cutting the stator into two parts is easy if the condenser has supports for the stator in both front and rear, but if the whole assembly is supported from the front bearing plate it presents something of a problem. Here is a solution provided by Bill Best, W4ACQ, as applied to the Pilot midget.

The extra materials needed are a few short pieces of standard-size spaghetti and some insulating washers the same thickness as the regular brass spacing washers. Take off the plates that are to form the extra stator section (generally two plates will be enough) and ream out the holes to make them 3/16-inch in diameter. The insulating washers should also be reamed out to have the same size hole if not already drilled to the right size. Two of the regular spacing washers should also be reamed similarly. Then, leaving the rest of the condenser with its regular construction (using the right number of plates of course) slip a piece of spaghetti over each of the mounting bolts and assemble the new section as shown in the diagram. A soldering lug should be brought out from the insulated section for making external connections.

This scheme has given good service at W4ACQ, and has permitted the use of a small condenser in limited space.

Carbon tetrachloride, or Carbona, as well as being a good cleanser for crystals often will get that noise you can’t clear up in your receiver. Apply it to the ‘phone plug contacts and to the contacts of the ‘phone jack itself. Then too it is a good cleanser for the dry bearings of variable condensers.

—W1ADF
How to Calibrate Your Frequency Meter from WWV

By Louis Berkowitz, W1AVE*

Tucked away at the very end of the schedules of "Standard Frequency Transmissions" is one small paragraph with the heading "WWV 5000-kc. Transmissions." The amateur, in search of a standard frequency transmission with which to calibrate his monitor or frequency meter, passes this by with just a glance. It looks as if it would be impossible for one to calibrate a frequency meter on the 3.5-mc. band to use 5000-kc. transmissions for this purpose. This article gives a method by which the 5000-kc. transmissions may be used to calibrate such a frequency meter, with the following advantages over the methods usually employed: First, freedom from the QRM encountered on transmissions in the amateur bands; second, the transmissions take place (at the present time) every Tuesday, which is a real advantage if you have missed the transmission from your nearest s.f. station and have to wait a month for the next transmission on 3.5 mc.; third, the transmissions are continuous from 10:00 a.m. to 12:00 noon and from 8:00 to 10:00 p.m., Eastern Standard Time, allowing a generous amount of time to make adjustments; fourth, the transmissions consist mainly of a continuous unkeyed carrier frequency which assists in taking precise readings.

The extra apparatus necessary consists only of a roughly calibrated intermediate oscillator having a range of from about 1500 kc. to below 500 kc. The oscillator uses a Type '01-A tube with a 45-volt "B" battery for plate supply. The filament of the tube is heated from the same battery that runs the short-wave receiver. A good vernier dial is used to turn the variable condenser and a Bradleystat is used for filament control. Any of the smaller receiving tubes could be used, of course. The oscillator, unshielded, gives plenty of signal strength. Its circuit is shown in Fig. 1.

To make a preliminary calibration of this oscillator, it is assumed that access can be had to a broadcast receiver. A local broadcast station is tuned in on the receiver, and the intermediate oscillator dial is turned until a whistle is heard in the receiver. This is the beat note between the oscillator and the carrier wave of the broadcasting station. As the dial is slowly turned a bit more, the whistle will start again at a low pitch and rise to a higher pitch until it goes above the limits of audibility. Log the dial reading at zero beat as being for the same frequency as the broadcast carrier. Do this with as many stations as you can receive, making a graph similar to the one shown in Fig. 2, the assigned frequencies of the stations being taken from published programs, etc.

The following explains the general method of calibrating an amateur frequency meter with the above oscillator. Tune in WWV (frequency 5000 kc., wavelength 60 meters) on the short-wave receiver and turn on the intermediate oscillator. There will be seven points on the dial between 1500 kc. and 500 kc. where beat notes will be heard. The seven frequencies having harmonics which beat with WWV's 5000 kc. transmissions are as follows:

- 4th harmonic of 1250 kc.
- 5th harmonic of 1000 kc.
- 6th harmonic 833 ⅓ kc.
- 7th harmonic 714 ⅔ kc.
- 8th harmonic 625 kc.
- 9th harmonic 555 ⅓ kc.
- 10th harmonic 500 kc.

By the use of harmonics of some of the above seven frequencies, calibration for the amateur bands is made possible. With the oscillator tuned to 500 kc., for instance, the 7th and 8th harmonics will mark 3500 kc. and 3000 kc., the limits of the 3.5-mc. band. Likewise, calibration points can be obtained for the edges of the new "160-meter" phone band (1875 kc. to 2000 kc.); the center of the 3.5-mc. band (3750 kc.) etc. All the points obtain-

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* 849 Blue Hill Ave., Dorchester, Mass.
able up to the 14th harmonic of the intermediate oscillator are shown in the chart.

CONSTRUCTION AND USE

The oscillator is built on a baseboard 8" by 6½". The panel is a wooden panel 8" by 7" and was cut from the panel of an old five-tube t.r.f. broadcast receiver. The variable condenser is a 500 µµfd. from the same BCL set. The coil L is a replacement radio-frequency coil for a Victor model R-32 set. These are readily available from most jobbers of surplus parts at a cost of about fifty cents for a set of four. This coil was used because it is small in size and comes with a center tap brought out to a soldering lug on the end of the form. The primary winding of this coil may be removed or left on without any connections to it. The coil was mounted in back of the variable condenser by a single bolt which passes through the coil form and the condenser frame. The filament rheostat is a Bradleystat and this is used as a fine vernier for frequency control because the frequency of the oscillator will vary slightly with the filament temperature. The blocking condenser C2 should be tested for a short circuit before it is installed in the oscillator, because it will run the "B" battery down if it is defective. The old dial was removed from the panel and was replaced with a good vernier for easy adjustment of the oscillator.

To receive the signals from WWV, a coil which had 19 turns of No. 28 d.s.c. magnet wire wound on a tube base was built for the receiver at W1AVE. The tickler coil is seven turns of the same wire. The tuning condenser is a seven-plate Pilot midget.

The calibration procedure is as follows. Tune in WWV. Adjust the oscillator to approximately 500-kc., zero-beating the oscillator's tenth harmonic with the signal from WWV. Now leave the oscillator set and tune the receiver to the 3.5-mc. band. Tune in the 7th harmonic from the oscillator, at the 3500-kc. end of the band. Then turn on your frequency meter, and adjust it to zero beat with the oscillator signal in the receiver.

Log the frequency meter dial setting. Now tune the receiver to the other end of the band, zero-beating the receiver to the 8th harmonic of the oscillator. Adjust the frequency meter to zero beat with oscillator signal in receiver, as before, and log the frequency meter dial setting for 4000 kc. The intermediate points are obtained by the same procedure. There will probably be a small amount of body capacity noticed in the oscillator. If the rheostat is turned up enough to place about four volts on the filament of the 201-A, the final tuning of the oscillator to zero beat with WWV may be done with filament rheostat; and body capacity will be nil.

By reference to the chart other calibration points will be found.

If greater accuracy is desired, two receivers

(Continued on page 88)

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<th>Harmonics</th>
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<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
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<td>2nd</td>
<td>1250 kc.</td>
<td>1000 kc.</td>
<td>833½ km.</td>
<td>714½ km.</td>
<td>625 kc.</td>
<td>555½ kc.</td>
<td>2000</td>
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<td>3rd</td>
<td>3750</td>
<td>2000</td>
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FIG. 2 — HARMONICS OF INTERMEDIATE OSCILLATOR FREQUENCIES

A to G inclusive will give beats with WWV's 5000-kc. signal.
Break-In Operation with Crystal Control

Blocked-Grid Keying Applied to a High-Power Transmitter

By Robert T. Foreman, W9ZZE

The use of break-in for traffic handling is generally regarded as the smoothest way of avoiding long and useless repetitions, but its use is largely confined to low-power self-controlled transmitters, where the oscillator is stopped when the key is up. After working several schedules with hams using break-in at their end, and after wishing in vain for the ability to use it at this end, the writer finally decided that if break-in could not be used with a crystal-controlled station, either low or high-powered, it might be preferable to go back to a High-C self-controlled transmitter. Much paper was wasted in an endeavor to procure an effective system by modifying the various methods described in QST from time to time; each method was given a thorough trial, and although as many as six relays were used in some of them, it was impossible to eliminate clicks in the phones. The method to be described was finally adopted as wholly satisfactory, and is presented with the hope that it will enable others to enjoy the benefits of break-in operation.

The receiver in use at this station is a four-tube affair, with a.c. on the filaments and a “B” eliminator for plate and grid supply. A stage of Type ’24 r.f. (tuned or untuned at will) is followed by a ’24 detector using grid detection; the detector is coupled to a ’27 by means of a Ford coil and condenser, giving peaked audio amplification with an over-all detector gain of 27, compared to 10 or 12 for resistance coupling; the ’27 is transformer coupled to a ’45, the output of which is shown in Fig. 1. The receiver is enclosed in a metal cabinet, but filament transformer and eliminator are located about two feet from the receiver, and are not shielded. The transmitter employs a Type ’10 oscillator, a ’45 buffer, a 50-watt amplifier, and a 250-watt final amplifier. The use of the ’45 buffer has certainly been justified, since it permits keying both the 50-watt and 250-watt stages, while still providing effective isolation for the crystal tube. As pointed out in QST many times, such isolation is essential to avoid creeping and other frequency changes due to changes in the load on the crystal tube.

Both transmitter and receiver are mounted on the operating table, with only a few inches between them. The antenna is a current-fed Zepp, with two-wire feeders. The receiving antenna is run at right angles to the transmitting antenna, and the receiving lead-in goes up about 20 feet from the feeders to the Zepp. With this physical arrangement it might seem that enormous pick-up would result, but such is not the case.

The 50-watt and 250-watt stages are shown in skeleton diagram in Fig. 1. The keying arrangement is by no means new, having been described at length in QST for May, 1929. It is simple, effective, needs no filter to eliminate sparking, and is the best all-around arrangement the writer has ever tried. The theory of operation is completely covered in the article referred to, but is...
briefly as follows: The combined resistor $R_1$ plus $R_2$ forms a potentiometer, the filament center-tap being connected to the junction of the two resistors and the plates to the positive end. As the center-tap is moved to the right it becomes positive with respect to the grids — that is, the grids are negative with respect to center-tap. At the same time, the plate is made less positive with respect to center-tap. The result is that the grid bias is raised and the plate voltage lowered, this adjustment being continued until the tubes stop oscillating, even with excitation applied. The relay (or key) is connected from center-tap to negative high voltage; when the key is up the grids have a high bias, but when the key is down the additional bias is removed and the grids are connected to center-tap. The arrangement can be applied to any number of tubes, either self-controlled or separately excited; the only requirement is that the tube to be keyed shall receive plate voltage from the same source. Either batteries, grid leaks, or resistances in the negative leads can be used for bias; batteries or grid leaks would, of course, be connected at the points in the grid leads at which the grid milliammeters appear in Fig. 1.

With this arrangement a very high bias is suddenly applied to the grids, and just as suddenly removed; it therefore may be necessary to use one of the schemes shown in the Handbook to taper the wave trains and prevent thumps, although no such arrangement was necessary at this station.

So much for the general layout. Again referring to Fig. 1, it will be seen that the key is used to close relay No. 1, the latter being energized by one or two dry cells. When relay No. 1 is actuated, its moving contact is drawn down and closes the circuit through the coil of relay No. 2, which in turn shorts out the high grid bias referred to above. Furthermore, when relay No. 1 starts to move down, it opens the phone circuit before it closes relay No. 2; and when the key is opened and relay No. 1 starts up, it opens relay No. 2 before the phone circuit is closed. The result is that the phone circuit is dead before the tubes start oscillating; and it is not closed until after the high bias stops oscillation in the tubes. The gap on relay No. 1 is made very wide and the spring is loose, while the gap on relay No. 2 is normal and the spring is very stiff; this results in relay No. 2 opening a split second before relay No. 1 reaches the top of its travel. Obviously, there cannot be any click in the phones due to detector excitation from the transmitter.

In practice, then, the Type '10 oscillator and the '45 buffer are allowed to run continuously (they have a separate low-voltage plate supply), and the 50 watter and 250 watter are dead until the key is closed. Both oscillator and buffer are working well under their rating, the oscillator being tuned far below the point of maximum output (by detuning the plate tank to a higher frequency). However, the output from the '45 buffer is more than enough to swing the 50-watt grid and its signal covers but a 50-ke. band in the receiver. Any station, therefore, which is operating on a frequency 25 kc. above or below W9ZZE's frequency can be heard perfectly when the key is up, and break-in operation proceeds as usual.

As previously stated, the physical arrangement at this station is such that the receiver does not block when the key is closed. This may not be the case in other stations, and if the detector tube shows a tendency to lag in oscillation after the key is opened, an additional relay may be used to ground the antenna, as shown in Fig. 2. The field of this relay may be placed in shunt with the field of relay No. 2. When the key is closed, the action is the same as before, except that the antenna is now grounded. If this relay is used, the antenna should be connected to the stationary contact to reduce capacity to ground, since the stationary contact usually contains less metal than the moving contact.

To provide an audible signal when the key is closed, a small resistance $R_3$ is placed so as to produce a drop of 2 or 3 volts when relay No. 2 is closed (it may be seen that the full plate current flows through this resistor). A buzzer connected across the resistor will be actuated as the transmitter is keyed; the buzzer might also be connected in shunt with the field of relay No. 2, but will increase battery drain. Furthermore, relay No. 3, if used, can also be connected across the resistor, still further reducing battery drain.

A slight click may result from sparking at the key contacts, the lower contact of relay No. 1, and the contacts of relay No. 2. In such cases a small condenser (.5 µfd. or more), or a condenser and resistor in series, will remedy the trouble. However, relay No. 2 will seldom spark, even with plate current on the order of 500 ma.

In determining the values of $R_1$ and $R_2$ it is well to use enough resistors to limit the voltage drop across each resistor to not more than 250 volts. With 1500 volts, therefore, six resistors would be used in series for $R_3$ since this section must stand

(Continued on page 90)
Radio Commission Reorganizes Field Force

Number of Inspection Districts Increased to Twenty—Amateur Calls to Remain the Same—Station License Applications now go Direct to Washington

All amateur station license applications are now to be submitted direct to the Federal Radio Commission at Washington as the result of a sweeping reorganization of its field force announced by the Commission to be effective November 2. Operator licensing will continue to be handled by the individual district inspection offices, but new inspection districts for this purpose have been named, as outlined below.

The principal effect of the new order, which comes as a continuation of the economy program inaugurated with the absorption of the Radio Division by the Federal Radio Commission last July, is the abolishing of the old field system of nine districts, with nine main offices and ten sub-offices, and the creation instead of twenty inspection districts, each reporting direct to Washington and each to be managed by an "Inspector in Charge."

Amateurs need feel no alarm over the possibility of losing their present calls. There will be no change. Our number prefixes will continue to run from "1" to "9" and will be assigned in the same areas as at present. While, for administrative purposes, there are now twenty inspection districts, the Commission will issue licenses and call letters in accordance with the old nine areas.

Application blanks for both station and operator licenses may be obtained through the district inspection offices, but the station application, when filled out, should be sent direct to the Federal Radio Commission at Washington. All operator license applications and examinations will continue to be handled by the district inspection offices, however, and should be returned to them.

Designed to effect economies in radio administration, the new system should speed up the issuance of both station and operator licenses and for that reason constitutes a welcome step, from our standpoint. Under the old system an application went first to the district supervisor (and in many cases to a sub-office before that), and then to Washington. The procedure now provides for station applications to go direct to Washington with, we trust, a consequent speeding up in the licensing procedure.

Summarized, then, the situation is as follows: Obtain application blanks for both station and operator licenses from your local inspection office. Send the station license application direct to the Federal Radio Commission at Washington. Send your operator license application to and take your operator license exam at the district inspector's office.

December, 1932

A. L. B.
STRAYS

QST Index (1932) Now Available

The annual index to QST for 1932 (Volume XVI) has been published as the second section of the December number, and sent to every member of the League. Newsstand readers may obtain a copy of this index for 6 cents in stamps.

Monte Douglas missed one town in his list of the names of towns with radio meanings. I have found that there is a town in Ky. with Eighty Eight for a name. — W9FYB

Resistors in Kit Form

The International Resistance Company has recently placed on the market a Grid-Bias Kit which contains resistors suitable for cathode-biasing of various types of tubes now used. A folder enclosed with the kit gives information on how to use the resistors. A second kit contains twenty 2-watt resistors ranging in value from 500 ohms to 500,000 ohms, the individual units of which can be used singly or combined to give thousands of resistance values. More information about resistor kits and their uses can be obtained by writing the International Resistance Company, 2006 Chestnut St., Philadelphia, Pa.

On page 25, September QST, W7YX is listed as being one of the outstanding stations logged in Oceania on 7 me. during the February 20th-26th period of the International Goodwill Tests. This should have been W8YX, the station at the University of Cincinnati.

Ever know Benjamin Franklin was a ham? Yep, he signs W7AVK.

W6BTT nominates H. A. Mandoli for a high place in the H.A.M. fraternity. His call is W6HAM!

Left to right: Mr. Van Dyke, M.G.M., now directing the production of "Estimo"; E. B. Stevens, W7BB; Clyde De Vinne, W6OJ, chief photographer with the "Estimo"" photographing expeditions; photo taken in front of W7BB's shack. The expedition is now in northern Alaska. W6OJ has his portable set up and operating under the call K7UT with 500-cycle plate supply on about 7290 kc. crystal-controlled. A daily schedule is maintained with W7BB, K7AZ, portable of Mr. Watson, radio and sound man with M.G.M., is also in operation with a p.d.c. note on about 7275 kc. Watson is also operator on the schooner Nanuk, which took a number of the troupe North. K7BV is the call of Mr. Pratt, the chief sound engineer with the party. The latest plans of the expedition are to spend the winter at Teller, Alaska, about seventy-five miles northwest of Nome, and just south of the Cape Prince of Wales. Watch for K7UT, K7AZ and K7BV and try a QSO with the "far north." All "company business" for M.G.M. is taken care of by an R.C.A. installation, with both high and intermediate frequency gear, under the call WKDB.

Word from De Vinne, K7UT-W6OJ, dated July 16th, reads in part as follows: "Just at present we're ramming around among the ice up here, making scenes with walrus, polar bear, seal and whale; but most of our опы is going to be made in the vicinity of Teller, where the Nanuk will be frozen in during the coming winter."

Taking a tip from the broadcast stations, a Detroit ham periodically cleans the dust out of his transmitter with an air blast. Hard to get? Not a bit. Take a look at the gadgets that come from Mother's vacuum cleaner. There's usually one intended to blow instead of suck, and the dust can be scooped out of condenser plates and from inaccessible corners in a matter of minutes.

There must be something in this mast business after all. By radiogram from W4AJH comes word that since putting up a pair of the two-by-two sticks described in September QST he gets out twice as well. More power to the sky-hooks!

1932 Government Callbooks NOT TO BE PUBLISHED

The Government Printing Office at Washington has advised us that owing to recent legislation curtailing Government expenditures the publications "Commercial and Government Radio Stations of the United States" and "Amateur Radio Stations of the United States" will not be published. Should publication be resumed notification will be given in QST.

Don't use acid to clean copper tubing coils, since acids attack the copper. A better cleaning solution can be made by dissolving a half pound of sodium cyanide ( obtainable from druggists or chemical supply houses) in a half gallon of water. The coils can be left in this solution any length of time with no danger to the copper, since the solution removes only the oxide. This is the method used by platers to clean copper. Caution — This solution is deadly poison if taken internally, so don't leave it standing around and don't fail to wash your hands thoroughly after using it. — W9FKC
Learning the Code

How to get Full Benefit from the A.R.R.L. Code-Practice Program—Complete
Schedules of Code-Practice Schedules

By E. L. Battey, Assistant Communications Manager

O NE of the primary requirements in obtaining an Amateur Radio Operator's License is a knowledge of the Continental Code. A speed of at least ten words per minute (five characters to the word) in both receiving and sending must be attained before an Amateur license can be secured.

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

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

Attention is called to the schedule for the transmission of Official and Special A.R.R.L. Broadcasts from the League's Headquarters Station, W1MK. These messages are sent by a tape transmitter at a speed of approximately 13 words per minute and afford excellent code practice for more advanced operators. The schedules for these transmissions follow:

**W1MK TRANSMITTING SCHEDULE—OFFICIAL AND SPECIAL BROADCASTS**

<table>
<thead>
<tr>
<th>Day</th>
<th>Time</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sunday</td>
<td>8:30 p.m.</td>
<td>3875 &amp; 7150 kc.</td>
</tr>
<tr>
<td></td>
<td>Midnight</td>
<td>3875 &amp; 7150 kc.</td>
</tr>
<tr>
<td>Monday</td>
<td>8:30 p.m.</td>
<td>3875 &amp; 7004 kc.</td>
</tr>
<tr>
<td></td>
<td>10:30 p.m.</td>
<td>1860 &amp; 7160 kc.</td>
</tr>
</tbody>
</table>

A complete discussion on learning the code is given in the Radio Amateur's Handbook. It would be well to read the suggestions given therein before tackling the code. Too many beginning amateurs become discouraged at their progress in conquering the code. To them (and to all other newcomers) we say, "Have patience!" Don't expect to learn it all in one day. Take things easily. Be optimistic! You will be surprised at your progress. If possible, get some one to practice with you, preferably some one who is also just starting in the game. Master the art of "receiving" before you try to "send" at top speed. Many beginners put too much stress on their "sending ability" and not enough on their "copying ability." A good operator can copy as fast as he can send. Do as much listening to actual signals on the air as possible. Try to copy as many letters as you can. Write down every letter or numeral you recognize. Keep it at regular. Soon you will find yourself getting whole words, and later whole sentences. Then you will find your speed increasing. Learning by actual listening on the air is in many ways preferable to learning by the use of a buzzer as it accustoms you to copying through interference, static, fading, and so on.

A well balanced program for the individual starting to learn the code might be to divide time between (1) one or more of the stations sending code practice on the 1715-kc band, (2) periods of listening to general amateur work on any of the bands, and (3) periods of practice with a buzzer and key, preferably with another beginner. Several other methods of learning the code are given in the "Getting Started" chapter of the Radio Amateur's Handbook.

Schedules of additional code practice stations will appear in future issues of QST as they volunteer their services. Any amateur operating a transmitter on the 1715-kc amateur band who is willing to devote some of his time to the A.R.R.L. program of code practice transmissions, is invited to write the League's Communication Department, West Hartford, Connecticut, for details as to how he may help in this work.
<table>
<thead>
<tr>
<th>Station</th>
<th>Location</th>
<th>Frequency</th>
<th>Days</th>
<th>Hours (Local Time)</th>
</tr>
</thead>
<tbody>
<tr>
<td>W1ASZ</td>
<td>Pawtucket, Rhode Island</td>
<td>1925 kc</td>
<td>Sundays, Mondays, Thursdays</td>
<td>7:45-8:45 p.m.</td>
</tr>
<tr>
<td>W1BGT</td>
<td>Wilson, Connecticut</td>
<td>1877 kc</td>
<td>Mondays, Tuesdays, Thursdays, Fridays</td>
<td>7:00-7:15 p.m.</td>
</tr>
<tr>
<td>W1BTL</td>
<td>Plymouth, Massachusetts</td>
<td>1943 kc</td>
<td>Tuesdays</td>
<td>8:00 p.m.</td>
</tr>
<tr>
<td>W1DEA</td>
<td>Middleboro, Massachusetts</td>
<td>1750 kc</td>
<td>Tuesdays, Thursdays</td>
<td>9:00 p.m.</td>
</tr>
<tr>
<td>W1GND</td>
<td>South Boston, Mass.</td>
<td>1795 kc</td>
<td>Wednesdays and Fridays</td>
<td>8:30-9:30 p.m.</td>
</tr>
<tr>
<td>W1GV</td>
<td>Cranston, Rhode Island</td>
<td>1750 kc</td>
<td>Sundays, Tuesdays, Thursdays</td>
<td>1:00 p.m.</td>
</tr>
<tr>
<td>W3BLH</td>
<td>Baltimore, Md.</td>
<td>1980 kc</td>
<td>Sundays</td>
<td>11:00 a.m.-Noon</td>
</tr>
<tr>
<td>W3BR</td>
<td>Baltimore, Md.</td>
<td>1765 kc</td>
<td>Saturdays</td>
<td>4:30-5:30 p.m.</td>
</tr>
<tr>
<td>W3CEI</td>
<td>Philadelphia, Pennsylvania</td>
<td>1876 kc</td>
<td>Tuesdays, Thursdays</td>
<td>7:30-8:30 p.m.</td>
</tr>
<tr>
<td>W3CNS</td>
<td>Dover, New Jersey</td>
<td>1970 kc</td>
<td>Wednesdays</td>
<td>8:00 p.m.</td>
</tr>
<tr>
<td>W5ALF</td>
<td>Pawnee, Okla.</td>
<td>1760 kc</td>
<td>Thursdays</td>
<td>5:00-6:00 p.m.</td>
</tr>
<tr>
<td>W6CQK</td>
<td>Los Angeles, California</td>
<td>1925 kc</td>
<td>Tuesdays, Thursdays, Saturdays</td>
<td>7:30 p.m.</td>
</tr>
<tr>
<td>W6CTT</td>
<td>Los Angeles, California</td>
<td>1885 kc</td>
<td>Thursdays</td>
<td>7:30-8:30 p.m.</td>
</tr>
<tr>
<td>W7CEH</td>
<td>Idaho Falls, Idaho</td>
<td>1800 kc</td>
<td>Mon., Wed., Fri.</td>
<td>7:00-7:30 p.m.</td>
</tr>
<tr>
<td>W8ARF</td>
<td>Toledo, Ohio</td>
<td>1960 kc</td>
<td>Wednesdays</td>
<td>9:30-10:00 p.m.</td>
</tr>
<tr>
<td>W8BNF</td>
<td>Canaan, New York</td>
<td>1980 kc</td>
<td>Mondays, Fridays</td>
<td>8:30-9:30 p.m.</td>
</tr>
<tr>
<td>W8BYD</td>
<td>Cleveland, Ohio</td>
<td>1945 kc</td>
<td>Sundays, Mondays, Tuesdays</td>
<td>9:00-10:00 a.m.</td>
</tr>
<tr>
<td>W8CMF</td>
<td>Sunbury, Pennsylvania</td>
<td>1840 kc</td>
<td>Tuesdays, Thursdays, Tuesdays, Thursdays</td>
<td>7:00-10:30 p.m.</td>
</tr>
<tr>
<td>W8CUW</td>
<td>Avon Lake, Ohio</td>
<td>1800 kc</td>
<td>Sundays, Mondays</td>
<td>9:45-10:00 a.m.</td>
</tr>
<tr>
<td>W8CVF</td>
<td>Baldwin, Michigan</td>
<td>1950 kc</td>
<td>Sundays, Daily except Sundays, Daily except Saturday and Sunday</td>
<td>8:00-8:30 a.m., 10:00-10:30 p.m.</td>
</tr>
<tr>
<td>W8DDX</td>
<td>Toledo, Ohio</td>
<td>1811 kc</td>
<td>Mondays</td>
<td>3:00-3:30 p.m.</td>
</tr>
<tr>
<td>W8DPN</td>
<td>Toledo, Ohio</td>
<td>1825 kc</td>
<td>Tuesdays</td>
<td>4:45-5:15 p.m.</td>
</tr>
<tr>
<td>W8FO</td>
<td>Toledo, Ohio</td>
<td>1811 kc</td>
<td>Fridays</td>
<td>Midnight-1:00 a.m. (Sat.)</td>
</tr>
<tr>
<td>W8FRC</td>
<td>Johnstown, Pennsylvania</td>
<td>1915 kc</td>
<td>Sundays, Mondays, Sundays, Wednesdays, Fridays</td>
<td>3:00 p.m., 7:30 p.m., 7:30 p.m.</td>
</tr>
<tr>
<td>W8GDC</td>
<td>Worthington, Ohio</td>
<td>1950 kc</td>
<td>Sundays, Mondays</td>
<td>3:00-4:00 p.m., 8:00-9:00 p.m.</td>
</tr>
<tr>
<td>W9AFP</td>
<td>Tabor, South Dakota</td>
<td>1750 kc</td>
<td>Sundays, Mondays, Tuesdays</td>
<td>9:00-10:00 a.m., 9:00-9:30 p.m.</td>
</tr>
<tr>
<td>W9BB</td>
<td>Crete, Nebraska</td>
<td>1950 kc</td>
<td>Tuesdays, Thursdays, Saturdays</td>
<td>7:00 p.m., 4:30 p.m.</td>
</tr>
<tr>
<td>W9CCG</td>
<td>Kansas City, Missouri</td>
<td>1750 kc</td>
<td>Sundays, Mondays, Wednesdays, Saturdays</td>
<td>10:00-11:00 p.m.</td>
</tr>
<tr>
<td>W9GFS</td>
<td>Evansville, Indiana</td>
<td>1950 kc</td>
<td>Mondays, Thursdays</td>
<td>8:30 p.m.</td>
</tr>
<tr>
<td>W9IK</td>
<td>Cogswell, North Dakota</td>
<td>1880 kc</td>
<td>Tuesdays, Thursdays, Saturdays, (beginners), Thursdays, Saturdays, (advanced)</td>
<td>7:30-8:15 p.m., 9:40-10:00 p.m.</td>
</tr>
</tbody>
</table>
EVERY once in a while we note comments on standard frequency report cards that indicate something wrong either with the s.f. signals or with the method used to transfer the calibration to the meter at the receiving station. "Zero beat too wide" and "signal very unsteady" are typical comments. Since other reports on the identical transmissions often completely contradict comments like those quoted, it is reasonable to suspect that the fault is very likely to be traceable to the procedure used at the receiving station.

The practice of keeping the receiver oscillating while beating the freqmeter signal against that of the s.f. station is probably most likely to be the seat of trouble. When this is done, the unstable oscillating detector of the receiver gets into the picture too and gives the impression that the s.f. station is wandering about in frequency. Now we know that oscillating detectors are poor examples of stability. The way to eliminate this uncertainty is, of course, to have the detector non-oscillating while the precise ealibration is being made. Back off the regeneration control and use the frequency meter as a separate heterodyne.

Here is the recommended routine procedure:

1. Tune in the s.f. signal as usual, with the detector oscillating to give the beat note.
2. Adjust the frequency meter approximately to zero beat.
3. Back off the regeneration control until the detector stops oscillating.
4. Tune the frequency meter to zero beat with the s.f. signal, using it as a separate heterodyne oscillator. Retune receiver, if necessary, to compensate for detuning that may be caused by regeneration control adjustment.

Using the freqmeter as a separate heterodyne, with the detector below oscillation, also makes it easier to pick out the s.f. signal because both QRM and QRN are considerably reduced with the detector non-oscillating.

Try this method on the following s.f. transmissions.

<table>
<thead>
<tr>
<th>Date</th>
<th>Schedule</th>
<th>Station</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dec. 2, Friday</td>
<td>BB</td>
<td>W1XP</td>
</tr>
<tr>
<td>Dec. 3, Saturday</td>
<td>BX</td>
<td>W6XK</td>
</tr>
<tr>
<td>Dec. 4, Sunday</td>
<td>C</td>
<td>W6XK</td>
</tr>
<tr>
<td>Dec. 5, Friday</td>
<td>A</td>
<td>W9XAN</td>
</tr>
<tr>
<td>Dec. 11, Sunday</td>
<td>C</td>
<td>W1XP</td>
</tr>
<tr>
<td>Dec. 14, Wednesday</td>
<td>A</td>
<td>W1XP</td>
</tr>
<tr>
<td>Dec. 16, Friday</td>
<td>B</td>
<td>W9XAN</td>
</tr>
<tr>
<td>Dec. 21, Wednesday</td>
<td>BB</td>
<td>W1XP</td>
</tr>
<tr>
<td>Dec. 23, Friday</td>
<td>B</td>
<td>W9XAN</td>
</tr>
</tbody>
</table>

STANDARD FREQUENCY SCHEDULES

<table>
<thead>
<tr>
<th>Time (p.m.)</th>
<th>Schedule and Time Freq. (kc.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00</td>
<td>3500 7000</td>
</tr>
<tr>
<td>8:08</td>
<td>3600 7100</td>
</tr>
<tr>
<td>8:16</td>
<td>3700 7200</td>
</tr>
<tr>
<td>8:24</td>
<td>3800 7300</td>
</tr>
<tr>
<td>8:32</td>
<td>3900 4:02</td>
</tr>
</tbody>
</table>

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

TRANSMITTING PROCEDURE

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

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

ACCURACY

Although the accuracy of the transmissions is not guaranteed, those of W1XP are usually dependable to 0.001 per cent and those of W9XAN and W6XK to 0.01 per cent.

THE TRANSMITTING STATIONS

W1XP: Massachusetts Institute of Technology, Round Hill Research, South Dartmouth, Mass., Howard A. Chinn in charge.

(Continued on page 80)
More About the Direct-Coupled R. F. Amplifier
By H. A. Erickson, W9EVI*

THE publication of the information on the direct-coupled r.f. amplifier in the August, 1932, issue of QST, brought a flood of correspondence asking about the possibility of using crystal control, separate power supplies for different stages, 14-mc. operation, and a large number of other questions as to wire sizes, condenser values, etc. I have, therefore, worked out a new layout utilizing crystal control and direct coupling between all stages, with series feed to all plates and grids and using resistors to control the same way that cathode resistors are used to obtain bias in receiving sets. If the excitation should be cut off from one stage its plate current will not jump up as it does with simple grid leak bias, because an increase in plate current causes an increase in bias so that the system becomes self-balancing without damage to the tube if the right values of resistance are used. If $R_2$ and $R_3$ are variable, the grid bias can be adjusted individually for each stage to obtain maximum efficiency.

It is evident from the diagram that the plate voltages from one stage to the next add up. The total voltage from the oscillator minus $B$ to the plus 1000 volts on the final amplifier is 1000 volts. The filament transformers should be well insulated, and all of the blocking condensers should be of the 5000-volt transmitting type for protection against puncture by the plate voltage. If good quality parts are used throughout there should be no trouble in operating the rig, since it is adjusted in just the same way as the usual multi-stage transmitter.

Each stage should have its own plate supply, although two will be sufficient if both have approximately 1000-volt output. In this case one would be used for the amplifier and the other for the intermediate stage and oscillator, the proper voltages for the latter stages being obtained from a voltage divider. The 300-volt tap on the divider becomes the plus 300 volts for the oscillator and the minus 600 for the buffer.

For 14-mc. operation the 203-A can be used as a doubler by putting a suitable coil in the tank circuit. Alternatively, however, another 210 doubler stage can be added to the rig, in which case it will be necessary to add another power supply to take care of the extra tube. Fig. 2 shows schematically how this can be done with 210's. The same circuit diagram will apply if a 203-A is used in the output stage, although the voltages on the tubes should be adjusted to suit the changed conditions. While operating on 14-mc. the plate voltage recommended should not be exceeded.

*724 E. Bank St., Ishpeming, Mich.
Coupling an Untuned Line to a Zepp

After reading the article on transmission lines in the October QST the writer decided to place

get the load to divide evenly between the two halves of the rectifier. Generally one of the plates will take all the load and the other will not “start.” This is almost certain to happen if the positive lead is taken off one side of the rectifier filament transformer.

This can be corrected in a number of ways. A center-tap on the filament transformer often will do it, but the tap must be in the electrical center. Various experimenters have reported that center-tap resistances like those

one of the untuned variety in operation. The radiating system is a Zepp antenna designed for the 3500-kc. band, and since there was no diagram in the article which gave a means of feeding a Zepp with a random length transmission line, the method shown in Fig. 3 was tried.

Referring to the drawing, the line was coupled to the amplifier tank by a coil and condenser, L and C. This coil and condenser was constructed to tune to resonance with the amplifier tank frequency. At the receiving end of the transmission line a duplicate of L and C was placed. The Zepp was then coupled to the receiving end in the conventional way. The line was tuned exactly as described in the article.

The results were excellent. As much current could be obtained in the Zepp feeders as when it was originally coupled to the amplifier tank itself. The layout worked as soon as it was built and the writer got QSO the first station called. Incidentally the Zepp was disconnected and a local station worked. The report was that the signals were very weak, showing that the line was not radiating a great amount.

--- Roger W. Hodgkins, WIDUW

Operating Full-Wave Mercury Vapor Rectifiers with Plates in Parallel

In attempting to use both plates in parallel in 82 and 83 rectifiers, it is sometimes difficult to used in receiving sets will cause the load to be divided evenly between the two plates if connected across the filament transformer or if connected between the two plates. The positive high-voltage lead comes off the center-tap in the first case, and the a.c. is fed to the center-tap in the second.

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A Hissless Microphone

A good and inexpensive microphone of the type shown in Fig. 5 can be made quite easily by any amateur from parts which can nearly all be found in the junk box found in every ham station. This type of Mike is used by practically all Australian phone stations, and is notable for the lack of carbon hiss that is so annoying in the cheaper carbon-button microphones.

The construction should be evident from Fig. 4. A wooden block of the dimensions shown forms the “bedplate” of the instrument. Mounted on it is a piece of 3/8-inch bakelite measuring 4 1/2 by 3 1/2 inches, drilled at the corners to pass the wood screws which hold it in place. On top of this is a second bakelite piece made as shown at B. The cut-out portion of B is the chamber in which

---
the carbon is placed, and also contains the two electrodes, which are pieces of brass or copper of the size shown at A. The electrodes are drilled and countersunk to take machine screws, and are mounted on the back plate at the edges of the opening in B. The diaphragm, which is a piece of mica the same size as the back plate, goes on top of B. The diaphragm should be of the order of .002 of an inch thick. Finally there is a front plate, cut out in the same way as B, in which a piece of metal gauze is inserted to protect the diaphragm.

The secret of reducing the hiss is in gold-plating the electrodes, a job which any jeweller can handle. The carbon should be high grade, and should be about as fine as face powder. The microphone is used with a 22.5 volt B battery, and at this voltage the drain is about 6 milliamperes.

— M. M. O’Brien, VK4MM

Combined Oscillator and Doubler

Many amateurs who wish to use crystal control on the 7- and 14-mc. bands have difficulty in multiplying the 3.5-mc. crystal frequency for work in the higher bands, especially when the cost of the set must be kept down. In the course of experimenting with many types of doubling equipment I have arrived at the circuit arrangement of Fig. 6, which gives very good results with a minimum of parts.

Either a 46 or '47 can be used in this circuit. The oscillator tank is placed in the screen grid of the '47 or outer grid of the 46, and this much of the circuit performs just like any other crystal oscillator. The tank in the plate circuit is tuned to twice the crystal frequency, and is adjusted for the dip in plate current in just the same way as the ordinary amplifier or doubler. The values are not critical. At the voltages shown an output of about 5 watts is obtainable on 7 mc.

In actual operation the '47 is superior to the 46. With the '47 the plate current is 18 to 20 milliamperes, with an r.f. crystal current of 20 mls, while the 46 draws 35 to 40 milliamperes with a crystal current of about 60 mls. The output is the same in both cases. If the voltage applied to the screen grid is too great the grid will overheat, and when this happens the circuit will not start up again after the power has once been turned off.

Using this circuit and a second doubler of the ordinary type with a 46 tube, the output on 14 mc. is great enough to make a Type '10 draw 20 to 25 mls grid current. The results using the oscillator as a quadrupler have not been so good, since the output is only sufficient to excite a 46 tube to about 5 watts output.

For 3.5-mc. operation the tank in the screen-grid circuit is shorted out and a 3.5-mc. coil plugged in the plate circuit, changing the circuit to that of the regular pentode crystal oscillator.

— William P. Durkin, W2DHM

Reducing Clicks with High Power

The following is a brief description of a type of keying system which solves to a great extent the key-click problem of the ham using rather high power.

As a rule the low-power station has little or no trouble with key clicks, or if he has them he can eliminate them with simple key filters per the Handbook. Where a multi-stage outfit of higher power is used, however, those clicks are almost invariably serious.

The best thing that can be done is to key in a buffer stage of much lower power, but an important factor is caring for excess plate dissipation in the following amplifier, when the excitation is removed. Many hams are now using resistor bias and so when excitation is lifted, they have no bias on the tubes. By the method shown in Fig. 7, the
bias may be added just at the right time to pre­
vent damage to amplifier tubes which are running
Class “C” with resistor bias when the buffer is
keyed. A relay with two “make” contacts and
one “break” contact is used and may be bought
for less than a dollar from the New York mail
order houses. As the excitation is removed by
keying the buffer, just enough bias may be added
to the tube to prevent overheating.

This system is used with great success at both
W1BVP and W1ASY. Bias in one case is being
supplied by a rectifier and in the other by a
battery.

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FIG. 7 — CIRCUIT FOR INTRODUCING BIAS ON
AMPLIFIER STAGES FOLLOWING A
KEYED STAGE

ELECTION NOTICE

To All A.R.R.L. Members Residing in the
PACIFIC DIVISION:

1. You are hereby notified that Clair Foster
has resigned as A.R.R.L. Director from the Pacific
Division. You are also notified that a special elec­
tion for A.R.R.L. Director is about to be held in
the Pacific Division to fill the remainder of the
1932-1933 term left vacant by this resignation.
Your attention is invited to Section 1 of Article
IV of the constitution, providing for the govern­
ment of A.R.R.L. affairs by a Board of Directors;
Section 2 of Article IV defining their eligibility;
and By-Laws 10 to 19 providing for their nomina­
tion and election. Copy of the Constitution and
By-Laws will be mailed any member upon
request.

2. The election will take place during the
period between January 15 and March 1, 1933, on
ballots which will be mailed from Headquarters
in the first week of that period. The ballots will
list the names of all eligible candidates nominated
for the position by A.R.R.L. Pacific Division
members.

3. Nominating petitions are hereby solicited.
Ten or more A.R.R.L. members of the Pacific
Division have the right to nominate any member
of the League in that division as a candidate for
director therefrom. The following nominating
form is suggested:

(Place and date)

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

Gentlemen:
We, the undersigned members of the A.R.R.L
residing in the Pacific Division, hereby nominate

as a candidate for director from this division for the
remainder of the 1932-1933 term.

(signatures and addresses)

The signers must be League members in good
standing. The nominee must be a League member
in good standing and must be without commercial
radio connections. His complete name and address
should be given. All such petitions must be filed
at the headquarters office of the League in West
Hartford, Conn., by noon of January 15, 1933.

There is no limit on the number of petitions that
may be filed, but no member shall append his
signature to more than one such petition.

4. This election is the constitutional oppor­
tunity for members to put the man of their
choice in office as the representative of their
division. They are urged to take the initiative
and file nominating petitions immediately.

For the Executive Committee:
A. L. Budlong, Acting Secretary.
West Hartford, Conn., November 12, 1932.

Strays

Don’t buy a crystal with the idea that it will
obviate the construction of a frequency meter.
Calibrations on crystals aren’t always the most
accurate in the world, especially since crystals
have become so cheap, and mistakes can creep in.
A ham we know bought a crystal marked 5585
to double into the 7-mc. band—and the fre­
fquency turned out to be 5585 with embarrassing
results! Then, too, crystals often have two fre­
fquencies, and the second may turn out to be off
the reservation. Build that frequency meter
and play safe.

I’d like to put
To Eternal Rest
The guys who CQ
When making a test!

---

VE4FJ

W3LA has worked 115 ORS and heard 98,
handling at least one message with each ORS
worked. Can anybody beat this?

---

W6ANH answers to the name of D. C. Crystal.
Swell moniker for a ham!

---

December, 1932

41
**Amateur Radio STATIONS**

**W1DTJ, Hartford, Conn.**

W1DTJ is an excellent example of combining business with pleasure— the station is located in a room in an office building on the floor above that on which its owner, David L. Goldberg, conducts his law office. A telephone extension connects the radio room with the office so that any incoming business calls can be switched up to the operator whenever he may be caught playing "hookey" at the radio set! Incidentally, the station room is not a bad place to spend idle hours, as the photograph shows.

The transmitter, built with the cooperation of W1AVK, is a 'phone-c.w. outfit with four 852's in the output stage. The line-up, briefly, is as follows: 210 crystal oscillator (160 meters) with 200 volts on the plate, 210 doubler with 500 volts, 210 buffer with 500 volts, 203-A modulated amplifier with 975 volts, and a linear amplifier with four 852's in push-pull parallel at 2200 volts. The input to the last stage on 'phone usually is about 600 watts. A full kilowatt input can be used on c.w.

The speech equipment consists of a double-button Gavitt microphone, two stages of speech amplification using 227's, a third stage with a 245, and an 845 modulator. The last tube works at 1250 volts.

Three power supplies are used. One has a 2500-volt transformer with 866 rectifiers; the second a 1500-volt transformer also used with 866's, and the third a 750-volt transformer with 281's. Swinging chokes are used in all three for the sake of good regulation. Bias is supplied by batteries throughout. The filaments of all tubes are kept on during QSO's, and the high-voltage is applied through remote-control relays.

The power supplies, r.f. stages and the modulator tube are all built into the frame which occupies a corner of the room. Another photograph shows more of the details of the transmitter. The aluminum cabinet on the second shelf contains the oscillator and two buffer stages. A combined crystal holder and oven plugs into a plate on top of this cabinet.

The cabinet at the left on the operating table contains the speech amplifier, together with the necessary controls. A galvanometer pickup and a frequency meter are also mounted in the same cabinet. The similar cabinet on the right contains the receiver, which consists of a Philco 9-tube broadcast chassis with automatic volume control, used in conjunction with a National NC5 converter. For c.w. reception a 227 oscillator is coupled to the b.c. receiver to beat with the intermediate frequency. The automatic volume control is switched off when c.w. signals are being copied.
The microphone, keys, and a small horn speaker for listening to c.w. signals occupy the space on the table between these two units.

Although W1DTJ has been on the 75-meter 'phone band for only six months, all U.S. districts have been worked on 'phone as well as the Canadian 1st, 2nd, and 3rd districts and X5N. The station also has been reported several times in New Zealand and Ireland, and once in Czechoslovakia, in spite of the fact the station is located in the Hartford business district and surrounded by steel buildings.

W1ASP, New Haven, Conn.

This station is owned by Sidney Z. Bear, 262 Canner St., New Haven, Conn. First put on the air with a flea-power outfit in 1927, the station as it now stands has crystal control with a 211 in the output stage, an a.c. receiver, and all the fixings of the modern ham station.

One photograph shows the operating table, on which are the receiver, monitor and dynatron frequency meter. A 5-meter receiver occupies the small table at the right. The receiver is similar to the one described in December, 1930, QST, and uses a '24 detector and 56 amplifier. A homemade power supply using a Raytheon tube furnishes the "B" power.

The monitor uses a 230 tube, with coils available for all bands, including 28 mc. To the right of the monitor is a dynatron frequency meter which uses a '24 tube and is checked regularly against Standard Frequency Transmissions. The 56-mc. receiver has a pair of Type '30 tubes in the popular super-regenerative circuit. The companion transmitter is not visible in the photograph, but is a low-power set using two 112-A tubes.

The main transmitter, shown in another photograph, is similar to that described in November, 1931, QST, but with the substitution of a pentode as the crystal oscillator tube. The buffer doubler is a 210 and the final amplifier a 211. The input to the latter is ordinarily about 100 watts.

Underneath the wooden frame on which the r.f. part of the transmitter rests is the power supply equipment. Two power supplies are used, one with 866's for the 211, and the other, using 281's, taking care of the oscillator and buffer. Filament controls, switches, etc., are mounted on the lower panel. A "B" eliminator supplies bias for the transmitter.

W1ASP's radiating system for 3500-ke. is a center-fed Hertz, or "antenna-counterpoise," one wire being 68 feet long and the other 66 feet. On 7 and 14 mc. only the 68-foot wire is used, the antenna then being end-fed.

Since 1927 about 4000 contacts have been made, including 15 countries in five continents. W1ASP is an ORS, and is also a member of the Naval Communications Reserve.

W2PF, Brooklyn, N. Y.

Dave Talley needs no introduction to old timers in this ham game, especially in the New York area. After getting on the air back in 1915 with a 1-inch spark coil, the call 2PF was secured in 1919 when the reopening came along, and the station went through the usual phases of the time — spark powers up to 1 kw. with a synchronous gap, followed by a.c.c.w., and then, in 1925, crystal control, 2PF being one of the first stations in the vicinity of New York to put in crystal. About this time all continents were worked on 40 and 20 meters.

The present W2PF is used chiefly for Army-Amateur work on Monday nights. The transmitter, a photograph of which is shown here, is the result of seven years of experimenting with crystal control. It is built on an angle-iron frame, the power supply equipment being at the bottom.

(Continued on page 76)
THE formation of specialized amateur bodies, normally organized through the national amateur societies in cooperation with their respective governments, brings forcibly to mind the worthwhile advance in the public regard enjoyed by amateur radio in those countries where such organizations are inaugurated. Last month we told of the new British Royal Naval Wireless Auxiliary Reserve. At present, we have at hand some highly interesting particulars of the also newly formed New Zealand Radio Emergency Corps.

The corps was founded by the N.Z.A.R.T. in early 1932, and received official sanction and special concessions in June of this year. The stated purpose of the corps is that of providing a readily organized means of communication to and from the scene of any tragedy or national calamity.

The inauguration of an emergency station at Napier at the time of the 1931 earthquake disaster demonstrated the effectiveness of such a system to the authorities as well as the general public, and the necessity for a thoroughly organized emergency network in New Zealand.

The suggestion that a corps should be formed was first put forward by N. W. Laugeson, ZL3AS, vice-president of the N.Z.A.R.T. The proposal was taken up by the headquarters in February, and at the present time the scheme has spread thoroughly to all parts of New Zealand.

The Post and Telegraph Department has granted a special band from 2850 to 3000 kc. for the operation of Emergency Corps stations under the classification of private commercial stations auxiliary to the general communications system. Special call signs are also being allotted. The corps is now capable of establishing communication between any parts of the Dominion without delay.

Sections have been formed throughout the Dominion, we are told by J. C. Elliott, ZL3CG, leader of the Christchurch section. Each section comprises at least twelve members, including the following officers: Section Leader, Deputy Section Leader, Equipment Supervisor, Assistant Equipment Supervisor, Secretary-Treasurer, and Operators. Operators must be capable of operating at a speed of not less than 20 words per minute.

The organization is under the command of Commanding Officer W. G. Ashbridge, ZL2GP, of Wellington. Captain Aashbridge, who is communications supervisor of the N.Z.A.R.T., is

Conducted by Clinton B. DeSoto

December, 1932
also senior wireless officer in the N.Z. Signal Corps.

Each section will provide mobile transmitting and receiving stations, with trained operators, ready to function at a moment's notice. The apparatus in each section consists of two complete portable stations, one called the outpost station and the other a zone station. The outpost station is a light portable set, capable of being transported by one man. The zone station is a transportable outfit of higher power. In the event of emergency the outpost station will be taken as near as possible to the scene of emergency. The zone station will act as intermediary between the outpost and base stations.

The organization of the corps is well under way, from the progress reports appearing monthly in the N.Z.A.R.T.'s official organ, "Break-In." Sections are obtaining the cooperation of all utilities and public bodies. Field days to test the apparatus have been held, and have proved most successful. Members are all enthusiastic, and should an emergency occur, they will undoubtedly give an excellent account of themselves.

And a great deal of good has been done amateur radio in New Zealand. After all, public service is one of amateur radio's most glorious opportunities, and emergency work is about the finest piece of public work that we can do.

A new prefix, FF, makes its way onto the amateur horizon. Two stations are reported to be using this prefix, FF8BG and FF8GD. Their location is in the city of Djelfa, in the Sahara Desert, 250 miles south of the city of Algiers. According to Walter V. Turner, WSAYU, who has been QSO with him four times recently, FF8BG is the same as old FM8BG.

The R.S.G.B.'s schedule of tests for the 1932-33 season has just been made public, and we find listed therein a number of events in which amateurs in all parts of the world will want to participate. The organized tests have been arranged for the following periods:

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Dates</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.7 mc.</td>
<td>Nov. 5 &amp; 6</td>
</tr>
<tr>
<td>3.5 mc.</td>
<td>Apr. 1 &amp; 2</td>
</tr>
<tr>
<td>28 mc.</td>
<td>Dec. 3 &amp; 4</td>
</tr>
<tr>
<td>QRP</td>
<td>Jan. 14 to 22</td>
</tr>
<tr>
<td>B.E.R.U.</td>
<td>Four week-ends in February</td>
</tr>
</tbody>
</table>

All week-end contests extend from 0001 G.C.T. on Saturdays to 2400 G.C.T. on Sundays.

The D.A.S.D.'s annual convention held in Berlin on Aug. 27-28th was a gratifying success to its sponsors, for in spite of the trying times more than 100 hams from all over Germany gathered in the capital, although (as previously reported) it was decided to run this convention along rather simple lines owing to the difficult economic conditions.

At the Hamfest on Saturday, Aug. 27th, Werner Nestel, D4LV, of the Central Laboratory of the Reichsrundfunkgesellschaft (German Broadcasting Co.) reported on his impressions of the amateur radio situation in the U. S. A. Max Drechsler, D4ABI, produced an amateur movie, while Erhard Graff, D4ADC, seconded him by reproducing self-made gramophone records of some outstanding amateur traffic.

The business meeting was held on Sunday, Aug. 28th, when the old Council was completely re-elected. Dr. Curt Lamm, D4AFA, was forced to resign from the post of Foreign Secretary of the D.A.S.D. on account of increased work, but upon the insistence of the president and his colleagues our good friend will remain a member of the board. At his suggestion, Julius Kron, D4SAR, and Rudolph Romeike, D4ZUA, were unanimously elected Foreign Secretaries, and will "endeavour to maintain and to foster the cordial..."
relations existing with Germany’s foreign friends and sister societies.” All other officers of the D.A.S.D. will again resume their duties for the coming year.

Amateur radio in Brazil is at ebb tide these days, revolutions and the stringent economic situation having conspired to cause governmental cancellation of all amateur licenses. J. Jonotskoff, ex-PYLAA, who has temporarily abandoned the ham game for this reason, writes that there is no immediate hope for return of the old favorable conditions.

The long-standing interest in inter-Antipodes communication on 3.5 mc. still remains. The latest achievement in this connection to our knowledge was the W6ATV-VK3RJ contact, a most satisfactory one according to reports. VK3RJ was using 24 watts input to his '10 PA, with a half-wave 40-meter Hertz antenna.

VK stations were recently reported heard in the U. S. 8th district on 3500, but no QSO's outside of W6 have been reported on the low frequency band.

Conditions on this band are reported pretty terrible in Europe. QRM from 'phone stations is so bad that ragershwers have mostly moved to the higher frequencies, writes C. A. Gehrels, PA0QG, European RCC organizer. W signals have been coming through rather good, often very strong, in most parts of the continent. The band was crowded with them from 0300 to 0500 G.C.T. during August and September, but QSO's were impossible owing to the terrific QRM. There is one exception to this: PA0ASD's regular sked with VOSZ.

A particular request for a month-long December test on this band. All American 3.5 mc. stations should make strenuous efforts to contact Europe during this month. The best time is from 0600 to 0700 G.C.T. daily; this is one hour before European sunrise, when W signals are strongest.

Conditions on the other bands seem to have been uniformly good during recent months, although, as is to be expected, freakiness increased with frequency. Daylight DX QSO's on 7 mc. have been of major interest, and should appeal to many U. S. DX stations. VK5BY has been known to work W1AAO and W1SZ at 4 p.m. E.S.T., the signals going the long way 'round. The big difficulty with this sort of thing is, of course, the terrific interference at this time of day.

European stations have been coming in very well in New England on 7 mc. from early in the afternoon until late in the evening. Transatlantic QSO's have daily been possible, with good signal strength; during W1SZ's regular sked with EAR96 and EAR224, for example, signals are normally R6-7 and occasionally R9. XU1U was recently worked from the Netherlands on this band; the Antipodes occasionally, as well, the most successful station being PA0GO.

As a result of negotiations with the officials of the Danish Postal and Telegraph Service, the E.D.R. announces a relaxation in the absolute ban on amateur transmission during the broadcast hours. A special permit to transmit at all hours will be issued any amateur with the proviso that it will be immediately forfeited if interference is caused.

A special beginner's license requiring a code speed of 8 words per minute instead of the usual 12 will also be issued; the recipient will only be permitted to use the frequency band 3550–3600 kc. This license can at any time be changed to the regular license when proof of ability to send and receive at 12 wpm is adduced.

Both changes were suggested by the E.D.R. to be useful in eliminating unlicensed amateurs in Denmark, we are told by James Steffensen, president, and it is hoped results will soon begin to appear.

Brief items of gossip from the month's mail: VK3RJ is a commercial landline operator, and on several occasions when the submarine cables connecting VK3 and VK7 have failed, his station and services have been placed at the disposal of the Postmaster General, who controls all communications systems in Australia.... On each occasion hundreds of public messages have been handled with ease..... On other occasions the station has been utilized as a breaking circuit for the Postal Department's emergency station VK3LR (5KC)..... Great progress has been made by the recently formed British Royal Naval Wireless Auxiliary Reserve, with the London District now practically established..... The organization of Reserve centers in Bristol, Birmingham and Glasgow will follow almost immediately..... Another seasoned ham joined in double harness. This time it was VK5BY, (Continued on page 78)
Traffic Briefs

In early September W6BIP worked ZS5U "both ways," at 8 p.m. and again at 7 a.m. P.S.T. With just a single '10 running perfectly cool BIP has a record of about 60 QSOs with ZS... dozens of 'em with ZS5U, ZS2A, ZS2F and ZTSW. W6FFP (who gave us the "low down" on this work) has a regular "hit" with ZL1AA which has netted well over 100 QSOs with ZL to date.

W8EIK handled an emergency neatly—maintaining communication with a fleet of 10 bombers and 6 scout planes (marooned at Bluefield, W. Va., by bad weather) with their base at Langley Field over the period Oct. 15th-19th. FB, Larry!

Congratulations and best wishes to W5AUW, SOM of New Mexico, on his marriage, which took place October 10th at Los Lunas.

On June 27th W8ECF heard ZL2BE on 3650 kc. at 5:20 a.m. E.S.T. QSA3 R4.

A 3500-kc. QSO with PA6ASD is reported by VO8Z for August 6th. VO8Z was using a single '10 and received a QSA6 R5-7. A schedule was arranged for August 13 to see if the QSO could be repeated. Sure enough, at the appointed time they again clicked and had another fine QSO.

"Variety is the spice of life"—in ham radio as in anything else—W2BKJ complains that the majority of QSOs start out, "Ur sigs QSA-R- hr in Podunk Hollow." He says why not vary this procedure now and then with, "Greeting from Podunk Hollow eh your sigs are QSA-R-," or some other procedure of your own. No harm in adding a little "spice" to the game, OMs.

W9FKI suggests that we sign our "state" after our call, thus, "W9FKI Indiana," or "W9FKI Ind." This might help in routing traffic, and in adding states never before worked. It would surely save time spent in looking up locations in the call book.

On March 16th W8SG on 1 mc. contacted 8 VKs and ZLs in succession, without missing any called!

On the occasion of "Founder's Day, Young Men's Christian Association," October 11, 1932, a message from President Herbert Hoover to "All Young Men" was transmitted from the A.R.R.L. Official Broadcasting Stations (some 175 in all). Many stations other than O.B.S. copied the message and retransmitted; W6EML did outstanding work in Canada. The message was copied in all parts of the United States and Canada, and in many other countries throughout the world. A cup, offered to "the man who did most in forwarding the Presidential Founder's Day message to the youth of the world," was awarded to Mr. Edwin C. Wilbur of New York.

W2BSR reports that "CAB" of VE5FX, Chesterfield Inlet, Northwest Territory, Canada, is returning next summer after three years in the Arctic. When he returns he will QSL to all operators worked with a "photo" of himself, the post, the station, groups of Eskimos or views of the northwceat country; operators worked are to specify the kind of "photo" they would like.

Official Observer W8CTO has a new 100-kc. bus... W8BON wants to know if it has a foot rest.

A NEW EMBLEM

A new, special color, A.R.R.L. personal emblem is now available for League Route Managers. Just as an emblem with Blue background signifies "ORS," and an emblem with Red background signifies "SCM," appointment as Route Manager now provides the privilege of wearing one of the attractive new "Green-background emblems." Each holder of ORS, SCM, or RM appointments should wear the particular color emblem that exemplifies his office.

The following contribution by Mr. R. N. Eubank, W3AAJ-WS, wins the C.D. article contest prize for this month.

Your articles on any phase of amateur communication activity are solicited. Each month the prize winner has his choice of three selections of prizes. See page 55, September, 1932, QST, for more complete details of the article contest. Send yours today. -- F. E. H.

Crystal Versus Self-Excited

By R. N. Eubank, W3AAJ-WS

IN this article the writer compares the merits of a crystal controlled transmitter using a type '47 pentode with those of a self-excited rig using the well-known TNT circuit. The superiority of the crystal outfit will speak for itself.

Let us first consider the construction costs since this is a primary consideration these days. The prices used in determining the total cost of each transmitter were taken from the same catalog; the same type power supply was used for both. The total costs of parts for each transmitter are very near equal, with the pentode crystal outfit costing slightly less. Now, more about the power supply. While the same type power supply was assumed in making a cost comparison, actually much heavier construction and equipment should be used in the power supply for the

* A.R.R.L. Section Communications Manager Virginia, 2817 Montrose Ave., Richmond, Va.
self-excited rig, if fair frequency stability and note are to be obtained. With the crystal outfit, the crystal will offset a lot of ills which may be present in the power supply. From an operating standpoint "frequency stability" and "character of note" are perhaps the basic things to consider in choosing a transmitter. With the crystal controlled transmitter you have practically "guaranteed freedom from thumps to be eliminated. No need to say how difficult it sometimes is to eliminate key thumps with a self-excited circuit!

With the advent of the Single Signal Receiver we are able to chalk up another advantage for crystal control. Crystal controlled signals are received best on the single signal receiver since c.c. signals have but one frequency and a much higher order of frequency stability than any self-excited circuit! Properly built crystal controlled transmitters stay put, regardless of people walking near the transmitter, swinging antennas, and the like.

Power output consideration of the 47 pentode outfit is interesting. Using the 47 pentode with 400 or 500 volts on the plate with 40 to 55 miliamps current, feeding directly into the antenna, being keyed in the center tap, the measured output in the antenna is from eight to eleven watts. As a fairly good crystal will stand up to 100 mils (3500-kc.) there is a large factor of safety. Other types of commonly used oscillator tubes will draw from two to three times as much current through the crystal, with much less efficiency in output. This limits the output from other type tubes if the crystal is to be kept in one piece. The use of circuits with pentode-crystal has great merit. Its use is bound to increase by leaps and bounds. Give the crystal a try against your high power outfit!

O. B. S.

The following is a supplement to the list of A.R.R.L. Official Broadcasting Stations in November QST (page 51):

- W1HIO, W1CRP
- W3ADO, W3ATJ, W3ZA, W2ZX
- W4UWH-W5NO
- W5ABO, W5CGJ
- W6BME, W6GEG, W6UV
- W6WME, W6SEQ, W6UV
- W6PCO, W6QY, W6UCT, W6CEF, W6LWF
- W6CHA, W6FTA, W6YB
- CM2MW
- V5HGC

**Relative Traffic Standings**

(SEPTEMBER-OCTOBER)

<table>
<thead>
<tr>
<th>Messages Per Station (25%)</th>
<th>Stations Reporting Traffic (25%)</th>
<th>Gain or Loss (Traffic Reports) (25%)</th>
<th>Traffic Total (45%)</th>
<th>Standing Based on Average of Four Ratings %</th>
<th>Leading Section in Division</th>
</tr>
</thead>
</table>

**THE TEN HIGHEST SECTIONS**

S. G. M.

**Michigan** breaks through the Los Angeles line this month and captures the Banner! Michigan is a real competitor now—watch your laurel! Los Angeles for the thirteenth consecutive month holds the No. 1 position. The gain of 125 stations handling traffic over the previous month, and a trifile total of over 100,000—these are active days in traffic work . . . get in on some of this fun.

MICHIGAN breaks through the Los Angeles line this month and captures the Banner! Michigan is a real competitor now—watch your laurel! Los Angeles for the thirteenth consecutive month holds the No. 1 position. The gain of 125 stations handling traffic over the previous month, and a trifile total of over 100,000—these are active days in traffic work . . . get in on some of this fun.

**December, 1932**

49
Traffic Briefs

During June and July while TITTAO was in New York City, a daily schedule was maintained on 14 mc. from W2WF with his station in Costa Rica. TITTAO handled the TAO transmitter. Many important messages were handled and TITTAO got a big "kick" out of working his own transmitter, some 2000 miles away.

ELECTION NOTICES

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

(They give the dates, closing date for receipt of nominating petitions, and the date of election of the new officers. This notice supersedes previous notices)

In case where no valid nominating petitions have been handed in during the period of A.R.R.L. Members residing in the Sections, the present 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 filed in the office of the Section Manager.

Due to the largescale, Sectional, and National action section nominating petitions are hereby solicited for the office of Section Communications Manager in this section and the closing date for receiving nominating petitions is Dec. 15, 1932, as A.R.R.L. Headquarters is hereafter specified.

Section Closing Date Present SCM Present Term of Office
Rhode Island Dec. 15, 1932
Arkansas Dec. 15, 1932
Sacramento Valley Dec. 15, 1932
Louisiana Dec. 15, 1932
Mississippi Jan. 15, 1933
Iowa Jan. 15, 1933
Western Pna. Mar. 15, 1933

Communications Manager, A.R.R.L.

We, the undersigned members of the A.R.R.L. residing in the above-named state, do hereby nominate, herewith apply for election for the two-year term of office.

(Place and date)

Bosilinlv of elections is to take place in the different Sections immediately after the closing date for receipt of nominating petitions as given opposite the different Sections. The Notice and petitions will be mailed to the Sections concerned. Ballots will be mailed to members as the closing date specified above, for receipt of nominating petitions.

Election Results

Valid petitions nominating a single candidate as Section Manager of Sections of or before the closing dates that had been announced for receipt of the Section Manager as set forth in the Constitution and By-Laws, shall be deemed elected. Accordingly election results have been mailed to the following officials, the term of office starting on the date given:

Idaho (or) Oct. 2, 1932
Tennessee Oct. 14, 1932
Ohio Oct. 4, 1932
Southern Indiana Oct. 14, 1932
Southern Illinois Oct. 4, 1932
South Dakota Oct. 14, 1932

BRASS POUDLERS' LEAGUE

<table>
<thead>
<tr>
<th>Call</th>
<th>Org.</th>
<th>Del.</th>
<th>Rel.</th>
<th>Total</th>
</tr>
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<tbody>
<tr>
<td>W6GP</td>
<td>222</td>
<td>277</td>
<td>.50</td>
<td>227</td>
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<tr>
<td>W6XCL</td>
<td>214</td>
<td>163</td>
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<td>115</td>
<td>720</td>
<td>1253</td>
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<td>W6BO</td>
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Atlantic Division

SOUTHERN NEW JERSEY — SCM, Gideon M. Rigor, W3QJ. — W3XZ is new RM for phone on 14 mc. W3APN is new RM for CW, W3BEI reports off-frequency stations W3ATL and W3BPO completely rebuilt. W36BZ gets new ORS. W36C0L applies for ORS. W36C0B is chief op at WACM. W36BDP is on 14 mc. W36ASG is President of Camden Radio Club. W3XH has 2nd schedule. W33PP has installed oc. W3ARL in working DX. W36AYA blew the complete works. W36QQ has 15 schedules per week. The Jersey gang put over 2000 deliveries count! The work of the organization is proceeding splendidly. There is no limit or the number of petitions that may be filed.


Western New York — SCM, Don Farrell, W6DPS, W6BZO, high traffic man, has been appointed Route Manager. W6GZW, W6AON, W6CQJ and W6BR

QST for
are rebuilding. W8DBX built a DC Super Wasp. W8AQF reports nice total. W8DFQ has two schedules. W8HFD has a new call and W8DFD is running a shack. W8DTL built a new receiver. W8HJZ is busy at night school. W8DME is making up some circuits. W8CAG is going to head the list.


MARYLAND-DELAWARE-DISTRICT OF COLUMBIA — SCM, Nancy Ginsberg, W3NY. W3BBT, E. W. Darne, Chief RM; W8BAA, E. L. Hudson, RM. The radio men of Baltimore have formed the Institute of Radio Conferences (I.R.C.). Mr. George Sterling, W8ID, is President; Mr. L. C. Herndon, Vice-President; Mr. Schulz of W8CAO is Secretary; M. L. Krum, W8ZK, is Treasurer; Mr. Gerald Cook is Chairman of the Executive Committee. The Frederick Amateur Radio Association deserves a lot of credit for the splendid Hamfest tenanted over to 50 amateurs, October 8th. The Washington Radio Club participated in the activities of the President's Cup Regatta. The 56-mc. equipment of W3CFP, W8DQD and W3PN was used, and operated by W3CFP, W3CFP, W8BBI, W8ASN, W8OZ, W8AJS, District of Columbia. W8CQZ has a new schedule. W8CQZ is making up some circuits. W8CQZ is picking up at W8BTW. "C. J.", of the old Ep Darne gang, is helping W3ASO move traffic. W3NR is getting fine results. W8BOS has new receiver. W3IL can't seem to run into traffic. W8DQD attended the Frederick Hamfest. W8AJS is going to head the list.


CENTRAL DIVISION

KENTUCKY — SCM. Carl L. Plumbl, W90X — W9QFC, W8CMJ, W9JYO, W9RFH and W9VEL want ORS. Since installing radio in his car, W9VEL has gone to camping and thus received nice benefits from W9YLI activities. His seasonal antenna schedules keep W9AVH busy. W9DWE comes on air in Trenton, Ohio, under portable W9ZZZB. W9EYW had successful 'phone QSO with plane, I0XZ, on 36 mc. W9BBM is a new W9CQV. W9IFM has new tower. 300 rupees. W8GJZ. W8EFO relinquishes ORS, but his XLYWJY carries on. W8CDA's crystal refuses to cooperate with antenna. W8FRH has portable W8KFU. Bob Foreman is tinkering with speaker amplifier. W8FMR has a new doubled antenna. Depression is blamed for low total by W8BAI. W9DDU is on in great style. 3.5 mc. "phone keeps W9DCQ busy, WPDE duty breaks up W8PEV's schedules. Using a 1200-foot transmission line is only way W8MP has seen any interest. W9MPG blows his 'tis, W9GFR is working with a coupling frequency of KA. W9AUIH is out to win another ORS contest. Answering 6's and 7's keeps W9ETD occupied. W9CZC is an expert rag-chewer. "New antenna in new location," says W8XHN. W8AZY popped his 30-watt. Life is beginning to Gl on W8CNE. W9BOC is our official DX-hound. W9HCQ is suffering from modesty.

Traffic: W9IOX 1112, W8QFO 65, W8A3Z 69, W8YJO 30, W8CM 28, W8JI 29, W9AAX 18, W9AML 14, W9W0Z 14, W8BP 10, W9BFX 12, W8[attrip] 10, W8AUH 9, W8FM 8, W8JGZ 8, W8EFO 6, W8HGO 6, W8KEX 5, W9ERH 4, W9ELL 2, W9CDA 2, W9AYZ 2. ILLINOIS — SCM. F. J. Hinda, W9FPW — RM. NE Section W9DDE Ed Wilcox. RM NW Section W8ERU F. A. Hubbard. RM S. W. Stentz has new rupees. W9AAK helps W9FTK decide what circuit to use. W9GET has new power transformer. W9EXB is building new rig. W8IUU has c. c. W8TQ, W9GKI, W8ACF and W9DFQ are attending a "Commercial Ticket" night school. W9BVF is experimenting with 50 mc. W9HYF wants ORS. Since installing radio in his car, W9VEL has gone to camping and thus received nice benefits from W9YLI activities. His seasonal antenna schedules keep W9AVH busy. W9DWE comes on air in Trenton, Ohio, under portable W9ZZZB. W9EYW had successful 'phone QSO with plane, I0XZ, on 36 mc. W9BBM is a new W9CQV. W9IFM has new tower. 300 rupees. W8GJZ. W8EFO relinquishes ORS, but his XLYWJY carries on. W8CDA's crystal refuses to cooperate with antenna. W8FRH has portable W8KFU. Bob Foreman is tinkering with speaker amplifier. W8FMR has a new doubled antenna. Depression is blamed for low total by W8BAI. W9DDU is on in great style. 3.5 mc. "phone keeps W9DCQ busy, WPDE duty breaks up W8PEV's schedules. Using a 1200-foot transmission line is only way W8MP has seen any interest. W9MPG blows his 'tis, W9GFR is working with a coupling frequency of KA. W9AUIH is out to win another ORS contest. Answering 6's and 7's keeps W9ETD occupied. W9CZC is an expert rag-chewer. "New antenna in new location," says W8XHN. W8AZY popped his 30-watt. Life is beginning to Gl on W8CNE. W9BOC is our official DX-hound. W9HCQ is suffering from modesty.

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W9AEB 2, W9FJA 2, W9GFS 1, W9AIP 1, W9GGJ 1, W9KQ 14.

W9ERS schedules W9EYX. W9GVL expects to stay on 3.5 mc for another month. W9RJH is sailing on the Lakes. W9ZZN -IAQ asks for schedules. W9EJW leads this month. W9DXV schedules W9EPJ. W9FSS heads the U.S. Navy. W9EHD-HA is building a station in his apartment. W9HTZ is on 7200 kc. W9ZY reports that L. P. Valentine is W8BTK has a 211.

Crnsse Radio Amateur Club has begun regular meetings. W9FRU was busy putting out forest fires. W9FHK reported with wgzy_ W9FAF would be glad to trade radio parts for blonde YLs. W9ESZ has been started reporting again. W9APB sends first report.

has new rig. W8JMH schedules W8GNP. W8ACZ is Vice-President Cleveland Amateur Traffic Association. W8W5Q has schedule. W8CEZ schedules W8DAT. W8DHI schedules W8CIG. W8CZT schedules Detroit. W8GUL is Secretary of Lakeford Wood Radio Club. W8FKK schedules W8EBY. W8FEJ, W8EBZ and W8FVP. W8FVL now has W8FXH as a non-inactive reporter. W8AFI, W8JAR and W8ZBN are active. W8DHI is doing commercial ticket at W8EBY. W8DAT is doing real traffic work. "Ohio is coming along all OK," reports W8BAH. RM W8BYD has 15 schedules. W8DDS buys that for the CATA Greater Cleveland Net. W8HIO asks W8JBY for traffic information for Central Division. District No. 2 W8BMK: W8BMK says A.A.R.S. schedules all shot. W8GHF is on with low power. W8EJ is an Ensign in U.S.N.R. District No. 3 RM W8APO: W8APO takes charge of this district again as RM. See him for schedules. Maumee Valley Radio Association Club will hold a QSP Contest, WSEMIE donating prizes. W8ATN is waiting for antenna. W8DHI is in radio service business. W8EIK is awaiting new batteries. W8AND is going in radio business. Glad to hear from W8JTT. W8XEYD is a new reporter. W8GEO wants schedule with Bluefield, W. Va. W8SCMY has a job on the Lakes. District No. 4: RM W8SEQ now has new QRA. Following report from W8DQA: New club in Galion with 8 members. W8GEO is a member, and W8DQA chief of W8DQA. W8GBBD is W8GBBD's transmitter. W8GAE is going to operate W8JW. W8EBO is working on new receiver. W8DYW and W8GAYV had hard time getting home after club meeting, as garage was too small. Hi. W8WU is a real great man to A.A.R.S. We sure be glad to see W8PO back on schedules. District No. 5: RM W8DFR attended Toronto Convention. 50-watter went west at W8FPC. W8FQV is making good use of prizes won at Central Division Convention. Nine reports from W8KBX. W8WY is State NCS A.A.R.S. W8MBM has applied for ORS. Another hot report from W8EIK. W8BSR is not on much. District No. 6: RM W8BBH schedules W8DP, W8MB, W8DLQ and W8CSS. W8GIZ reports nice total. W8EJN is back from Mines. W8DHI on W8EHN back. W8HFC is new ham. W8NHI will have 860 watts on last stage. W8ARW has his QRS renewed. District No. 7: RM W8VP is doing great work in his Section. W8ANS schedules W8BBA. W8CKKX is now in radio service work. District No. 8: RM W8GDS reports activity in district picking up. We hope W8ALQ got his ticket OK. New reporter is W8GDC. W8CGL lost ORS certificate in fire. "Busy rebuilding W8BQA, school transmitter," reports W8BQD. District No. 9: RM W8HBI of Newtonville, ex-ORS W8GFD. W8FBRV has a nice report. W8YR is on 7030 kc. Truffle: W8BDDS 222, W8BETY 421, W8BAHI 284, W8CMB 280, W8BMZ 169, W8DAT 278, W8DFB 06, W8BMR 02, W8CSL 27, W8FNP 54, W8ANS 52, W8EBY 47, W8BPC 47, W8FSF 44, W8UW 39, W8CGS 26, W8FVG 36, W8FDY 34, W8JFJ 32, W8FVL 39, W8FFK 29, W8GUL 35, W8CKK 23, W8GBE 15, W8CN 14, W8CZT 14, W8VIR 12, W8BZL 11, W8ARK 11, W8GDC 10, W8ZBG 10, W8HDL 9, W8CSE 8, W8XED 8, W8ACL 7, W8BTT 7, W8BII 6, W8SAI 6, W8BMO 2, W8WUAC 6, W8AJO 4, W8BRR-B8FRR-W8BRR-W8BRR 2, W8FBR-W8RG-2 3, W8APC 582.

**DAKOTA DIVISION**

**NORTH DAKOTA**—SCM, Wm. A. Langer, W8DOS. W8FFW — W8FFQ has left from W8OS. W8HIC's traffic map is nearing completion. W8IGR is newest ORS. W8GBP's several ops keep the ether busy. W8DYA is c.e. on 1.75-mc. band for A.A.R.S. W8IGR discovers new things every day. W8DFT, W8FQB, W8HIC, W8JAR and W8ZBN write last reports. W8DFT finds 14 mc. W8DDM is struggling with a bally buffer stage. Frencl of Montpelier visited the SCM. He plans to use W8FJP's idea for power supply. The SCM is QRL the AA net. W8ATZ's rig lines up like this: 47-27-11-10 final. Hi. Truffle: W8FNY 810, W8DNS 208, W8HIC 320, W8HIC 338, W8PPM 96, W8DFA 13, W8FBI 13, W8FFS 11, W8GAE 11, W8EIQ 7, W8MAB 3.

**SOUTHERN MINNESOTA**—Acting SCM, Via Schleuder. W8KXK -- Four stations made the BPL. W8EJF leading, W8HCC a close second, and W8BKK and W8BN next in line. W8BN handled Farm Strike news for Minneapolis. W8MMQ is raising his traffic totals. W8CMF keeps schedules. W8BNN has new 3.5-mc. zepp. W8CSY joined A.A.R.S. W8CPD did good work in handling hospital case reports. W8FKJ is leaving Minneapolis for winter. W8BA reports fine hunting. W8AO reports W8SUZ is active in traffic work. W8JUN has YLitis. W8JCS has daily schedules. W8CTB is attending U. of M. W8YK reports traffic contest among ops at station. W8FFY is active in A.A.R.S. W8JH is on 1.75 mc. W8JN finds more traffic. W8FFX has new zepp. W8JAB has new Comet Pro. W8DGE was transferred to Thr. Thor. W8FM4 makes good use of 5-point system. W8TX has his 2 call back. W8DHR reports pre-war Canadian ham in his city. W8JDF is using a '10. W8SGG rebuilt to improve appearance. W8JIB is going c.e. W8GSN has gone to 3.5 mc.


**SOUTH DAKOTA**—SCM, Carroll B. Miller, W8DLK -- This is my first SCM report. I sure appreciate your support to gain this office. W8JX is looking for western schedules. W8AO reports for W8JIB. W8JH2S is building a new superhet. W8BLZ, W8DES, and W8DNS visited W8HWH. W8CSU received his pilot's license. W8DOR built new AC receiver. W8JTG is on air. W8FQO has new 52-foot tower. The Aberdeen gang has opened club again. The Redfield Hamfest was a real success. Traffic: W8JIV 67, W8FKL 30, W8HJJ 15, W8FQO 5.

**NORTHERN MINNESOTA**—SCM, Palmer Andersen, W8JQO — W8JQO, W8AFZ, W8AEI, W8GBN and W8AIZ now have regular tickets. W8JN has a 'phone ticket. W8DBL leads this month. W8BAR had a great time at Mankato. W8GYY has portable W8KNU. Two new hams are W8KIL and W8JFY. W8JQO reports that W8JFJ has been moved. W8obar has a 135-foot zepp. W8FPN has a dandy 'phone. W8GCV tried to keep his 1000-watt job a secret, but the news leaked out. W8JS is rebuilding. W8FQF (W8FVLAJ is a new reporter. W8JBA a new ORS. W8EHL has a 135-foot zepp. W8FPNJ gets a kick out of pleasant hunting. W8IR has a 'phone. W8GCHV is on air. W8FOQ has new 52-foot tower. The Aberdeen gang has opened club again. The Redfield Hamfest was a real success. Traffic: W8JIV 67, W8FKL 30, W8HJJ 15, W8FQO 5.
State Amateur Association is planning a Hamfest. W5V is alerting the arrival of new and bigger filter condensers. W5M's Paradise can be heard in their range. W5CQF is active in Paris (Ark.). W5HIN will be on with 3.5-mc. phone and 7-mc. C.W. W5CFJ /W5CQY is one of the能手s W5VJ and W5AIU. W5AIU is made the Convention. W5AIU and W5CQJ report traffic. W5BD has new ac receiver. W5J is handling traffic. W5MBV with flts on 56 mc. W5Y will be soon active. W5BRW, W5IQ, W5CFE and W5HIE are active. W5FX is new A.A.R.S. and O.R.S. W5JLJ goes out line, W5AKB and W5BED want schedules. W5SMF pounds out a few. W5BDW has new ac receiver. W5JK is handling traffic. W5CFL has new A.A.R.S. and O.R.S. W5ABL gets out fine. W5AKB wants schedules. W5BBK and W5LV are on phone. W5CBZ is using type 'l0s in PP. W5BXM and W5CCW were at Convention. W5ABI extends W5AIU 6, W5FE 4, W5CCW 19, W5ABL 17, W5FM 16, W5ANR 9, W5BKB 7, W5J 5, W5IO and W5AIU have MOPAs. W5CFF and W5CFG are interested in schedules. W5AXU is about to get BC license. W5AXD is the proud papa of a bouncing YL. W5FM reports plenty traffic. W5BPL is moving to Belltown. W5YOZ is on 3.5 me. W5BAP reports plenty traffic handled by him and W5DQE. W5ALD now has c/o N.C.S. of the Tennessee A.A.R.S. W5AHP operates a Radio School course. W5BPL 6, W5FE 4, W5CCW 19, W5ABL 17, W5FM 16, W5ANR 9, W5BKB 7, W5J 5, W5IO and W5AIU have MOPAs. W5CFF and W5CFG are interested in schedules. W5AXU is about to get BC license. W5AXD is the proud papa of a bouncing YL. W5FM reports plenty traffic. W5BPL is moving to Belltown. W5YOZ is on 3.5 me. W5BAP reports plenty traffic handled by him and W5DQE. W5ALD now has c/o N.C.S. of the Tennessee A.A.R.S. W5AHP operates a Radio School course. W5BPL 6, W5FE 4, W5CCW 19, W5ABL 17, W5FM 16, W5ANR 9, W5BKB 7, W5J 5, W5IO and W5AIU have MOPAs. W5CFF and W5CFG are interested in schedules. W5AXU is about to get BC license. W5AXD is the proud papa of a bouncing YL. W5FM reports plenty traffic. 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Cuba along with Peru and Panama. W2A1Q gets some traffic to 56 mc. W2DMN keeps four schedules. W2CUII relays traffic to W2AIQ on 56 mc. W2BW has new cc rig on 7 mc. W2CY will soon be moving. W2VHL, the Nassau Radio Club station at Oceanside, L. I., has traffic and schedules on 3.5 mc. and will be moved. W2AES has placed his rig in his new residence. W2MO moved to St. Albans. W2COI pounds away on 3.3 mc. W2BOM has a new a.c. receiver. W2EEL reports from Rockville Center; W2DJO is on again. W2DFU is using an electron coupled rig. W2DQK will have IRS soon. W2AGL is QRL working overline. W2AUS is trying to make one transmitter do the work of three. W2DOG and W2CHIK are going strong. All Hudson division hams are requested to attend the A.A.R.L. meetings held at the Armory at Whitehall Street, in N.Y.C., usually on the first Monday of each month. Please get in touch with the SCM or your RM if you are handling traffic. Let's get that traffic banner away from our rivals on the West Coast. Everyone report his outfit to remote control. W2ZBF 335, W9ABE 345, W2BMH 1, W2PF 78, W2FF 1, W2QM 86, W2BRB 1, W2JFQ 13, W2BVL 9, W2AIQ 98, W2JBe 71, W2BOF 111, W2LF 48, W2SSL 82, W2AUS 172, W2LBN 34, W2BVU 87, W2BXY 11, W2BEY 4, W2AGL 34, W2CWP 34, W2CBH 26, W2CHK 65, W2CSP 154, W2DJO 9, W2UHI 38, W2DBA 18, W2ELK 2, W2DPD 12, W2DMN 8, W2DUP 19, W2ECU 6, W2DN 9, W2CWM 6.

CONTEST FOR MIDWEST DIVISION BANNER

DATES: November 16th to and including February 15th.

COUNT: Message Count to be "Standard A.A.R.L." and from Traffic Reports.

RULES: 1. The SCMs, W9BNT, and Director W9GPI to be ineligible to win the Division Banner, but their Traffic Reports SHALL BE COUNTED in the totals of the respective Sections.

Division Banner to be Awarded to Station standing highest in the Winning Section, except as noted as ineligible, and to be retained by said Station for a Period of One Year and the Contest Renewed. Section winning the Banner three respective years to retain it.

MIDWEST DIVISION

N EBRASKA — SCM, S. C. Wallace, W9FAM — W9BNT busts loose with an FB total. W9DMY is doing fine work in AA net. W9FAM started the ball rolling. W9DHA, RM, wants the gang to send him their doing fine work in AA net. W9FAM started the ball in the harness again. W9DGL is a regular DX hound. W9EEW will be with us soon. W9EYW has everything all set. W9FAM reports. W9EYW is having trouble with his eyes. W9BQH has gone back with us. W9TU is doing fine traffic work. W9FE reports traffic. W9FRY increased power. W9CWM is helping put Lincoln on the map. W9FZP is traffic minded. W9EEW will be with us soon.


IOWA — SCM, George D. Hansen, W9FEP — W9EIV, RM; W9BPM, RM. W9EIV, western RM, leads this time. W9BWP is not far behind. W9GUX got his first-class ticket. W9ABE is QRL. W9BBG is back in the running. W9FEPF manages to get a fair total. W9ACL blew power transformer. W9KRM, ex-a10, reports, or first time, W9CWG has call W9KRM for 56 mc. W9JG0, ex-a12XK, reports. W9JF holds daily schedules. W9AYC is active A.A.R.L. W9CYL is on 3.5 mc. W9BP pays a visit to W9CWM. W9EWO has been QRL corn-picking. W9D0 reports new ops. W9AXR reports for portable W9ZDE. W9DUE has IRS aspirations. W9FZO changed QTH. W9AGQ has good reports on his OBCs. W9JXO is holding schedules. W9DMX reports a few. W9ERY promises better next time. W9HLG reports new stations W9KMA, W9EAC, and W9JTS. W9DNEZ is followed by illiness. W9FZT gives us the dope on the transmission. W9CWM is back to W9DZM. W9KMI, W9DV, and W9WT are new stations. W9JMB sports a new National. W9YB, pre-war ex9RB, is back in the fold. W9FQK is QRL enlarging the wood pile. W9BARQ finally got the "J" card. Remember the Midwest Division Traffic Contest!


KANSAS — SCM, O. J. Spetter, W9FLG — W9FLG and W9BEE were honored with a visit from W9DZM and his Buddy. W9ABR lost his antenna in wind storm. W9KBE is working 7 me. W9EKY seems to be going places, W9FLG is rebuilding. W9ABR is making one transmitter do the work of three. W9JZM comes through with some news. W9DGL reported for W9JAM. W9DHS is working graveyard shift. W9PB is on 3.5 mc. W9UHI 38, W2DBA 18, W2ELK 2, W2DPD 12, W2DMN 8, W2DUP 19, W2ECU 6, W2DN 9, W2CWM 6.

MIDWEST DIVISION BANNER

Winning Banners: November 16th to and including February 15th.

ELIGIBLES: Station having traffic reports SHALL BE COUNTED in the totals of the respective Sections. Winning Banners to be Awarded to Station standing highest in the Winning Section, except as noted as ineligible, and to be retained by said Station for a Period of One Year and the Contest Renewed. Section winning the Banner three respective years to retain it.

MISSOURI — SCM, C. R. Cannady, W9CYG — RBs: Harves and W9I, W9FAP and W9ST, W9FAP and W9ST, W9FAP and W9ST. GOING UP! A 58 Per Cent Gain in one month. That MISSOURI's record and all in getting ready for that BIG INTRA-DIVISIONAL CONTEST beginning NOVEMBER 15th and lasting three months. Don't forget your report on the 16th. Let's show 'em how to win a contest! W9EYG led the state in traffic. W9QPTC came through with some news. W9A1Q is QRL enlarging the wood pile. W9CHR works all bands. W9QPL applied for IRS. New calls for Hutchinson, W9EUL, W9FKT, W9KM, and W9KRNwW9QDDY. W9ABR has portable W9ZAB. W9UHI got his operator's ticket. W9AXR is recovering from his vacation. W9JZM is taking his new W9JZS. W9BPG is on 3.5 mc. W9UHI 38, W2DBA 18, W2ELK 2, W2DPD 12, W2DMN 8, W2DUP 19, W2ECU 6, W2DN 9, W2CWM 6.

MISSOURI-SOM, C. R. Cannady, W9CYG — RBs: Harves and W9I, W9FAP and W9ST, W9FAP and W9ST, W9FAP and W9ST. GOING UP! A 58 Per Cent Gain in one month. That MISSOURI's record and all in getting ready for that BIG INTRA-DIVISIONAL CONTEST beginning NOVEMBER 15th and lasting three months. Don't forget your report on the 16th. Let's show 'em how to win a contest! W9EYG led the state in traffic. W9QPTC came through with some news. W9A1Q is QRL enlarging the wood pile. W9CHR works all bands. W9QPL applied for IRS. New calls for Hutchinson, W9EUL, W9FKT, W9KM, and W9KRNwW9QDDY. W9ABR has portable W9ZAB. W9UHI got his operator's ticket. W9AXR is recovering from his vacation. W9JZM is taking his new W9JZS. W9BPG is on 3.5 mc. W9UHI 38, W2DBA 18, W2ELK 2, W2DPD 12, W2DMN 8, W2DUP 19, W2ECU 6, W2DN 9, W2CWM 6.
of '52s. W9GTF went into business for himself. W9HJL
W9FFW is QRL school. Kansas City: W9GCO got WAC
W9AIJ
W9GQY reports very little traffic. QRL WMBH. W9CRM rebuilt. W9FJV sends all Mis­
ed. E.E. job. W9FTA is adding a couple
trunk line underway. W9RR sends blanket report. W9ZQ
W9FSU and W9HVC turned partners in a 1.75-mc. 'phone.
and W9HVC turned partners in a 1.75-mc. 'phone. W9GMI has new
sion Convention. W9CJR-FEH was appointed DNCS for
7-mc. c.c. rig. W9HUG takes a little more traffic. W9GBJ
W9JBZ gets in on some traffic. W9DHN ways E.E.
and W9CNI were visited by W9DLC. W9DLC is moving
the rig on 7-mc. W9IYU is a new ham. W9ARH moved to Kirks­
and W9HVC turned partners in a 1.75-mc. 'phone. W9RR sends blanket report. W9ZZ
semes. W9FTA is adding a couple
ports WIESE and W1DUS new hams in Worcester.
South Missouri Association of Radio Amateurs: W9GMI has new
7-mc. rig. W9GJY takes a little more traffic. W9GJY adds another W9FYV and W9CNO to its Delta
Convention. W9CJR-FEE was appointed DNCS for
Girardeau. W9GEF has a 3.9-mc. 'phone. W9DWK and
Springfield. REMEMBER THE CONTEST, GANG!
6, W9FSZ 6, W9HWE 5, W9KNH 7.
2, W9FSZ 6, W9HWE 5, W9KNH 7.
W9FYM 4, W9GG 7, W9BYV 6, W9ANG 7, W9GCH 8.
W9EOW-W9DLC-W9ENK-W9GTK-W9fiW-W9HVJ.
W9KEI 4, W9IJW 3, W9EWT 3, W9FYU 3, W9CZI­
W9EFC 19, W9GBJ 17, W9EL 16, W9DGI 16, W9DUD 16, W9JYU 12, W9HUP 11, W9TOE 10, W9GMI 9, W9FSG 9, W9HWE 8, W9ABU 7, W9HVE 6, W9FYU 6, W9ANG 6, W9GCH 8.
ASSOCIATION OF RADIO AMATEURS: W9GMI has new
ports WIESE and W1DUS new hams in Worcester.
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W9EOW-W9DLC-W9ENK-W9GTK-W9fiW-W9HVJ.
W9KEI 4, W9IJW 3, W9EWT 3, W9FYU 3, W9CZI­
W9EFC 19, W9GBJ 17, W9EL 16, W9DGI 16, W9DUD 16, W9JYU 12, W9HUP 11, W9TOE 10, W9GMI 9, W9FSG 9, W9HWE 8, W9ABU 7, W9HVE 6, W9FYU 6, W9ANG 6, W9GCH 8.
NEW ENGLAND DIVISION
WESTERN MASSACHUSETTS—SCM. Earl G. Hewinson, WlCOY-WIRB—W1BP, RM, is high man. W1BVR, W1DWH and W1COS are QRL A.A.R.S. W1APL promises big things on traffic. W1AQM visited W9FWM and W1BDI himself. W1AJD and W1COS are QRL A.A.R.S. W1APL promises big things on traffic. W1AQM visited W9FWM and W1BDI himself. W1AJD and W1COS are QRL A.A.R.S. W1APL promises big things on traffic. W1AQM visited W9FWM and W1BDI himself. W1AJD and W1COS are QRL A.A.R.S.
Taft School Radio Club (W1CIG) started off with 17 members. W1DMK says the Waterbury gang have the 56-mc. bug due to the efforts of W1ED, W1CVD sends in her first report. W1TD will be open for schedules soon. W1DF is wanted a 14 and 3.5 mc. W1DFP says W1DFR sends code practice on 1.75 mc. W1NBW says DX good between 6 and 7 a.m. on chilly mornings! W1AOB added a buffer to his outfit. W1SC asks for ORS information. W1EBAQ is active in O.O. work. W1BIQB QSOs W6 and W7. W1DFT says W1DFR is building S.S. receiver. W1BDW reports that W1DCEG is hooking up with real DX. W1CUCX, W1DDP, W1DDX and W1CSY traveled to N.Y.C. and brought home their First Class licenses. W1VAVB says it a little "Calox" oxygen tooth powder is lies W1WIWM getting crystals when he's working on crystals. The Annual get-together of Conn. ORS was held at A.R.R.L. Headquarters on October 16th. W1ARJ found a lot of QSLs at HQ.s. W1APZ says not much time on 10-meter. W1BAX sends in Class licenses. W1AVB says "School QRM." W1CVD sends blank for 64, W1DOW 62, W1AJB 60, W1BVW 50, W1APW 44, W1CGB 38, W1SHK 38, W1TALE 35, W1VIALE 5, W1KOA 4, W1PEL 4. Taft School Radio Club (W1CIG) started off with 17 members. W1CGB is getting disgusted with ham radio. W1AJK has QSO'd 2.5 on 56 me. W1VS 47 is working 14 mc. W1CME opened a radio store. W1CAM's '52 is working FB. W1DRI reports traffic increasing. W1RQ is ready for a big traffic session. W1CUM has new 13-tube phone. W1AUQT's 'phone was heard in England. W1DOW has five schedules. W1DKH is remodeled transmitter. W1CJG reports for 300 gang, W1TP moved to Massachusetts. W1BBQ has gone to MIT. W1CMLD is working. W1BST is planning a contest. W1FX is working with 56 mc. W1BOC is on again.

Traffic: W1VP 90, W1DRI 35, W1DNC 14, W1CJE 8, W1FES 2, W1BIK 5, W1XL 5.

EASTERN MASSACHUSETTS — SCM, Joseph A. Mullen, W1ASL — W1KIE has QSO'd 25 on 56 mc. W1VS is organizing an Eastern Mass. traffic net. He makes the BPL! W1ARJ is snapping the whip at all losters. W1ARJ is putting down his W7 from W1HCG and has his 6AF QSO'd. W1EJQ is a new W1DCEG. W1BIQB's new rig. W1CUCX is working on S.S. receiver. W1BIQB's new rig. W1CUCX is working on S.S. receiver. W1BIQB's new rig. W1CUCX is working on S.S. receiver. W1BI QB's new rig. W1CUCX is working on S.S. receiver. W1BIQB's new rig.
plenty. W7BBY rebuilt. W7JKJ. W7AXY and W7CMQ have new phone rigs.

Traffic: W7AYH 91. W7BAA 47. W7BEO 62. W7QD 40. W7AQQ 11. W7AKY 15. W7YH 15. Ray Cummins, W7AE2 -- W7AWH leads again. W7AEF visited the SCM. W7BOH handled traffic. W7QO and W7BDW are back on the air. W7SY has new SW3. W7AVB and W7AZW are new Marshfield stations. W7BLN is QRL Telephone Co. W7CMK worked his 1LZ. W7AEJ and W7AXN handled traffic. W7AVJ lines up reports from the Marshfield gang. W7AEF is op at KGN. W7WL is rebuilding the dynatron, W7ATX handles wx reports for airways. W7ED and W7AKY are reporting. W7OEJ and 50 others to Sib. W7BEY keeps five daily schedules. W7CBA hopes Oregon will lead in traffic. W7BOO has his eye on an ORS. W7AXJ keeps daily schedule with K7FF. W7HD is on 8.5 mc. for traffic. W7WY wants more schedules. W7BBT is employed at Pocatello, Idaho. Rose City Amateur Radio Club elected new officers as follows: President, W7BTS; Vice-President, W7AIG; Secretary-Treasurer, W7AGP, and W7AXB is Vice-President; W7AXC, Secretary. W7BTS and W7AXB are new Marshfield stations to W7BUQ. W7AHQ shortly. W7BNI relayed Wenatchee-Yakima football string! W7TZ says, "Yours till kilocycles have handle."

WASHINGTON -- SCM, John P. Gruble, W7RTW, reports: W7ALF is W7AX, is Washington's new Route Manager. W7QI is our other RM. Traffic handlers should get in touch with their nearest RM. Plans are being formulated for the publication of a Washington section rating. SCM is in a high place in national section rating. Everyone reports. Be there with us when we go over the top! 73 or as you prefer. (HL) W70V expects to be operator aboard a ship out of Juneau, Alaska. W7WY 137, W7WY 131, W7WY 16, W7WY 11, W7WY 10, W7WY 9, W7WY 8, W7WY 7, W7WY 6, W7WY 5, W7WY 4, W7WY 3, W7WY 2, W7WY 1, W7WY 0. W7CAZ 10, W7CAZ 9, W7CAZ 8, W7CAZ 7, W7CAZ 6, W7CAZ 5, W7CAZ 4, W7CAZ 3, W7CAZ 2, W7CAZ 1. W7CAZ 0.

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Traffic: W7ACH 31, W7ED 22, W7APE 22, W7QY 18, W7AEM 18, W7AXO 15, W7ALA 12, WSY 10, W7ALY 9, W7HD 8, W7CBA 6, W7BOE 5, W7BZS 4, W7WU 4, W7AXJ 3, W7BOC 2, W7AQ 2, W7CQ 1.

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WASHINGTON -- SCM, John P. Gruble, W7RTW, reports: W7ALF is W7AX, is Washington's new Route Manager. W7QI is our other RM. Traffic handlers should get in touch with their nearest RM. Plans are being formulated for the publication of a Washington section rating. SCM is in a high place in national section rating. Everyone reports. Be there with us when we go over the top! 73 or as you prefer. (HL) W70V expects to be operator aboard a ship out of Juneau, Alaska. W7WY 137, W7WY 131, W7WY 16, W7WY 11, W7WY 10, W7WY 9, W7WY 8, W7WY 7, W7WY 6, W7WY 5, W7WY 4, W7WY 3, W7WY 2, W7WY 1, W7WY 0. W7CAZ 10, W7CAZ 9, W7CAZ 8, W7CAZ 7, W7CAZ 6, W7CAZ 5, W7CAZ 4, W7CAZ 3, W7CAZ 2, W7CAZ 1. W7CAZ 0.
expects to be operating a ship out of Juneau in near future. K7TF reports.

Trailer: K7TPF, K7KRH 5, K7BQW 12, K7ASM 14, K7ALR 16, K7BFO 20, K7BMY 26, K7PQ 85, K7TF 129.

PACIFIC DIVISION

SAN FRANCISCO — SCM, C. Bane, W6WL, — Byron Goodman, W6CAL, Acting SCM. W6QP continues his fine work. W6NEK sends a nice report. W6CIS is going FB on Trunk Line "B." Quoting Martin, W6AYC: "Thanks to all who participated in the 56-mc. EXPEDITION, October 8th. The 46-mile record of the Bloomfield Radio Club was broken by a 31-mile duplex QSO between Mt. Tamalpais, near San Francisco, and Mt. Hamilton, near San Jose. Those responsible for the success of the venture were W6PW, W6MV-GMV, W6WB, W6VM, W6LQ-QV, W6DW-CDW, W6EG, W6FPU-GQG, W6WC, W6AEU-AWM, W6DX, W6DZD, and W6FEP-AYC-ARD." W6AZK has c.c. rig going. W6BVL heard Portugal on 7 mc. W6EY moved to 3.5 mc. Twenty-three countries have been worked by W6WU. W6CAL is now W6. W6ARG reports two new stations at Eureka, W6CWR and W6FYL. W6ERS found time to handle a few. Africa is duck soup for ol' W6DZZ. W6FMT sends a description of his station. W6IU promises traffic. With the passing of Frank Joseph we lose one of our kindest amateurs.


SANTA C时A VALLEY — SCM, Bruce Stone, W6AMM — Traffic some lower this month. Send more reports, please. W6HM and W6AMM have trans-Pacific totals. W6DBB is bed-ridden, but on the air. W6DZD had 53 straight QSOs with T15FI without a miss. W6FBW is doing FB as RM. W6FPL and W6FLP are back on. W6ENF is crying for traffic. W6BMW cracked his best crystal. W6FMT (YL) raises her traffic report every month. W6CCEO has daily schedule with KAIIO. W6ALW has a new crystal job. W6ASC worked up totals at W6YG and W6DZD.


PHILIPPINES — Acting SCM, Newton E. Thompson, KAIYA — The P. I. Section will have three c.c. stations in the future. K7TF reports.

Traffic: K7HR 98, KAIIO 83, KAIIO 64, KAHRS 72, KAIYA 49, KAIIF 35, KAIYA 34, KAIIP 18, KAIIF 16, KAIOS 14, KAIYB 14, KAIIMC 14, KAIIMC 10.

HAWAII — SCM, C. D. Slatten, K6COC — The call K6EM is being returned to K6CIB as a portable. K6EQW has been appointed RM for Hawaii. K6EQW and K6AU are organizing an inter-island traffic net. K6CCO and a few new calls are bringing the Island of Kauai into the Section. W6DQN is a new reporter. W6GNT is doing line work. W6FOH is active on 1.75 mc. W6EFC has new "Radiotelephone First." W6CTI is getting the itch for a ham key again. W6BJF has 211 perking FB. W6QIC is working a gold claim near Prescott. W6APO is experimenting. W6CZC was in Phoenix enroute to California. W6DLS-W6ZZAF, of Des Moines, Iowa, spent a week in Phoenix. W6BUQ, second on at W6CZC, attends Tempe Teachers College. W6UQ is one of the "Profs" at Tempe Normal. W6FLG was promoted from Corporal to Sergeant in the Tempe Guard. W6FLG is building a QSK. W6TJ is moving.


NEVADA — SCM, Keston L. Ramsey, W6EAD — W6UO is high man. W6AFP busy with trunk lines. W6AW is on "vacation." W6FMJ joins the A.R.R.L. W6EAD is building 36-mc. equipment. W6TJ is moving.


EAST BAY — SCM, S. C. Houston, W6ZAM — CRM J. H. MacLafferty, Jr., W0AQ, Alameda County: W6AQ is a new ham in Berkeley. W6CSV and W6DKJ are keeping Albany on the map. W6QIC, W6CSV, and W6NBR are new reporters. W6HOF, W6NBR, and W6AQ are on new c.c. rigs. W6FMT is on 1.75 mc. W6UW has a new MOPA. W6CSV is going QRO. W6F AQ is building a new rig.


SAN DIEGO — SCM, C. D. Slatten, K6COC — The new ham in San Diego is K6FQQ. W6DOW is a new ORS. K6VQ's is a new ORS. W6CIS is going QRO. W6F AI is going QRO. W6BY is going to shelf the 1-KW bottle. W6AFP and W6GPT are new hams. W6CAN is a new ORS. W6CGM needs a good receiver. W6BYS is going to put some filter. W6BQH is returning from China.

Traffic: K6BBL 144, K6AIU 78, K6EDZ 7, K6CQF 4.

SAN DIEGO VALLEY — SCM, Ernest Mendoza, W6BF — W6CDU is installing c.c. on 30 pm-QRTG. W6CEC will have crystals for all bands. W6FPZ has junked his MOPA. W6QIC has broken his crystal. W6AVD is in cooking W6AIY is in a new station in Tucson. W6WUF worked five continents. W6QIC also worked a PK1. W6GGG and W6AGL have new c.c. rigs. W6DOW expects to attend a Gulf radio-technical school this winter. W6CQI works a big spread on 1.75 mc. W6CQI is thinking of going QRO. W6F AI is doing line work. W6FOH is active on 1.75 mc. W6EF has new "Radiotelephone First." W6CTI is getting the itch for a ham key again. W6BJF has 211 perking FB. W6QIC is working a gold claim near Prescott. W6APO is experimenting. W6CZC was in Phoenix enroute to California. W6DLS-W6ZZAF, of Des Moines, Iowa, spent a week in Phoenix. W6BUQ, second on at W6CZC, attends Tempe Teachers College. W6UQ is one of the "Profs" at Tempe Normal. W6FLG was promoted from Corporal to Sergeant in the Tempe Guard. W6FLG is building a QSK. W6TJ is moving.


NEVADA — SCM, Keston L. Ramsey, W6EAD — W6UO is high man. W6AFP busy with trunk lines. W6AW is on "vacation." W6FMJ joins the A.R.R.L. W6EAD is building 36-mc. equipment. W6TJ is moving.

moving again. W6AVG has '38s. W6DQV is active in U.S.N.R. W6EFPQ claims four continents in 45 minutes. W6BEK knocked 'em over on the U.S.N.R. meet in San Jose with the SCM's pet gem, W6FFU, W6AME, W6EKQ, W6CHO, W6FFP and others. W6CRR is on 720 kHz while W6FQF uses 211E in final stage. W6FPM reported for first time. W6BIP sent in a long report. W6ASV is R-8 in Japan and Australia. W6BIL has portable W6FEX. W6DJO is QRL at U.S.C. Law School. W6HIS is talking schedules. W6FSE helped relay Fair. W6GEG changed antenna. W6ETL is revamping. W6BGF is QRL. W6AOF has answer back in five minutes. What's this we hear about sickness. W6FGT is keying his crystal. W6DH rebuilt signing off indefinitely. W6AKD Covina. W6CSC is minus filter. W6EUP has some FB antenna. W6DEP took his portable, W6ZZCE, on road tour. Five stations make the BPL: W6DKQ, W6BZX, W6BME, W6EMJ, W6DDJ. W6AOF has 1-KW input. W6AICL is back on air. W6BCT is using four '38s. W6FIP is handling foreign traffic. 111E reports death of J11DM through W6EAK. W6DEL has new shack. W6EUL put 1100 volts on his '101 New transmitting antenna at W6LN. W6BMM took traffic from Zeilin boat 520 miles to Mexican Coast during screening of "Tiger Shark." W6CGP is showing 100 watts into the antenna. W6BVC's '61 is amazing out FB. W6CRL reports for W6FGQ. W6DUX has new SW6. W6ZVQ is doing QSL work. W6BIM is using his '04A. W6AVE is QRL at UCLA. W6PDJ is handling foreign traffic. "No money, less YLs, more traffic," says W6PDJ. W6OCH worked ZS, ZT, ZU, OR twice in seven days. W6EGF is using an electron coupled oscillator. W6BOC is with W6BQE. W6DZK is experimenting with receivers. "No money, less YLs, more traffic," says W6PDJ. W6OCH worked ZS, ZT, ZU, OR twice in seven days. W6EGF is using an electron coupled oscillator. W6BOC is with W6BQE. W6DZK is experimenting with receivers. "No money, less YLs, more traffic," says W6PDJ. W6OCH worked ZS, ZT, ZU, OR twice in seven days. W6EGF is using an electron coupled oscillator. W6BOC is with W6BQE.
miter into panel job. W6CJJ is back on air. Mono and Inyo Counties: W6FVD has some excellent schedules. See you all at the Hamfest in Pasadena, December 3rd.


ROCKY MOUNTAIN DIVISION

U TAH-WYOMING — SCM, C. R. Miller, W6PDP — Utah: W6PTX reports more U.S.N.R. activity in S.L.C. W6EXL is active A.A.R.S. W6BSE keeps his '45s oscillating. QRZ from new, 10-KW KSL transmitter is 8, W6DPO 8, W6FAE 5, F6DEM 5, W6DAM 4, W7ACQ Casper. W9ESA is on the air again. W9JNV tops the list. At the W6EYS went deer hunting. W6DPJ keeps several traff. hears lots of DX. W7AMU joined A.A.R.S. W7NY is W7ARK is a new station at Big Horn. W7ADF passed to charge each ham 10 cents for not reporting to back on. W7BXS, W7ACQ, W7CJR, are hunting says pancake coils are better than helix. W9FPZ holds a gettmg his portable Tig fixed to operate from top of Pike's Peak Amateur Radio Association W9JNV's motion W6FRN tried MOPA. W6AHD will represent A.A.R.S. The Loveland hams were visited by W9BSP and W9IC. W9HZP and W9KBO; first belongs to W9CKO — Second W9MA and W9APR are on some. W9I.TU is kicking out W9AQN is using a '.52 final. W9CND W9AAB, W9CJ,T, W9BTO, W9FYY, W9BCW, W9AUJ, has been on a rest. WDGBQ is QRL Grange meetings. W4AUV is getting out W4BGR building the exam. to enter West Point. W4BKA and W4BOW are QRL school. W4AUV is planning a new transmitter. We are sorry to hear that W4AUA lost his father, W4BKA can't QSO other West Fla. stations. W4BHI had battery trouble, W4BMD moved to Georgia, W4BET is still getting the DX. W4ML keeps the mike hot. W4AGS hear a lot of DX. W4KB handles traffic on 'phone and CW. W4QI moved to W4HQ's. W4BMJ has worked all districts except '2" and "1' on 5600 kc. with spark coil plate supply. W4QY, yo, you had better get in touch with W4BMJ. W4UW-W6NO has been "sea going." W4ZER reports via radio. W4BLW is hard at it. W4ABK is going to rebuild. W4QAQ will be showing them soon. W4BF knocks them out on the air. W4AOO says nil until the pressure is over. W4XKP keeps three schedules. W4AQL works with a Public Address System. W4AGS' crystal oscillates on two freqs. You should hear Mrs. W4BKB's 7080-ka. crystal note! Mrs. W4MS received a heard card from W4QI. W4BQIA is using the W4BQI's outfit. W4AFT is still getting them out on 3500 kc. W4AOO says pancake coils are better than helix. W4FZZ holds a broadcast ticket. W4CWA wants schedules with Denver. W4GKN has new 350-watt c.w. outfit. W4QIQ has a receiver. W4AQL is working on his '34 outfit. W4BQIA is building another station. W4BMJ is going into a real outfit. Miss Ada W4GLG visited Denver hams. W4CKO reports for the Loveland gang. W4AKJ makes a bid for a spot on the Seminole Traffic Chain communicat. with W4AOW or W4NN at once. W4AKH 15, W4MF 12, W4ANY 12, W4AKJ 10, W4DE 10, W4TO 7, W4WS 7, W4ACZ 6, W4PAB 5, W4BKX 3, W4TK 1. W4AYK is planning on a portable ut U. of A. W4AWM is QRL A.A.R.S. W4VZ has moved his outfit. W4BOW gave a talk on U.S.N. at Gleeley, James A. (Pop) Fernald, Treasurer of Colorado Radio Experimenters Association, built a real 56-ka. Super. W4QI will soon be c.c. W4CRS is QRL college. W4BQO is busy at Phone Co. W4DIO moved to California. W4CWE finds time for a good traffic total. W4BQO and W4APR keep Police Radio KGFX on the air. W3CWK is pounding out. W4KIN's rig was built by W4AAB. W4FQI blew a filament transformer. W4PAM has been on a rest. W4BQG is QRL Grange Meetings. W4ALJ-W4CV-W4ZZAE renewed his operator's license. W4HQ-W4PBW has turned his equipment over to W4QI. W4AUW is getting out our bulletin. "XMTB." W4VR is QRL. W4MS led the fourth dis­ trict in the ORS QSO Party. W4ZP is being operated on 36 mc.

TRAFFIC:


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WEST GULF DIVISION

Oklahoma - SCM, Emil Glsed, W5VQ - W5KB heads the list. W5ALD comes in second. W5BBP says too much QRN. W5AH is new W5ATZ. W5MT and W5MPA promises renewed activity. W5BEF works XE. W5AJW is new QRA. W5SMF, W5BSP, W5PC, W5AJV, W5AMK, W5ANB, W5ABF, W5AEV, W5AJC, W5AVK, W5AOE, W5AEV, W5AVK, W5AOE, W5AEV.

Tulsa Amateur Radio Club operated W5KB at the Tulsa State Fair. W5CQZ is pushing out QRM. W5AXX is installing 960. W5AUU has new c.e. rig. W5FH recently got married. W5CQZ has a new receiver. W5ATO is on 1.75 mc. W5AYZ is on 3.3 mc. CW W5BVM is planning on 1.75 mc. phone. W5BQF is QRL school. W5AVK is on 7 mc and 3.5 mc. W5AJB and W5BZB are interested in Army A.A.R.S. W5VQ is on 7 mc and 2.5 mc. W5ALI is changing to Class B. Many Oklahoma hams were present at the West Gulf Convention at Fort Worth. W5BQA is awaiting lineup.


NEW MEXICO - SCM, Jerry Quinn, W5AWU - Crotia; W5ADH and his CW say they are going to win first prize in our contest. W5BVUY promises big things next month. Roswell: W5ZU is hunting for schedules. W5AIS is located at the Institute. W5ZM is putting in 1.75 mc.

phone. Albuquerque: W5AOP doesn't like his new location. W5CPO is on regularly. W5AOE is putting in Class B mod. W5ASR has YLita. W5AUV changed QRA to 420 West Lead Ave., Albuquerque. Santa Fe: W5GPF worked HHTG. W5AIO is QRL work. W5CGJ is building a new mast. Las Cruces: W5HZ is building a new mast. W5UP is on 3.5 mc. phone. W5BQD is in Cruces at school. SURPRISE ... The SCM got married this month. III.


SOUTHERN CA.- SCM, D. H. Calk, W5BHI - San Antonio: W5AMW and W5CRI are brothers. W5MN and W5MCF are back on the key. W5YL and W5BQG send nice report. W5MI is attending S.A. Jr. College. W5QW reports bad skip, W5BQP is troubled with power leaks. El Paso: W5QW is QRL work. W5KBB is going to 73 to gang. W5AUU is going strong. W5ATQ is building a c.e. job. W5WJJ has c.e. '10. W5CSW is in Chicago with call W5AZ. W5DE is quite active. W5VE moved again. W5NT is an Official Observer. W5IK took its portable on a trip. W5GXY is rebuilding. Corpus Christi: W5CHL and W5ZQU attended Ft. Worth Convention. W5MS offers schedules. W5MX is building a phone. W5TO is building portable. W5JF, W5BBB and W5CLP are at college. W5BQG wants to make 6-meter contacts. W5QMF keeps Army schedules. W5ZQ wants to understand W5QKB. W5DG and W5GOM are back on the key.

Traffic: W5BO 9, W5AW 8, W5VQ 6, W5AY 4, W5AA 3, W5AM 2, W5DS 2, W5KQ 1, W5AO 1, W5QD 1, W5AG 1, W5MZ 1, W5AW 1, W5AV 1, W5AI 1, W5AR 1, W5AM 1, W5AO 1.


Traffic: W5BOE reports traffic. W5OJ handled a death message. W4ALA is an ORS. W4ZS moved from cellar to the attic. W4DS moved to new QRA. W4IA reconstructed his shack. W4DS is QSLing as much as possible. W4AAY says Augusta Club is growing. W4BH visited Augusta in Vaudeville. W4ATZ is a DX hound. W4CQ does nice work. W5AGG has YT troubles. San Benito: W5CQG is getting out. W5AEO-W5ZLI had his FB portable at the Ft. Worth Convention. Bay City: W5BO is building MOPA. W5CIM is rebuilding. W5CUE moved to Bay City. Austin: W5VY plans schedules with Allison during latter's trip through Hawaii and Australia. W5SBJ went to sea. W5BDA and W5ATQ are on 3.5 mc schedules. W5SRA and W5BLR hope to be on 3.5 mc. 'phone. W5ASK and W5BQG took exam at that Convention. W5CT is victim of a call swiper. W5CIE is on 1.5 mc. 'phone. College Station: W5AQY is rebuilding 500-watt rig. Fort Clark: W5BSH-GJ burst out power transformer. W5SM is on 7 mc soon. The Tulare Amateur Radio Club operates W5XK at the Tulare State Fair. W5CQZ is pushing out QRM. W5AXX is installing 960. W5AUU has new c.e. rig. W5FH recently got married. W5CQZ has a new receiver. W5ATO is on 1.75 mc. W5AYZ is on 3.3 mc. CW. W5BVM is planning on 1.75 mc. 'phone. W5BM is QRL school. W5AVK is on 7 mc and 3.5 mc. W5AJB and W5BZB are interested in Army A.A.R.S. W5VQ is on 7 mc, 2.5 and 1.75 mc. W5AIS is changing to Class B. Many Oklahoma hams were present at the West Gulf Convention at Fort Worth. W5BQA is awaiting lineup.

104, VE3DW 98, VE3GL 48, YE3HB 27, VE3HV 16, QRA. YE3JB has finished a new receiver. All reports must be mailed on the 16th of the month.

Traffic: VE3AD, 467, VE3CP 111, VE3IH 107, VE3WX 106, VE3DW 98, VE3GL 48, VE3HV 27, VE3HY 18, VE3GT 24, VE3CE 16, VE3JS 13, VE3WK 10, VE3AL 9, VE3OM 7, VE3HO 7, VE3JB 6, VE3HA 5, VE3JU 5, VE3BV 2, VE3LS 1, VE3DX 9, VE3GT 62, VE3AU 18.

QUEBEC DIVISION

Q UEBEC—Acting SCM, John C. Stadler, VE2AP—Montreal amateurs operated a booth in the local Radio Show. VE2CX looked after arrangements. Nine VE2s attended Toronto Convention. VE2BD brought the booth home in the form of a '45. VE2AA will shortly appear on 3.5-mc. phone. VE2QZ recommends the Franklin circuit on 14 mc. VE2CP announces a bumper season. VE2AB is putting Dr. Woodruff's advice to use. VE2BP reports traffic schedule. VE2BD is on again. VE3HI and VE2DX have joined outfits. VE3CU is rebuilding. Welcome to VE2IG and VE2IS. All VE2s please report to VE2AP (Westmount 5847, or drop a line). Traffic: VE2BB 201, VE2AP 39, VE2CO 9, VE2DR 6, VE2CX 184, VE2CP 292, VE2CA 26, VE2QZ 29, VE3BG 11, VE3BT 2, VE3CL 9, VE3BE 30, VE3EL 2.

VANALTA DIVISION

ALBERTA—SCM, C. H. Harris, VE4HM—VE4GY harvested a good crop. VE4XU is getting out well. VE4HI expects a good season. VE4HI is new ORS. VE4GY uses Class B modulation. VE4DQ is building electron coupled MOPA. VE4EA gets good reports on 3.5-mc. phone. VE4GC gets flocks of QSLs every mail. VE4FJ dessert credit to VE4AL for the work. VE4QD sent Calgary report to VE4HM by a phone QSO. VE4JK worked DX. VE4QH is experimenting with condenser mike. VE4HZ returned from the north. VE4RT is new ham at Wetaskiwin. VE4HM schedules VE4FM in the Arctic. VE4BY has fallen in love with a guitar. VE4DJT is QRL grain business.

Traffic: VE4BS 34, VE4DQ 18, VE4BD 8, VE4JK 5, VE4EA 2, VE4HM 2, VE4EC 2.

BRITISH COLUMBIA—SCM, J. K. Cavalsky, VE5AL—VE5FG is now a proud father. VE5BH's second op. is away on a honeymoon. VE5EW uses a pentode. VE5AC plans a new rig. VE5AL has new rig. VE5HI has new receiver. VE5FE has nice o.c. rig. VE5FT will work from VE5AJ. VE5G a skeds Vancouver. VE5HP is a busy man. VE5EC has new n.c. receiver. VE5QO is looking for DX. VE5FH is on again.

Traffic: VE5EF 13, VE5MIP 8, VE5EC 42, VE5GT 40, VE5AC 28, VE5AL 20, VE5FG 66, VE5DQ 2, VE5HT 2, VE5BH 33, VE5GW 45.
WiXP in British Isles

183 Ilderton Road, South Bermondsey, London, S. E. 16

Editor, QST:

I was recently looking through some back numbers of QST and in one of them was interested by a description of WIXP.

Some little time ago my calibration for the 3.5-mc. band went haywire and I was extremely anxious to get another reliable calibration, owing to having a scheduled on that frequency with WSDBX, who is heard here occasionally. Calibration services over here are few in number and are only of the "two point" variety—giving solely the high- and low-frequency limits of the various ham bands—and are thus of limited utility.

In the small hours on August 27th last, I happened to be having a look around on 3.5 mc. and, finding the "W" signal-strength-to-QRN ratio decidedly favorable, decided to spend an hour or so in the hope of hearing one or two friends of mine on your side of the ditch. So it was that, purely by luck, I happened to be pottering around at the low-frequency end of the band at 0200 BST when, wham! I hit onto an R7-8 signal signing "Standard Frequency de WIXP," with the characteristic letter "G."

Of course, with a QSA5 signal of that strength, it was child's play getting the six points at 100-ke. intervals that followed, and the resultant curve sure looks very FB! I can do no less than pen these few lines in appreciation of such an excellent service, as requested at the conclusion of the aforementioned "QST" article.

I should add, too, that I consider the "W" hams are lucky to be able to avail themselves of such FB calibration services as those arranged for them by A.R.R.L., and that it is sure a mystery how any of them ever manage to get off wave!

— G. C. Allen, ex-BRS250

Cure the Long CQ's!

279 Park Place, Brooklyn, N. Y.

Editor, QST:

The other night I listened to an 8th district station sending CQ for fully 4 minutes. Instead of impatiently tuning him out for some other signal, I waited until he finished, gave him a call, and when I established communication, this is the first thing I said (and it is literally true): "It's a shame OM that a station with a note as steady and good as yours should send a CQ that is so disgustingly long."

In the course of the conversation that followed, he admitted his abuse of the "CQ" privilege, and I feel that one ham may have been cured.

This brings me to the point I wish to emphasize. How many of us fail to call a station's attention to his discourteous violation of amateur transmitting ethics?

I can cite an analogy in a matter concerning our municipal government. There was a ditch in the asphalt pavement near my home, and it was so deep that every time a truck went past it shook the whole house. This went on for four months and nothing was done. All the neighbors complained to one another about the thing, but all of them were too indolent to write to the Commissioner of Highways, until "yours truly" wrote the necessary letter. Contrary to general belief, the Department took prompt notice of the complaint, and the ditch was repaired within the next three or four days.

I am going to sign off by saying it should be the duty of every ham to call another's attention to his abuse of the CQ privilege at the very time communication is established. There are some things about which we can have an open mind, but the lengthy CQ is not one of them.

—Charles F. Jacobs, W2EM

Tommy Baird

Spokane Radio Operators Club, Spokane, Wash.

Editor, QST:

I don't know exactly how to write this letter, but it must be done. We can't always do the things we like, you know. I'm writing a little obituary for Thomas W. Baird, Jr., W7VL.

Tommy was born in Chicago, at an early age moved to Spokane, and attended grade and high school here. At the close of his high school years he was stricken by a form of rheumatism which kept him in bed for three or four years. At this time he became interested in radio and started out on 160 meters with an old UV-202 and an entire layout of home-made apparatus. The plate transformer was wound by hand while he was flat on his back in bed.
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EXPERIENCE — ENGINEERING

TRANSFORMERS SWINGING CHOICES SMOOTHING CHOICES HI-VOLTAGE CONDENSERS (PYRANOL TREATED)

PERFORMANCE
is of high standard. These units are designed specifically for transmitter power supplies. Proper Engineering has produced these esssentials —
Excellent Regulation Ample Load Capacity Low Ripple

PRICE
is low in amount. Proper design and accurate rating knowledge has resulted in —
Correct Material Use Omission of Non-Essentials Production Economies

SPECIAL UNITS FOR THE NEW CRYSTAL XMITTER NOVEMBER QST

Input — 115 volts 60 cy. A.C. Output — 400 volts 175 MA D.C., VT — 82 Rectifier Tube Regulation from bleeder load to full load — 12 1/4%. Ripple — 5%.

Note Electrostatic Shields — Essential at High Frequencies. If more smoothing is required, add a second filter section consisting of an AD140 (8.5 H., 175 A., $4.55) and 4 mfd. condenser AD300. Ripple will then become 2 1/2%.


T. Cat. No. AD20 Multifil. Transformer Volts 480-0-480 A.C. r.m.s. Pwr. VA 95. Amps 0.130 A.C. r.m.s. Sec. VA 125. Insulation 2500 v. peak. Your Price $4.30.

L. Cat. No. AD30 Ind. 5/20 Henrys. Insulation 2500 v. peak. Your Price $5.95.


Terms of Sale: 20% deposit with order. Balance C.O.D.

Shipment: Direct from factory stock, F.O.B. Cambridge, Mass.

Delta welcomes the opportunity to assist amateurs in solving their power supply problems. A complete description of circuit and problem will promptly bring our best advice without charge.

Send for Bulletin AD describing in detail these items and the complete new line specially developed for amateur use

F. S. Dellenbaugh, Jr. G. E. M. Bertram

SUCCESSORS TO ACME APPARATUS CO.

Soon he was able to be up and around even though the effects of the disease had left him a cripple. His back and hips were entirely stiff and could not be moved. His neck also was stiff and he was bent forward in practically a half circle. His amateur station grew and grew till he had a single 852, with which he worked all continents except Africa, and became perhaps the Northwest’s best known amateur. Despite his crippled condition he went to work at KFPY in 1927 and became chief engineer in 1928. At this time the Spokane Radio Operators Club was organized and he became President, succeeding himself each year till his death, August 1st of this year.

Tommy met his death as a result of a fall at KFPY. He came down to the station about 2 a.m. to do some work and after completing it went to the studio to sleep on a davenport. In some way he tripped on a level floor (not improbable because of his stiff hips) and fractured a vertebra. One side became paralyzed, though he was not in much pain and no doubt would have lived. Faced with spending the rest of his life in bed, he chose to take a chance on an operation. The operation was successful and all seemed well until ether pneumonia set in, and he passed away at 3:30 p.m. on August 1st.

Thus we briefly record the life and death of one of the greatest fellows ham radio has ever known, and also the best radio expert in this Northwest Division. Tommy was the kind of a man that had many friends with never an enemy. Every friend was a strong friend.

— Wes Bell, W7ADU

R.A.C.

Editor, QST:
I’m a beginner, and perhaps I speak out of turn; however, a QSO is a big thing to me yet, so here goes!

Books, magazines, articles and items have all given to me one seemingly important factor in amateur radio work; the value of a clean, sharp signal. Now, I think someone is kidding me. The thing to do is to get a good husky r.s.c. note on the air — one that’s able to cover and blot out all the signs on my end of the band at least. Then when I answer a CQ they have to listen or go out of business!!

Ethical? Lawful? Why not! Plenty of fellows with two-letter calls and the smell of old-timer about them are doing it and logging QSO’s by the yard. If they can do it and nobody stops them — well, why can’t I? Don’t tell me that old one about the rules and regulations — I’ve heard it before, and it’s certainly a wonderful consolation to know that we have such rules, etc., especially when you’ve hooked real DX and try for the nth time to get or give a report or QRA through the mellow, mud-like r.a.c. only 20 kc. away.

What’s the answer, OM? I’m just a beginner and I may be all wet!!

— Charles E. Winkley, Jr., W1EIF

Mentionnez que vous l’avez lu dans le QST — Cela vous identifie et aide le QST
BARGAINS  ARMY AND NAVY  RADIO SURPLUS

We have made drastic price cuts in many items!

All equipment is guaranteed to be in first class operating condition—the greatest majority of it is new in manufacturer's original packaging.

**Western Elect. Condensers types 21A, 1000 V. D.C. 6.3 volts, 1 mfd. Excellent for filters. Several can be used together for large capacity or high voltage. Esth.$7.75**

**Condensers, Mica, op. volts 12,500, cap. .004 Dubler, new $1.50. Dubler, used $1.00. Wireless spec. new $1.50. Wireless spec. used $1.00. Condenser, Dubler, mica, volts 60,000, cap. 20-150000 or 0.01 $100.00 Condenser, Dubler, mica, op. volts 5,500, cap. .004 $5.00. Condenser, Wiedoch 0.005 mfd. 5000 volts, ... $1.00. Above condensers are standard for use in high-grade commercial transmitters.**

**Lightning switch, ceiling type, heavy brass. Can handle 10 K.W. $10.00.**

**A beautiful piece of equipment which will add "tone" to any amateur station.**

**Condenser, Jubilier, mica, op. volts 8,500, capacity 0.004 mfd. 5000 volts, $15.00 value.**

**Several can be used in high-grade commercial transmitters.**

**West, Eec. line- man's letter for high res. and long circuits. A beautifully made high-grade instrument. Magnets and ringer $1.50.**

**Army headphone receiver 1000 ohm, using 1 volt. Testing etc. $1.75**

**Thermocouple ammeter, 0-2 scale 0-15-150 guaranteed 3 of 1% accurate. $10.00.**

**Anemometer, D.C. portable new Weston model 45, 3 scale 0-15-150 guaranteed 3 of 1% accurate. $10.00.**

**Voltage, D.C. portable new Weston model 45, 3 scale 0-15-150 with 3 scale external shunt and loads 3 of 1% accurate. $10.00.**

**Table Phone, Kellogg Single button microphone, 70 ohm. Useful for headphones. J.00 ohm. Useful for headphones. $3.50.**

**Converter, 3Z d.c. 110 a.c. 400 mills, 50 cycle, $7.50.**

**VF meter, Weston, 120 to 600 d.c. 2 kw., $115.00.**

**Navy Aircraft Dynamo, Gen. Ries., new, 24/1000 volts, 1 amp., extended shaft with pulley, can be driven by motor, or propeller, giving 54 volts output for filament and 1000 volts for plate or driven by its own input of 24 volts. A big, powerful machine. Value $250.00. Our special price $30.00.**

**Generators**

- **110 volt a.c. 900 cycle, self-excited. $90.00.**
- **115 volt a.c. 600 cycle, self-excited. $250.00.**
- **250 watts. $15.00.**
- **110 volt a.c. 500 cycle, self-excited. $250.00.**
- **250 watts. $15.00.**
- **1500 volt d.c. 660 mills, 1 kw. $50.00.**
- **240 volt 500 cycle, self-excited 250 r.p.m. $25.00.**
- **250 vat. in use (also hand drive). $25.00.**
- **220 volt a.c. 500 cycle 1 kw. $45.00.**
- **220 volt a.c. 500 cycle 2 kw. $60.00.**
- **12 volt a.c. 60 amp. $15.00.**
- **12 volt a.c. 35 amp. 7.50.**

**MOTOR GENERATORS**

- **110 volt a.c. 110 or 220 a.c. 50 cycle, 250 watts. $100.00.**
- **110 volt a.c. 110 or 220 a.c. 50 cycle, 250 watts. $100.00.**
- **120 volt a.c. 2 kw. $115.00.**
- **600 volt a.c. 2 kw. $45.00.**
- **220 volt a.c. 50 cycle 1 kw. $45.00.**
- **220 volt a.c. 50 cycle 2 kw. $60.00.**
- **12 volt a.c. 20 amp. $15.00.**
- **12 volt a.c. 40 amp. $45.00.**
- **12 volt d.c. 20 amp. 2 kw. $60.00.**
- **12 volt d.c. 40 amp. 2 kw. $60.00.**

**Converters**

- **120 d.c. 120 a.c. cycle, 2 kw. $85.00.**
- **Converters, 3Z. - 110 a.c.. 1000 volts. $15.00.**
- **Converters, 3Z. - 110 a.c.. 500 volts. $20.00.**

**FOR XMAS**

A WONDERFUL OPPORTUNITY TO GIVE SOME ONE A GIFT OF REAL VALUE FROM AMONG THESE BARGAINS AT VERY SMALL COST.

Largest Radio Electric Supply House in U. S. on Army Navy Surplus. Sufficient postage and deposit of 20% required on C. O. D. orders. No orders shipped for less than $1.00.

**Canadian Orders must include Full Remittance**

**MANHATTAN ELECTRIC BARGAIN HOUSE, DEPT. Q, 105-7 Fulton St., New York City**

Say You Saw It in QST — It Identifies You and Helps QST
Making 'Em QSL

Editor, *QST*:

I have discovered a system whereby I receive a much larger percentage of QSL cards from my QSO's. This announcement, I judge from the many cries of lamentation voiced regularly in *QST* over the failure of some fellows to QSL, will be hailed by some as a great boon to hamdom.

While the procedure is not productive of 100% results, its effectiveness is none the less amazing. Before I began the practice I received QSL cards from about 40% of my otherwise perfect QSO's. This percentage has been boosted to about 90.

I have, for enclosure with my QSL card, a printed notice the same size as my QSL, on which I inform the addressee that if his QSL card is not received in a reasonable time, his call letters and QRA are to be added in very legible letters to my non-Q list. This is a large white placard of sturdy quality, whereon are recorded all station calls belonging to those who have failed to exchange cards, but who are probably none the less pleased to have received mine. This system has been in effect about a year, and during that time very few QRA's have been added. If at any time a card is received from one whose name emblazons the placard, that name is promptly removed. My station is located where I have opportunity to display my rebels' mailing list to many visitors. All this is explained on the printed notice, and I am inclined to believe that even a hard-hearted non-QSL enthusiast is apt to break down under the pressure of the qualms of conscience when he knows that his call letters and QRA are held up in plain view of the rest of hamdom.

I intended to furnish a complete list of non-Q artists already listed with each QSL card, but the system outlined above was found sufficiently effective.

--- Foster D. Brunton, KG6LG

FB!

Editor, *QST*:

Just to prove that the venerated April, 1929 fone transmitter circuit is still hard to beat in spite of Class B high-power hookups, I am reporting that in five weeks during August and September W4QZ, using almost identically the same arrangement brought out in *QST*’s first 100% modulation circuit, has made 37 west coast contacts.

On the night of September 23rd I worked all U. S. districts, Canada, Mexico, and Hawaii on 75-meter fone. K6BAZ, Honolulu, gave me a QSA4 R7 report. So did X5N, Rodriguez Dam, Lower California, Mexico. W6GOH and W6CZ, Los Angeles, gave me QSA5 R8. Pendleton, Oregon, W7AQX, said I was QSA4 R6. I have worked all U. S. districts for four consecutive week-ends.

W4QZ’s final amplifier is a couple of 852’s.
Jerry announces 3 new numbers!  

The "Eagle" a new sensational 3 tube S. W. Receiver $16.95

Here at last is a short wave receiver embodying features comparable to those in sets selling at a much higher price. Unusually flexible, designed for continuous short wave broadcast coverage or ham band spreading. Constructed of finest material available, such as tinned Manganin Inductance Indicators, etc. This Receiver was designed for the discriminating buyer desirous of purchasing the finest of its type. It will be found to compare favorably with any of the "junk piles" selling at anywhere near the price of the "EAGLE." Each unit is individually finished to give you the satisfactory performance you would naturally expect from apparatus produced by GERRY CROSS.

Economical to operate. Employs the new 2 volt tubes which can be operated from two dry cells on the filaments for extended periods of time. While full dial coverage on each ham band can be had, the "EAGLE" may be adjusted to cover continuous range from approximately 15 to 200 meters. This is very easily done by controlling the tank condenser which is operated from the front of the panel.

CHECK THESE FEATURES!!

SCREEN GRID 222 R.F. and grid detector offering highest possible gain and most efficient regeneration.

PENTODE POWER AUDIO 33 gives maximum audio gain than obtained from two ordinary transformer coupled stages. Will operate on either 6 volt or 12 volt battery.

TANK GRID-IN-BAMPH - is operated from the front of panel and eliminates the objectionable necessity of lifting the cover. Speedy changes at your fingertips. The ADDITIONAL condenser employed here gives much finer tuning than is possible with the ordinary large condenser.

BAND SPREADING CONDENSER — very small capacity permits widest possible bandwidth, controlling the tank condenser which is operated from the front of the panel.

DIAL — Latest design, real vernier control over any portion of the dial at a single glance. Absolutely no jump or slip — very rugged.

REGULATION CONTROL — Employs condenser for stabilization, ruggedness and velvet-like smoothness, not noisy like ordinary large condenser.

POWER CABLE — Eliminates possibility of wrong connections.

GABINET — Size 6" x 7" x 9/16", metal, compact, banded cover, vacuum packed finish. Completely shields the receiver. Also ideal for portable use.

RANGE 15 to 200 meters — 4 plug-in coils are supplied with each receiver.

The "EAGLE" completely wired and tested. Price. $16.95

The "EAGLE" complete kit of parts with diagram. Price. $12.50

Now a greater value than ever — HOYT METERS — GERMAN SILVER DIALS — BAKELITE INDICATOR KNOBS and other refinements at no increase in price.

Your choice of 210 oscillator 210 buffer 210 amplifier or Pentode oscillator 210 buffer 210 amplifier. Can also be supplied with two 210's in push pull output stage. Completely assembled ready for you to wire with three Hoyer meters $9.85; with three Weston meters, $12.50; 210's push pull in output stage $8.00 extra.

CLASS "B" MODULATION UNITS — for modulating the GC-30 complete kit ................ $49.50

RELAY RACKS — fine for mounting the GC-30 or GC-100 and all power packs. Black crystalized finish, price. .......... $12.50

GC-100 — Same construction as GC-30 — a new higher powered job for use with 203-A or all in the output stage. Completely assembled.................. $59.50

NEW!!

Billey crystal holder, moulded bakelite job with chromium polished electrodes — crystal is hermetically sealed in, only $1.50

Billey 40 meter crystals now only ........ $1.50

HOYT ANTENNA METERS!!

Hot wire antenna meters 1/4 and 3 amperes ranges. 10 volt antenna meters when you can buy them at Jerry's who knows what the "Ham" wants. Special low price ........ $2.95 each Hoyt perfectly damped meters at a price. These are not to be confused with the usual meter "hampers" 2" mounting hole, shape 9/16" diameter, supplied in the following sizes: 10 m. $4.50, 20 m. $6.50, 30 m. $8.50, 40 m. $10.50, 50 m. $12.50, 60 m. $14.50, 70 m. $16.50, 80 m. $18.50, 90 m. $20.50, 100 m. $22.50. Price each .... $1.95

10 volt filament transformer, 7.5 amperes, extra special only ...... $9.50

Cased 2½ volt — 866 transformers, 10 amperes, extra special........ $2.50

Chrissell condenser mike kit, contains all the parts necessary to assemble your own condenser mike, special........ $2.85

P R I C E S  C U T

Plated copper tubing inductances wound and ends drilled free

25 ft. 5/16" 6c turn $1.75 12c turn $1.75

25 ft. 3/8" 6c turn $2.50 12c turn $2.50

100 ft. 5/16" 6c turn $5.85 12c turn $5.85

Genuine Baldwin Type "C" Mica Dielectric

No. 12 (any length) 100 ft. $1.35
No. 10 (any length) 100 ft. .... $1.95
No. 8 (any length) per 100 ft. $4.20

Ebonite panels, beveled edges 3/4" thick

10 ft. $1.20 20 ft. $2.00 30 ft. $2.95 50 ft. $10.10

Flat plate condensers, air spaced, 3 turn, flat plate

10 ft. $1.10 20 ft. $2.20 30 ft. $2.40 50 ft. $10.60

50 ft. $14.10

20% deposit with all C. O. D. orders. Include Postage.

A COMPLETE LINE OF STANDARD AND "HARD TO GET" PARTS

"JERRY'S PLACE"  

25 WARREN STREET, N. Y. C. TELePHONE BARCLAY 7-6928

Say You Saw It in QST — It Identifies You and Helps QST
"Why Take Chances?"

REPLACE WITH GENUINE CENTRALAB FIXED RESISTORS

CENTRALAB FIXED RESISTORS are Baptized with Fire in the making and will withstand a greater load than any other composition resistor of equal size.

Packed in handy carton of 10. Your choice of resistance values.

Centralab
CENTRAL RADIO LABORATORIES
MILWAUKEE, WIS.

YOU CAN'T AFFORD TO BE WITHOUT THE NEW
Easy-Working Genuine Martin

No. 6 VIBROPLEX
Reg. Trade Marks: Vibroplex, Bug, Lightning Bug

In Colors
Blue Green Red

Makes sending easy. Easy to learn. Easy to operate.

Black or Colored, $17. Nickel Plated, $19

Improved MARTIN Vibroplex

Black or Colored, $17
Nickel-Plated, $19

Special MARTIN RADIO Bug — Extra large Specially Constructed Contact Points for direct use without relay. Black or Colored. $25

Liberal allowance on old Vibroplex. Remit by Money Order or Registered Mail

THE VIBROPLEX CO., Inc. 525 BROADWAY NEW YORK CITY
Cable Address: "VIBROPLEX," New York

Ham Helpfulness

1350 Garfield Ave., San Marino, Calif.

Editor, QST:

Lucien Daufau is an ex-soldier who served the United States at a very early age, and is paying for his patriotic impulses by a life-time of continuous suffering. He is able to move about, and with the assistance of crutches makes his painful way from place to place about the house, all the while being wracked with excruciating pains in his back.

For three years young Daufau has felt that life was almost unbearable. With nothing to do but lie in his bed, thinking of the doctors who, in tedious succession, have failed to cure him, he has been on the point of sacrificing his reason. Then, somehow, the thought occurred to him that about the only thing in which he could interest his mind was amateur radio telegraphy. Because his home is in the high mountains of northern Idaho, he was strictly limited as to available conveniences. Added to that, he had no means.

From somewhere Lucien obtained an old, discarded BCL receiver. He tore it apart. Writing to a technical magazine he obtained the blueprint of a short-wave receiver, and, without knowing anything at all of the principles of radio reception, set about building a 40-meter outfit. No one within many miles of him knew anything about short-wave "stuff," so Lucien worked alone.

For weeks his set refused to work. He couldn't get anything but blasts and squeals out of the headphones. At last, however (after dynamiting his tubes once!), he got in some signals, but found them to be away up on the lower end of the b.c. band. By whittling at his tuning condensers and otherwise reducing the electrical dimensions of the component parts, Lucien finally got down to 40 meters, where the hams were thickest.

Probably no ham in America spends as many hours a month with "cans" on his ears as does Daufau. When he can sit up he is in front of his instruments; when the pain forces him to recline, he sets his receiver at a likely point and lies down with the 'phones still on his head. He listens to everybody — especially to the ham telephone outfits, for he is only beginning to pick up code. One night Daufau heard a two-way telephonic conversation between Ernest Van Horn, of Kirkland, Washington, and some other ham in California. The Kirkland OM seemed so anxious to help the other fellow that next day Lucien wrote him a letter, asking certain questions anent the pile of junk that lay on the "DX Table" of his home in the Rocky Mountains.

72 Diga que lo ha leído en QST — Así se dará Vd. a conocer y ayudará a la vez a QST
Hey Gang! Wasn’t the depression awful? But we didn’t feel it at any time, as we had the lowest prices, guaranteed everything unconditionally, and because we’re a real Ham Organization. The gang flocked to our door day and night to get that 100% service. Try us, and get acquainted. Send Your Problems in! UNCLE DAVE.

25-watt tube. Just what the amateurs have been waiting for! 7½ volts filament, 850 plate volts, grid volts 75-100, ONLY $4.25

<table>
<thead>
<tr>
<th>Description</th>
<th>Price</th>
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<tbody>
<tr>
<td>856 Heavy duty, mercury rectifier tubes</td>
<td>$1.40</td>
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<tr>
<td>$80 new type, oval plastic, circular shape, shielded, ceramic, uncond.</td>
<td>$3.35</td>
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**FIRST QUALITY, 90 Day Guar.**

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<th>Description</th>
<th>Price</th>
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<tr>
<td>15-watt 210's, each. 15A-7; 280-900, each</td>
<td>$1.20</td>
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<tr>
<td>15-watt 210 grid with grid on top</td>
<td>$2.50</td>
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<tr>
<td>280-M, each. $1.61; 280-280 or 53, each</td>
<td>$2.75</td>
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<tr>
<td>New type 871 or 888, each $1.49; 82-M, each</td>
<td>$2.50</td>
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<tr>
<td>Pyrex lead-in bowls</td>
<td>$1.45</td>
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<tr>
<td>Pyrex 3&quot; insulators - 27c; 1½&quot; 75c; 1¼&quot; 127c</td>
<td>$1.45</td>
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<tr>
<td>Soldering irons - heavy duty, each. 93c; extra 6½c</td>
<td>$1.00</td>
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<tr>
<td>Universal watch case model, single button tubes</td>
<td>$1.75</td>
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<tr>
<td>Kitsel microphone cases, each</td>
<td>$1.45</td>
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<tr>
<td>Universal BB microphone, new model</td>
<td>$1.95</td>
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<tr>
<td>Universal BB bullet microphone, our price</td>
<td>$2.50</td>
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<tr>
<td>Stand-off insulators, per dozen 9½c, 2½c</td>
<td>$1.00</td>
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<tr>
<td>American type CD double button tubes</td>
<td>$2.75</td>
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<tr>
<td>Jefferson single-button mike elements, fully shielded and fully mounted</td>
<td>$1.95</td>
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<tr>
<td>Double button</td>
<td>$2.95</td>
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**CRYSTALS**

<table>
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<th>Description</th>
<th>Price</th>
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<tr>
<td>Unfinished crystal blanks, either X or V cut</td>
<td>$1.20</td>
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<tr>
<td>Finished polished blanks</td>
<td>$2.00</td>
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<tr>
<td>800 ohm X cut, high quality, fully shielded and mounted</td>
<td>$1.85</td>
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**ARSCO XMITTERS AND RECEIVERS**

<table>
<thead>
<tr>
<th>Description</th>
<th>Price</th>
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<tbody>
<tr>
<td>Arseo Jr. single 245 TTTN tube, complete with power pack, tubes, and mercury rectifier</td>
<td>$12.95</td>
</tr>
<tr>
<td>Arseo Junior Push PTPY 245, complete with tubes and mercury rectifier built to Handbook specifications</td>
<td>$16.00</td>
</tr>
<tr>
<td>Arseo 2-tube bread board receiver, made of finest material with 3-Speed 3BB's 4.75 in chassis</td>
<td>$9.25</td>
</tr>
<tr>
<td>TRANSFORMERS - THIS MONTH'S SPECIAL 3000-WATT 1150 PRIMARY DIAM. 1/2&quot; O.D.</td>
<td>$1.75</td>
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<tr>
<td>2-½ volt C.T. winding, high voltage 300 volts CT, 2000 v. C.T.</td>
<td>$1.75</td>
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<tr>
<td>1-½ volt C.T. winding, high voltage 300 volts CT, 1500 v. C.T.</td>
<td>$1.75</td>
</tr>
<tr>
<td>1-½ volt C.T. winding, high voltage 300 volts CT, 1000 v. C.T.</td>
<td>$1.75</td>
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<tr>
<td>1-½ volt C.T. winding, high voltage 300 volts CT, 500 v. C.T.</td>
<td>$1.75</td>
</tr>
<tr>
<td>1-½ volt C.T. winding, high voltage 300 volts CT, 100 v. C.T.</td>
<td>$1.75</td>
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**TELEPLEXES with Tapes**

<table>
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<tr>
<th>Description</th>
<th>Price</th>
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<tbody>
<tr>
<td>WIRE: GENUINE ACME, solid enamelled arial wire</td>
<td>$1.00</td>
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<tr>
<td>100 ft. No. 10 gauge 95c; No. 12 gauge 85c; No. 14 gauge 75c</td>
<td>$1.50</td>
</tr>
<tr>
<td>100 ft. No. 12 gauge 95c; No. 14 gauge 85c</td>
<td>$1.50</td>
</tr>
<tr>
<td>100 ft. No. 14 gauge 95c; No. 16 gauge 85c</td>
<td>$1.50</td>
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UNCLE DAVE'S RADIO SHACK
Proud of it?

Are you proud that you are an amateur — proud of your A.R.R.L. membership? Then proclaim it! Let the hams who meet you on the street, in the radio store, or traveling, know it. Wear your A.R.R.L. emblem!

The distinctive League emblem comes in four different forms. Its use by members is endorsed and encouraged by the League. Every member should endeavor to display the insignia of his organization in every possible way.

THE PERSONAL EMBLEM, in extra-heavy rolled gold and black enamel, just \(\frac{1}{2}\)" high, supplied in lapel button or pin-back style, is recognized as the sign of a good amateur. Wear your emblem, and feel proud of having taken your rightful place in the radio fraternity. Either style, $1.00, postpaid.

THE AUTOMOBILE EMBLEM, heavily enameled in yellow and black on sheet metal, will gain you friends. On the road, traveling, it identifies you as a real amateur. 5 x 2\(\frac{1}{2}\)", holes top and bottom. 50c each, postpaid.

THE EMBLEM CUT, a mounted printing electrotype, the same size as the personal emblem, is for use by members on amateur printed matter, letterheads, cards, etc. $1.00 each, postpaid.

THE "JUMBO" EMBLEM, an attention-getter for the shack wall or that 100-footer, is a big yellow-and-black affair 19 x 8\(\frac{1}{4}\)", same style as the Automobile Emblem. $1.25 each, postpaid.

In a week Van Horn wrote back saying to listen in for him at a scheduled time, and he'd tell him all about it. At the appointed time he was on the air, coming in with: "Hello, Lucien Daufau, Hello Two Creek Rancho, hello Porthill Idaho, hello Lucien Daufau!" He answered all questions, giving minute instructions, and said that if he had overlooked anything to ask him again.

A few days after this occurrence a big box arrived by express at Porthill, Idaho. It was addressed to Lucien Daufau, and came from Ernest Van Horn. The contents was as assorted a bunch of old wireless junk as ever a man gazed upon, but it was a treasure to young Daufau. From the equipment sent him by the Kirkland chap, whom he has never has seen, Lucien now has a new receiver in service, and with it is reaching out as never before. He is boning the code, too, and can copy parts of weather reports already. Forging ahead toward the day when he actually will be on the air, Lucien Daufau has built a transmitter and, although he has not been able to get to a place where he can take the exam for a ham ticket, he has tuned up his one-tube dry-cell-power-supply outfit, and has magnetized all the watches in the house!

The writer of this letter is a friend of the Daufau family who went to school with them 24 years ago. He wants to express thanks to Ernest Van Horn for the splendid thing that young man has done. Such unselfishness and magnanimity and helpfulness deserve citation.

--- Geo. Roger Chute

Inductance Switch

ALTHOUGH coil-switching arrangements for band-changing have attained little popularity in amateur receivers, possibly part of the reason has been the lack of a suitable multi-point and multi-blade switch, especially since home construction of such a switch becomes a rather difficult proposition mechanically. It is common practice to use switches of this type in commercial converters and combine short- and long-wave broadcast receivers, however, and it is now possible for the amateur experimenter to obtain switches at a reasonable cost. The photograph illustrates a switch of this type.

The switch shown is a three-section five-position affair, which means that it will handle three
FOR THE PAST EIGHT YEARS

TUBES AT PRICES TO FIT EVERY BUDGET

FOR THE PAST EIGHT YEARS

- ROYAL MONITOR

- PUSH BACK WIRE

- General Electric Milliameters

- Meter Specials

- ROYAL SHORT WAVE RECEIVERS

- Transformer Specials

- Resistors

- Actual wattage ratings! Will not open or develop noise.

- Condenser Specials

- Filter Choke Specials

- ROYAL MONITOR

- FREQUENCY METER

- PUSH BACK WIRE

- General Electric Milliameters

- Meter Specials

- ROYAL SHORT WAVE RECEIVERS

- Transformer Specials

- Resistors

- Actual wattage ratings! Will not open or develop noise.

- Condenser Specials

- Filter Choke Specials

- ROYAL MONITOR

- FREQUENCY METER

- PUSH BACK WIRE

- General Electric Milliameters

- Meter Specials

- ROYAL SHORT WAVE RECEIVERS

- Transformer Specials

- Resistors

- Actual wattage ratings! Will not open or develop noise.

- Condenser Specials

- Filter Choke Specials
silent keys

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

Harold W. Fowkes, W2BFF, Yonkers, N. Y.

A. A. Gayton, VE1CE, Sydney, N. S. W.

Francis V. Joseph, W6BTC, San Francisco, Calif.


Clinton G. Mott, WS8DB, Wilkes-Barre, Pa.

S. Sugita, J1DN, Tokyo.

Kenneth Wolfe, ex-W9CAJ, Pipestone, Minn.

Dr. E. S. Yeck, W8EBP, St. Louis, Mo.

the receiver at W2PF is a National SW-3, using a.c. tubes with "B" battery plate supply. The usual monitor is on hand for checking up on the signals from the transmitter. The antenna is separate circuits and has five contacts available for each circuit. Wiping contacts with spring action are used throughout; there are no pigtails or bearing contacts on the rotating member. The switch can be mounted on a panel in the same way as a variable resistor or single-hole mounting variable condenser, and is controlled by the same kind of knob.

The multi-section switch illustrated is made by the Oak Manufacturing Company, 303 West Washington St., Chicago.

W2PF

(continued from page 45)

The crystal oscillator tube is a 510, the whole unit, with filament voltmeter, plate milliammeter and tank condenser being built in an aluminum box which occupies the left-hand side of the lowest shelf in the photograph. To the right of the oscillator is the buffer stage, also using a 510 tube, and similarly shielded. The power amplifier, a 503-A, is on the shelf just above, together with the necessary meters and tuning condenser. Antenna condensers and a radio-frequency ammeter are mounted on the top panel.

A 750-volt power supply using a 281 rectifier furnishes plate power for the oscillator and buffer stage as well as "C" bias for the buffer and final amplifier. Plate power for the 503-A is obtained from a Thordarson 1500-volt transformer, a pair of 566 rectifiers, and an 8-µfd. bank of filter condensers. The voltage at the plate of the tube is 1850. Keying is done in the center-tap of the final amplifier, a large click filter being used for the benefit of local b.c.l.'s.

The receiver at W2PF is a National SW-3, using a.c. tubes with "B" battery plate supply. The usual monitor is on hand for checking up on the signals from the transmitter. The antenna is
QST
Can Help You with Your Christmas List

Did he borrow YOUR copy?

CAN'T you picture certain of your friends who would be as delighted as you are with QST? A subscription present is unique, too. It serves as a monthly reminder of your thoughtfulness. A yearly subscription 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.

QST—38 LaSalle Road, West Hartford, Conn.
Please send QST to the following, find my check enclosed, and send out the Greeting cards for me.

1st ________________________________ 3rd ________________________________

2nd ________________________________ 4th ________________________________

Gift of {sign here}
I. A. R. U. News

(Continued from page 47)

Dougall Whitburn, Fullerton, South Australia, well known DX station of 32 meter days — and now — congratulations, OM. European 28 mc activity still continues. HAF, VO, G and PA are all active in this field. A few good activities still continue. HAF, VO, G and PA are all active in this field. A few good

Jewell Radio Company

Exclusive Eastern Distributors for

PURADYNE PRODUCTS

CHRISTMAS WEEK SPECIAL

Deduct 10% from all advertised merchandise and send your money order for the balance

PURADYNE Power Transformers are designed for continuous operation at full load. The insulation test at a potential of 10,000 volts insures satisfactory operation under all possible conditions.

<table>
<thead>
<tr>
<th>No.</th>
<th>Out Put Voltage</th>
<th>Filament Voltages</th>
<th>Watts</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>80</td>
<td>2500-0-2500</td>
<td>7½V.c.t.-7½V.c.t.</td>
<td>325</td>
<td>5.00</td>
</tr>
<tr>
<td>80A</td>
<td>600-0-600</td>
<td>7½V.c.t.-7½V.c.t.</td>
<td>200</td>
<td>4.00</td>
</tr>
</tbody>
</table>

Shaded with stand-off insulators

PURADYNE Filament Transformers, 10,000 v. insulation in metal cases with stand-off insulators: All guaranteed for six months against any defects.

PURADYNE CHOKES in metal cases with stand-off insulators

Type

<table>
<thead>
<tr>
<th>Henrys</th>
<th>Mills</th>
<th>D.C. Resistance</th>
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</thead>
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<td>80</td>
<td>250 Ohms</td>
</tr>
<tr>
<td>200</td>
<td>80</td>
<td>250 Ohms</td>
</tr>
<tr>
<td>200</td>
<td>80</td>
<td>250 Ohms</td>
</tr>
</tbody>
</table>

PURADYNE guaranteed transmitting filter condensers, metal cases with stand-off insulators. All condensers rated at a continuous working voltage:

<table>
<thead>
<tr>
<th>Capacity</th>
<th>1000V</th>
<th>1500V</th>
<th>2000V</th>
<th>3000V</th>
<th>4000V</th>
</tr>
</thead>
<tbody>
<tr>
<td>mfd.</td>
<td>1.55</td>
<td>2.00</td>
<td>2.00</td>
<td>5.00</td>
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<td>mfd.</td>
<td>2.50</td>
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<td>mfd.</td>
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</tr>
</tbody>
</table>

PURADYNE Double Button Microphones, broadcast quality:

A REAL BUY

PURADYNE 50 Watt Sockets, heavy duty SPECIAL: $7.75 Power Supply 211-91 transmitter will supply 700 volts 250 Mills of pure D.C. current and will supply 750 V for 321 watt packs, completely wired and guaranteed. Power Supply for 50 Watt Transmitter will supply 1250 Volts, at 400 Mills of pure D.C. Current and will also supply 10V, for 50 Watt Tubes, completely wired and guaranteed. Complete set $62.50

AMERICAN 250 P.P. Power Transformers 700-0-700 Volts 74v.c.t., 74v.c.t., 225 Mills, 325 Watts. $4.75

MERSHON Electrolytic Condensers, metal cases 8 mfd.

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Watts</th>
<th>Price</th>
</tr>
</thead>
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<tr>
<td>450</td>
<td>850</td>
<td>$1.50</td>
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<td>450</td>
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<tr>
<td>450</td>
<td>850</td>
<td>$1.50</td>
</tr>
</tbody>
</table>

Voltage Dividers 21,600 Ohms for 210 Packs packed $4.45

AMERICAN Power Supply Block mounted in metal case carry 1500 Mills, 9000 Ohms. $7.50

TUBE SHIELD Aluminium for 57 or 58 Tubes $10.25

PAU Amplifier for Double Tube $25.25

JEWELL RECORDER for Cutting and Recording on Aluminum Record Blank $6.95

WEBER 3-Stage Amplifiers, ideal for above $13.50

DUBLINER .004 Condensers 12500 V. Working $3.95

MURDOCK .004 Condensers 15000 V. Working $3.50

Take advantage of the CHRISTMAS WEEK SPECIAL and save 10% on each item.
"HOW CAN I BECOME A RADIO AMATEUR?"

Does your answer come easily, freely, briefly?
No blame to you if it doesn’t — amateur radio is a complex and diversified pursuit, and it cannot be considered in a word.

The easiest way to answer that question is to suggest that your inquirer secure a copy of the League’s special beginner’s booklet. It is by far the best answer you could possibly give him, too, for the 32 pages of the new second edition of “How to become a Radio Amateur” outline the entire field of amateur radio, make learning the code easy, and tell how to build a simple station, with clear illustrations and easily followed building instructions — and there’s concise dope on getting licenses and operating properly, too. In short, it answers the question — thoroughly, yet simply. An inexpensive introduction to amateur radio and preliminary to the Handbook. The price is 25c, postpaid.

ALUMINUM BOX SHIELDS
Genuine “ALCOA” stock, silver dip finish.
5 x 9 x 6 ........................................... $1.75
10 x 6 x 7 .......................................... 2.95

ANY SIZE TO ORDER
BLAN, the Radio Man, Inc.
177 Greenwich Street, New York, N. Y.

RADIO SCHOOL
YOUNG MEN wanted to train as radio operators, we prepare for U. S. Govt. license; send for 40-page catalog; established 1899. Oldest, largest and best equipped school in N. E. 170 Lic. graduates in 2 yrs. Investigate.
MASS., RADIO SCHOOL, 18 Boylston St., BOSTON

RACK PANEL UNITS
COMMERCIAL DESIGN
The up-to-date amateur will build his next transmitter on a relay rack. REL is ready to supply complete panels, assembled and tested for oscillators, buffers, power amplifiers, modulators, pre-amplifiers, etc. Designed to fit any standard relay rack. Here is your chance to build economically. REL can also supply panels drilled, black crystal lacquered and engraved. Send in your template.
REL cat. No. 312 amplifier unit shown illustrates the general appearance of rack panels. The “J10” panel measures 10½” x 10¾” with minimum construction throughout — class “B” push-pull modulator with class “A”” amplifier — 25 watts undistorted audio output — operates with single button microphone or can be connected to additional pre-amplification for use with two button or condenser microphones — uses three type do tubes — ready for immediate use — the ideal modulator — finest parts used — very reasonably priced. Write for information.
RADIO ENGINEERING LABORATORIES, INC., 100 WILBUR AVENUE
(IMPORT DEPT. 116 BROAD ST., N. Y. C.)
LONG ISLAND CITY, N. Y.
TRYMO OFFERS

Exceptional Bargains
TO HAMS AND SERVICE MEN

Our Chief Engineer, Mr. Frank Grimes, will gladly answer any trouble problems pertaining to receiving, transmitting, or public address system.

2 TUBE SHORT WAVE SET $9.95

Uses 212 and 233 tubes. Tunes from 15 to 200 meters in special shield case.

Complete Line of Lynch Resistors, "Plug Tall," 1 Watt, 90c.

2 Watt, 96c, 3 Watt, 94c.

Kellogg Single Button Hand Mike, for phone transmitters, public address system and home recording... $1.79

Crosell Acoustic Condenser Mike kit. Complete kit of parts for headset...

600-Volt Power Supply Kit, one power transformer, two chokes, two sockets, six condensers, one metal bowl. $12.45

Will supply 600 volts d.c. 150 mills with two 74-volt windings and one 72 volt.

Plate transformer, 600-600 2.74 fil. etc... $5.95

Thorpdarson 40 henry 125 mill. chokes... 1.49

Air Capac. Switches... "Stormberg"...

8 Mfd. dry elect. cond., 200 volt... 59c

Transmitter and receiver. practice... .58

Genuine Baldwin phones...

Braided "Superior" phones... 1.39

Sangamo Input and output P.F. Trans., pair... 2.79

Instantaneous voltage limiters, six A.C. current limits... 75c

Jackson soldering froge...

Stand off insulators, doz... .58

275 volt Fil. trans., two windings... 1.49

ALUMINUM CANS "Compare these prices, 5 x 4 x 9... .80 5 x 8 x 9... 1.50

6 x 5 x 8... 1.50 6 x 5 x 9... 1.10

6 x 6 x 9... 1.25 10 x 8 x 9... 2.25

Also aluminum cans and accepts cut to your order.

Philco power trans. No. 87... 2.75

Colonial power trans. No. 79...

Mepson cond. 8-8 Mfd... 79c

Keiford No. 300 gain transformer, globe in one unit... 1.19

Keiford output impedance, 500 ohm units... 1.39

Baldwin units...

Keiford output. Protect your speaker.

Thorpdarson 1-1 transformer, male...

R.C.A. power trans. 1500-1 500, 260 watts...

C. E. 3-8 transformer, male...

Rola output trans., P.F. pentodes...

R.C.A. high power, heavy duty...

Karse output trans...

Thorpdarson interstage push pull...

Tube shields for new tubes, 50-57-58...

Ely B6114, 4-5-6 phones...

E-groove...

Everbright Rossin core coder, 12...

Benjamin sockets, 4-prong...

Drs. Boll trans. Special...

Deforest tubes...

Telectric.... 50c

76... 74c

57... 76c

Bond 250 tubes...

S-H. Lamp socket antenna...

Dejar Amcne condensers 000025...

2 Gang... $1.19 3 Gang... $1.95

4 Gang...

Panel mount knobs...

50 rnight transmitting condensers...

Set of 4 single wave cells 12-20 meters...

Set of 2 coils, broadcast band...

00001... Hammardlund midget cond...

000025...

American mikes... Special Clarostat pots and vol...

Universal mikes... Special...

Cardwell condensers... Special...

Waston mikes... Special...

Jewel mikes... Special...

Redefine mikes...

Single button mike transformer...

Double button mike transformer...

Kenyor Transforms...

Powertone amplifier 1...

Powertone amplifier 1...

Powertone amplifier 3...

Powertone amplifier one stage 50 P.P.

Mike control boxes for single or double...

Mike speaker stands...

Trymo Radio carries the most complete line of mikes.

We can solve your Radio Problems. Let us know your needs.

TRY-MO RADIO CO.
Main Store, 85 Cortlandt St.

179 Greenwich St. 179 Greenwich St.

Cor. Cortlandt St. Neer Cortlandt St.

NEW YORK CITY

SEND FOR OUR LATEST CATALOG

Diga que o viu na QST — Assim se identifica e ajuda o QST

and Central districts of the N.V.L.R. held a fox
hunt recently — with direction finders... .

The Hague section had a field day with portable
3.5-mc. apparatus... .

 Geoffrey Builder, for-

mally operator of VK6MO, Watheroo, W.A.
(see May, 1931, QST) has been included in

the personnel of a scientific expedition to the North
Polar regions.

The Right Way to Do It

(Continued from page 37)

W9XAN: Elgin Observatory, Elgin National
Watch Company, Elgin, Ill., Frank D. Urie in

charge.

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

REPORT BLANKS

Blanks for reporting on the S.F. transmissions
will be sent postpaid upon request. Just send a
card or message to Standard Frequency System,
QST, West Hartford, Conn., asking for S.F. blanks.

WWV 5000-KC. TRANSMISSION

The 5000-kc. transmissions of the Bureau of
Standards station, WWV, are given every Tuesday
from 10:00 a.m. to 12 noon and from 8:00 to
10:00 p.m., E.S.T. The accuracy of these trans-
misions is to be better than 1 cycle (one in five
million). Information on how to receive and utilize
the signals is given in Letter Circular LC-335,
obtainable on request from the Bureau.

Communications concerning these transmissions and
reports on their reception should be addressed to
Bureau of Standards, Washington, D. C.

J. J. L.

Strays

Dr. C. L. Fortescue, of Westinghouse, in a
paper presented before the International Elec-
trical Congress in Paris, stated that there is no
possibility of counteracting the destructive
effects of a direct stroke of lightning. Lightning-
protective devices are useful chiefly to carry in-
duced surges to ground and in draining off the
"static" so that direct strokes are less likely to
occur. We wish now that somebody would come
along and take a crack at the idea that an antenna
is a hazard to life and property, while a wire
clotheline is perfectly safe.

High-power wavelengths! According to a San
Francisco paper, KJBS of that city is coming up
in the world, having increased its wavelength
from 5 watts to 100 watts. W6BNA says they use
a temperature-controlled wattmeter to keep on
frequency!

Some people have queer ideas of humor.
Not long ago we received a letter, ostensibly
from Mrs. W. C. Darracott, reporting the death
of K6CQZ. It was duly reported in Silent Keys,
and then comes a letter hot-foot from Darracott
himself, very much alive—and wanting to
Merry Christmas, OM!
Headquarters for Single Signal Superheterodynes — Why Not Start 1933 Right?

S. S. High Frequency Tuner & I. F. Filter $90.75 Complete, Less Tubes
The New M. & H. High Frequency and I. F. Filter Unit for the Single Signal Type Superhet, as described by Don Lusk in November QST, is now available to Amateurs in kit form. All parts assembled but not wired. A pair of pliers, a screw driver and soldering iron are only tools required.

I. F. & Audio Frequency Companion Unit $57. Complctely Assembled, But Not Wired
A fitting companion to the High Frequency Tuner and I. F. Filter Unit, constructed along same lines as the H. F. Tuner and provides for either C. W. or phone reception. Both units housed in heavy aluminum cabinets, finished in beautiful black crinkle lacquer.

Send for New 1933 Catalog. Just off the Press

M. & H. SPORTING GOODS CO.
512 MARKET STREET • PHILADELPHIA

Southern Products Announces

TUBE SALE. We have extended our tube sale another month. See Nov. QST, page 91. AMATEUR CALL BOOKS, new 90c. Postpaid.

Special Tubes for 5 meter and 4 meter Trans. and Rec. FNZ Transmitter with power supply and tube, $17.50, Push Pull with 2-243's, $19.50.

Condenser Mike Kits. Complete kits $3.00. Assorted $8.00. Also Moving Coil Dynamic Mike Kits.

Complete kit for the BEGINNER'S CRYSTAL CONTROL TRANSMITTER DESCRIBED IN NOV. QST — ready to wire. Write for price.

SOUTHERN PHOTO QSL'S. Have you seen these new clever cheap photo cards? Send 3c for samples and prices.

ATTENTION HAMS! Write for our new plan HAM CATALOG. Please Include Postage. 20% deposit on C.O.D.'s

SOUTHERN PRODUCTS
Dept. 106 UNIVERSITY, ALABAMA

Little Percy had a call
He hasn't got it now
The Supervisor said to him, "You simply don't know how."

Moral —
Send a dollar today for your copy of the Radio Amateur's Handbook 242 pages of invaluable ham dope.

American Radio Relay League, Inc.
West Hartford, Conn.

"Round the World Clock"
Tells time, at a glance, in all parts of the world
The ideal timepiece for an amateur radio station. 24-hour guaranteed movement. Mounted in a genuine black leather plaque with gold lettering as shown, individually for your own station. A beautiful and highly useful addition to your station. Supplied with either 12 zone (12 hours) or 24 zone (24 hours) dials. Illustration shows 12 zone dial.

Price $5.00 Plain — $6.00 Lettered — Shipping charges prepaid
40% Discount to Hams

de Wilde Co. 215 4th Ave., New York

"A Dandy Xmas Gift"
know what it was all about. That sort of thing is in pretty poor taste. Save the jokes for Strays.

While CQ'ing W2AZN detected a change in frequency, and upon scanning the horizon found a kitten QRQ'ing from the plate tank. No doubt that accounts for the squeal in his note!

W1ADP's call was the first one listed in "Calls Heard" in June QST, and he's willing to bet that the bird using his call on the 3500-ke, 'phone band on March 21st wishes he had used his own call — if he has one.

Pacific Coast Amateurs Dig Into 56-MC.

(Continued from page 27)

permits, passes, for locations, autos for the trips; to Mr. Aitken, Director of the Lick Observatory for giving the bunch stationed there all the comforts of home; to Commander Powers, Captain Porterfield, and Lt. Nelson, U. S. Navy, of Yerba Buena Island, San Francisco Bay, for assisting us at that location.

Radio Commission Reorganizes Field Force

(Continued from page 33)

dino of the State of California; the County of Clarke of the State of Nevada, and the State of Arizona.


Radio District No. 17: Headquarters, Kansas City, Mo. The States of Nebraska, Kansas, Missouri and Iowa, except the Counties of Winneshiek, Allamakee, Fayette, Clayton, Buchanan, Delaware, Dubuque, Linn, Jones, Jackson, Clinton, Cedar, Johnson, Washington, Muscatine, Scott, Louisa, Des Moines, Henry and Lee.

Radio District No. 18: Headquarters, Chicago, Ill. The States of Indiana, Illinois, and the Counties of Winneshiek, Allamakee, Fayette, Clayton, Buchanan, Delaware, Dubuque, Jones, Scott, Jackson, Clinton, Cedar, Johnson, Washington, Muscatine, Scott,
FIRST-AID RESISTOR KIT
Pocket size. Furnished in 1-watt and 2-watt types. Protect-O-Packed to keep wire-leads straight. Each unit stamped with value. Includes free supply of service labels.

Since radio receivers have become so popularly equipped with resistors, a new service has been created—for resistors, like other parts, cannot go on forever. "Look to your resistors" has become an important byword when sets are not performing satisfactorily. This is but one of the opportunities OHIOMHMS offer the service men.

OHIOMH RESISTORS
THE OHIO CARBON COMPANY
12508 Berea Rd. Cleveland, Ohio

OHIOHM Resistors are made in Canada by C. C. Meredith & Co., Ltd., Toronto.

SPARK SUPPRESSOR SETS
for eliminating ignition interference on 4, 6, or 8 cylinder cars. Contain condenser and necessary suppressors.

When you see insulators like these...
you'll know it's a JOHNSON idea
They are good—we admit it. And anything good enough to be so widely copied is good enough for you to demand the original. If your jobber hasn't them—we won't get them—order direct. Prices are right.

E. F. Johnson Co., Waseca, Minn.

"EMP-LAB"
FOR LESS THAN $20!
Here is the famous EMP-LAB PXO-1 crystal controlled transmitter & power supply. All tubes, x-tal ground 1/10 of 1% your spec. freq., milliammeter, metal cabinet, vernier dial, power supply chassis cadmium plated, assembled, wired and tested. Additional stages may be purchased with power supplies to obtain frequency doubling advantages or increase power. Amplifiers may be modulated for tone. Power supplies sold separately. Write for further information and our complete parts catalog.

EMPIRE STATE RADIO LABORATORIES
LYON BLOCK, ALBANY, N. Y.

Say You Saw It in QST — It Identifies You and Helps QST
A ragged, dirty newsboy blurted, "Gimme one, me sister's got it," and dropped on the marble counter a single penny that tinkled lonesomely. He was buying one of the first Christmas Seals sold in the United States for anti-tuberculosis work. The need was great. He knew. His sister had it.

Today, Christmas Seals help protect you and your family, for although the death rate from tuberculosis has been reduced two-thirds, it still kills more people between 15 and 45 than any other disease. Your pennies make possible free clinics, nursing service, preventoriums, and educational work that mean cure for some, relief for many, and hope for all.

*In the lobby of the Philadelphia "North American." Dec. 13, 1907

**

THE NATIONAL, STATE AND LOCAL TUBERCULOSIS ASSOCIATIONS OF THE UNITED STATES

Buy Christmas Seals

RADIO INSULATORS

No. 82
Midget

No. 14

No. 83
Heavy Duty

No. 33
No. 25

No. 15

No. 159 Lead-in

No. 88 Aerial Tightener

No. 9 Lead-in Bushing

No. 8 Heavy Duty

M. M. FERON & SON

THE PACIFIC DIVISION CONVENTION

PEP, vim, and vigor — plus the spirit of progressiveness over all. A good time! From start to finish something was doing every minute. Every committee had done its duty well. California sunshine at its best greeted a record-breaking attendance on September 2nd and 3rd. The affair put over by the Associated Radio Amateurs of Long Beach under the able direction of Convention Manager W6HT will be long remembered as outstanding in the annals of conventions.

The Registration Committee (Mrs. W6HT and Mrs. W6EKS) were greeted bright and early by a long line of waiting hams — led by W6BXE, who hiked all the way from Huntington Park (100 a.m.) in order to be "first to register." Col. Clair Foster, Pacific Division Director, formally opened the convention. All the delegates got acquainted and events came thick and fast. Code contests, visits to ham shacks, pike amusements (the convention ticket admitted one to dozens of interesting beach-places), etc. There was entertainment and enjoyment in varied forms, and colorful incidents too numerous to record in detail.

Club stunts, QLF, CQ, Whistling, liars' contests arranged by W6VH were followed by a whopping big smoker, W6QJI master of ceremonies... and then a "surprise trip" to the good (?) ship Johanna Smith II, a moonlit sail in swift motor taxis way out past the big battleships riding at anchor! Sunday, the convention got down to the more serious side of amateur radio. Technical and communications meetings with talks by authorities on many subjects were the order of the day. Wallace, W6AM; Routh, W6CJQ; Gordon, W6CIL; Swift, W6CMQ; Messrs. Moore and Whittemore; Handy, W1BDI-A.R.R.L.; Dr. Waters, W6EC-U.S.N.R.; Martin, W6AAN-A.R.S.; Section Communications Managers and RMs were on the program preceding the "open forum" which concluded in time for all delegates to take a dip — before the banquet. Music, novelty numbers, addresses by the Director, and Assistant Director Culver, W6AN, by the popular and efficient Radio Supervisor, Mr. Chapple, by Coms. Mgr. Handy, "Bill" Lippman, Jr., W6SN-W6USA, and others featured the banquet. Prize awards were made...
BARGAINS — SPECIAL NAVY SURPLUS

Dulibier Transmitting Condensers Regular Price $65
M. & H. Special Price $3
Type CD956-004 Mfd.-12500 volt!!! Mica dielectric—Mounted in aluminum cases. Tested and guaranteed.

DUBILIER Mica Transmitting Condenser
1. mfd. MICA 1750-vols. working $2.50
.1 mfd. 800 volt $1.50

U. S. NAVY SWITCHES
20c
SPST 60 Amp., 250 Volt on bakelite base
W. U. TELEGRAPH KEY 95c

Gen. Electric Relays $2
Type HG WSF-323287
Model 301
$2.50
Each

Navy type, CV 1030 Frequency Meter 0 to 700 cycles. Can be made into a DC milliammeter for any range above 25 MA by removing 1 ampere shunt.

Roller Smith Hotwire $1
Ammeters 0 to 1/4 amps. Radio frequency. Limited quantity.

Weston Meters
Model 301
$2.50
Each
Navy type, CV 1040 Frequency Meter, 0 to 100 cycles. Can be made into an AC milliammeter for any range above 25 MA.

Magnavox
Anti-Noise Transmitter
$1
With head straps Single button 100 ohm mike

EVERYTHING for the qualified Radio Amateur

LOW RANGE FUSES
Littelfuses for Instruments: Amps: 1/100, 1/32, 1/16 — 20c ea.
1/8, 1/4, 1/8, 1/2 — 15c ea. 1, 2 — 10c ea. For milliammeters, ban rectifiers, etc. Use 1/8 for radio B circuits.
High Voltage Littelfuses: 1000, 5000, 10,000 volt ranges in 1/16, 1/8, 1/4, 3/8, 1/2, 1/4, 1/8, 1/4 amp. Renewable. Price 8c to $1.25 ea.
Write for instructive bulletin 4-A.

M. & H. SPORTING GOODS CO.
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Johnny Jones groans and groans,
There are no signals in his phones.
Tomorrow night he'll be all right,
His Handbook's in the mail tonight.

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West Hartford, Conn.

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For the first time, a device is offered for the protection of valuable amateur transmitting equipment.

THE SENTINEL MAGNETIC OVERLOAD CIRCUIT BREAKER
Designed especially for the amateur at an amateur's price. Whether you operate a pair of '04-A's or an '04-A, the sentinel pays for itself the first time it operates. Provides reliable protection for tubes, meters, rectifiers. Transformers against damage caused by improper circuit adjustments, errors in plate voltage, failure of neutralization, rectifier overload, bias failure, transformer overload, and other unexpected causes. Indispensable in remote control work. Entirely automatic and instantaneous in action. No attention. No renewals. Tripping range 50 to 400 ma. Handles all amateur tubes and loads. Back of panel mounting. 53/4" x 3" x 2 1/2". Shipping weight 3 lbs. Breakers for higher powers on order. SEND FOR CIRCULAR A. Cash with order or C.O.D. only — $5.85 plus postage.

ORDER ONE TODAY AND SAVE THOSE EXTRA DOLLARS
DON. H. MIX & CO. Box 403 BRISTOL, CONN.
DEBUNKING CRYSTAL PRICES—

Read this:

Production costs of crystals between 99 Kc and 7000 Kc are nearly constant for any stated percentage of adjustment to the specified frequency. We, therefore, announce this schedule of FLAT prices.

<table>
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<th>Percentage plus or minus specified frequency</th>
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*Can only be guaranteed when calibrated in oscillator the crystal will control.

All Types of Mountings and Precision Equipment

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Huron Building. Kansas City, Kansas

If you want to be a High Speed, Expert Operator write CANDLER for Free Advice

GET YOUR SPEED where the Champions go there with the

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"By applying Candler System methods I won the Radio Telegraphic Championship of the World 3 consecutive years at 55, 55 1/10 and 65½ wpm. I say to all Commercial and amateur operators, by all means take Candler High Speed Telegraphing and 'Mill' Courses."


If you want to copy 56½ wpm. or receive the benefit of his 20 years' experience in developing Exarxs. Your questions will be answered promptly and personally. No obligation.

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6343 South Kedzie Ave., Chicago, Illinois

by WGANZ — oh what prizes! Enthusiastic bids for the next convention were made by Fresno and San Jose. The latter group won. They invite you. Don't miss it. The gang will see you there — San Jose, 1933!

—F. E. H.

Information Service Rules

PROMPT handling of inquiries concerning amateur equipment and problems will be greatly facilitated if the following rules are observed when writing to the A.R.R.L. Technical Information Service:

1. Before writing, consult The Radio Amateur’s Handbook and your files of QST. Nine times out of ten you will be able to find the answer in QST or the Handbook.

2. If reference is made to the Handbook, mention the page and the edition to which you refer. If reference is made to QST mention the page and issue you have in mind.

3. Write on one side of the paper only, and use a typewriter if possible.

4. Number the questions and make a separate paragraph for each question. Make the questions as brief and as direct as possible.

5. Make diagrams on separate sheets of paper and fasten them to your letter with a pin or paper clip. All diagrams should be schematic — do not send pictorial diagrams.

6. Print your name and address in full on each sheet of paper. A return address on the envelope is not sufficient, as the envelope is destroyed by the office manager as soon as the letter is opened.

7. Keep an exact copy of your questions and diagrams, and mention that you have done so.

8. Do not ask for opinions on, or comparisons of, business concerns or their products.

9. Enclose postage for the reply but do not send an envelope. It is much more convenient for us to use our own envelopes with our stationery.

10. Address all questions to the Technical Information Service, American Radio Relay League, 38 La Salle Road, West Hartford, Conn. Any back copies of QST to which we refer you may be obtained from our Circulation Department for twenty-five cents each.

The observance of the above rules will be mutually beneficial.

New Plug-in Crystal Holder

ALTHOUGH there are many varieties of plug-in crystal holders on the market, the one which was shown in the photograph of the low-power transmitter on page 9 of November QST is unusual in that it is made of a new alloy which is beneficial in reducing corona discharge. This alloy, which is named “Tinicosil,” is a white metal which takes a polish like that of nickel, but will not corrode or tarnish.

Tests with crystal holders using Tinicosil plates have shown them to be much superior to the usual brass plates. Corona forms at much lower oscillator plate voltages with brass plates, with consid-
GET MORE POWER—BETTER FREQUENCY STABILITY
FROM YOUR CRYSTAL-CONTROLLED TRANSMITTER

Examine your present crystal holder—Compare it carefully with the new General Radio holder designed for amateur and experimental transmitters.

SPECIFICATIONS:
1. Dust and moisture proof bakelite case, protecting crystal from unnecessary and harmful handling. 2. Holds any amateur crystal—Mounts 160-80-40-20 meter crystals, round or square, thick or thin. 3. Adjustable spring tension—Assures correct pressure on any crystal for maximum output—Spring tension easily changed. 4. Three blank bakelite retention plates supplied—Hold crystal correctly for best frequency stability—Ready cut with knife to fit your crystals. 5. Chromium-plated brass plates—Cut flat and lapped smooth—Prevent tarnish and corrosion—Insure reliable operation—Plates have ample surface for largest crystal. 6. Opened by loosening only two screws. 7. Standard plug-in terminals—Standard GR (.75 inch) spacing. If your present holder does not have every one of these features, you can well afford to spend $2.25 for a holder which will insure better performance from your transmitter.

TYPE 560-A Crystal Holder—$2.25

Send cash with your order and we'll pay the postage to any point in the U. S. or Canada. Address General Radio Company, 30 State Street, Cambridge, Massachusetts, or our San Francisco branch at 274 Brannan Street.

CORNELL “CUB” CONDENSERS
PAPER DIELECTRIC CAPACITORS for radio, television and ignition, and RESISTORS for radio and television. Also Filter and By-Pass Condensers and Interference Filters. Write for your free copy of our Catalog. CORNELL ELECTRIC MFG. CO., Inc. Long Island City New York

In 3 to 7 months we train you to secure government license. Course consists of Wireless Code, Radiophone, Microphone-Studio Technique, Television, Service, Police, and Aeronautical Radio. We are authorized to teach Radio Corporation of America Inst., Inc., texts. Return coupon for details.

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PORT ARTHUR COLLEGE
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Say You Saw It in QST.—It Identifies You and Helps QST
**ELECTRAD TRUVOLT**

Resistors have always had these exclusive advantages, due to patented construction:

1. Open, spiral winding, giving greater radiation, longer life and better electrical contact.

2. Adjustable sliding clips for setting exact voltage values.

Now, a safety feature is added: A full-length fibre guard protects the resistor and operator from contact with tools or hands.

No finer resistors are made. Ask your dealer.

Write Dept. Q-12 for Complete, New Catalog

---

**How to Calibrate Your Frequency Meter from WWV**

(Continued from page 30)

should be used. One should be tuned to WWV, and a monitoring operator should do nothing but keep the oscillator to zero beat with WWV. The second operator, using a second receiver, makes all other adjustments as above.

The method described is most useful for marking the limits of the 3500- to 4000-band; the new
The New SHALLCROSS General Purpose Meter No. 610

provides facilities for a wide range of electrical measurements not usually possible in one instrument. Employing a No. 610 Shallcross Resistor Kit and the Weston Model 80 Universal Meter, this combination makes possible 4 D.C. Voltage Ranges, 4 D.C. Current Ranges, 4 A.C. Voltage Ranges, Resistance measurements of 1 ohm to 1,000,000 ohms. Inductance measurements, 1 to 10,000 henrys. Capacity measurements .001 to 10 mfd. Output Meter.

Send 5c in stamps for Bulletin 152-C which contains a diagram of this circuit and information on its construction.

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Make Your Own Records

Easy to Make Easy to Read with

The New MASTER Teleplex

RECORDS your own sending in visible dots and dashes and then repeats it to you audibly on the headphones. 5000 words on each tape. Number of tapes unlimited. This marvelous new invention revolutionizes the teaching of code — makes learning easy, rapid and interesting. No previous experience necessary. The New Master Teleplex is the only instrument ever made that will record your own sending and then repeat it back to you exactly as it was sent. Radio and electrical engineers agree that this is the most marvelous instrument of the kind ever produced. Originally not intended for individual instruction because it was too expensive. It was developed for the U.S. Signal Corps for classroom instruction. However, we have formulated a plan whereby you may master the code without buying the machine.

Write for Folder 0-12 Giving Full Particulars

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Transmitting Condensers

Dubilier brand means all types—mica, paper, oil-filled, oil-impregnated, ultra-shortwave, and now, compact electrolytics here shown. Infinitely superior workmanship and materials. Two-year service guarantee. Lowest prices.

Write for data on Dubilier transmitting condensers as well as other types in which you are interested.

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We can supply all parts for the new circuits
Send for your Catalog of Nationally Advertised Transmitting and Receiving Parts at LOWEST PRICES

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Say You Saw It in QST — It Identifies You and Helps QST
Literally, the whole world listens in with Arcturus Blue Tubes... North, South, East and West... The Sultan of Morocco’s radio is equipped with Arcturus Blues. So are sets from Mexico to Madagascar; from Spitzbergen to Melbourne. Not only have the people of 77 countries adopted Arcturus as their own... it is also a fact that more American set manufacturers use Arcturus as standard equipment than any other tube... signal tribute to the outstanding quality of Arcturus.

It is no wonder that more and more radio dealers and jobbers depend upon the BLUE tube to win the approval of their customers.

ANY Set is Better with Arcturus Blue

PASSING the EXAM

is more important than merely taking it

MAKE sure you do not flunk out; be prepared for any question you may be asked. Typical questions, and their answers, are given in the new reprint of QST’s popular articles on “Passing the Government Examination for Amateur Operator’s License.” Originally these articles appeared in the January and February, 1930 issues; so popular were they that the entire back copy supply of these issues was exhausted within a year. Re-written, they were again published in October and November, 1931 and reprints prepared for distribution. This supply has again been exhausted, and now —

Revised in terms of latest amateur practice, with complete information on the new amateur regulations, a new reprint of the “Passing” articles is ready for distribution. In convenient, economical pamphlet form, you can find the answer to every exam question in it. 20c per copy postpaid.

The American Radio Relay League
West Hartford, Connecticut

'phone band 1875- to 2000-kc.; the center of the 3.5-mc. band, 3750 kc. (which has harmonics marking the high frequency ends of the “10-meter” and “5-meter” bands); and 7000 kc. (which has harmonics marking the low frequency end of the “10-meter” and “5-meter” bands). Calibrations from WWV made using one receiver and compared with calibrations made from transmissions by W1XP and W9XAN agree with each other to within a notch on the frequency meter dial.

Break-In Operation with Crystal Control

(Continued from page #8)

the full plate voltage when the key is closed. The values of these resistors must be sufficiently high to keep the current below their rating; for instance, for 25-watt resistors, 5000-ohm units would be used. Each resistor is rated at 70 ma. maximum; there are six in series, or 30,000 ohms; the plate voltage is 1500, and by applying Ohm’s Law, the current through each resistor is found to be 50 ma. — which allows a reasonable safety factor.

The ratio of $R_1$ to $R_2$ will usually be about one to five. In the example given above, we would make $R_1$ about 7000 ohms. The resistors making up $R_1$ must have almost the same current rating as those used in $R_2$, since the additional resistance introduced in the circuit does not greatly lower the current through each resistor, especially with poor regulation, because the voltage rises with the key up. It will be noted that $R_1$ plus $R_2$ constitute a “bleeder” resistor; consequently, if a bleeder resistor is already in use it may serve as $R_2$, and additional resistance may be inserted for $R_1$.

There is no reason why this break-in system should be limited by any power legal for amateur use, especially if relay No. 3 is used to ground the receiving antenna. In any effective transmitter, the crystal oscillator tube should be isolated by a buffer, which may be a low-powered tube; the higher powered tubes can be blocked by the keying method described, and the receiver will be in operation when the key is open. The system requires no elaborate filters, it involves no expensive apparatus (second-hand automobile circuit-breakers are used for relays at W9ZZE), and it necessitates no great change in transmitter arrangement. Its effectiveness is attested by the fact that with an antenna input of 260 watts, only a faint click can be heard in the screen-grid, fully a.c. operated BC receiver 40 feet distant, operating on the same a.c. supply line!

Modulating the Screen-Grid Amplifier

(Continued from page #8)

Obtained with an audio grid swing of the order of 20 volts r.m.s. across an input impedance of 30,000 ohms. However, the adjustments to obtain this performance are somewhat critical and are greatly influenced by changes in the r.f. excitation, electrode voltages and loading.

The second and final part of this article will appear next month.
BEAM December Bargains

New Short Wave Variable Condensers, small but not a midget. X.X.X.X., low loss insulation, ideal curve for ham band separation, ball bearing. A. special job, 1.65. 0.001 to 0.0005, all sizes. $1.27

COLORTUNE Receivers—three-and-four tube, using latest screen grids and pentodes throughout, band spread, beautiful appearance, good lock, low noise level, full vision. COLORTUNE, using "Beam" best special S. W. condensers and coils. An asset and adornment to any ham shack, 3-tube battery. $11.49

Humless AC. $11.90

With self-contained power supply. $19.50

110 DC self-contained power supply. $18.50

For four-tube jobs add $1.10 in each case

KITS—For COLORTUNE kit prices deduct $3.20 in each case.

IF-KIE-FOOFKE II—this sensational two-tube outfit in new improved form. Screen grid, band spread, using best of parts, easy to build, complete with instructions and diagram. $4.15

Transmitters—Hartley TGTP, TNT, beautifully built with copper tubing coils for 40 and 80 meters. With meter, less tubes and power supply. $9.10

759 V—DC. 74 V. — AC power supply. $8.90

P.A. Amplifier, uses one '24, one '56, two Triple-Twin 295's and one Pilot audios, 3.00. .00002 g. "83. Capable of delivering 15.5 watts undistorted output. Supplies for all size shafts brass or bakelite insulators. .10

In-Order. Orders filled same day. Transmitting frames and racks.

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Get Started in RADIO

Write for free booklet telling about this growing and most promising industry. The radio operator is an officer aboard ship. His work is light, pleasant and interesting. He has many opportunities to travel to all parts of the world. You can qualify in a short time in our well equipped school under expert instructors.

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"SUPERIOR BY COMPARISON"

SINCE 1925

COMMERCIAL AND BROADCAST STATIONS

We are at your service to supply you with HIGH GRADE CRYSTALS for POWER USE, said crystals ground to an ACCURACY of BETTER than .05% fully mounted in our Standard Holder. TWO DAY DELIVERIES. Prices as follows:

FREQUENCY RANGE

100 to 1500 Kilo-cycles $40.00
1501 to 3000 Kilo-cycles $45.00
3001 to 4000 Kilo-cycles $50.00
4001 to 6000 Kilo-cycles $60.00

Special Prices Quoted for Quantities of Ten (10) or More Crystals

AMATEUR BAND CRYSTALS

Prices for grinding crystals in the Amateur Bands below are for a crystal ground to within 10 Kilo-cycles of your specified frequency unmounted. Mounted in our Standard Holder $5.00 additional. Frequency calibration of the crystals are BETTER than .1%. Immediate delivery.

1715 to 2000 Kilo-cycles, $12.00 each. For two for $20.00
3500 to 4000 Kilo-cycles, $15.00 each. Two for $25.00

LOW FREQUENCY CRYSTALS

Low frequency crystals available to as low as 13,000 CYCLES. Prices upon receipt of specifications.

SCIENTIFIC RADIO SERVICE

"The Crystal Specialists"

124 Jackson Ave., University Park, Hyattsville, Md.

CHAS. HOODWIN CO.

4240 Lincoln Ave., Chicago

Price $5.95

Price $29.75

Price $29.75

Price $19.95
PLATE power for your set, the very heart of its performance, for quietness, D.X. ability, lifetime permanence, absolute dependability, low milliamperage plate drain, and 100% efficiency approaches the achievement of an Edison steel alkaline storage battery. Built painstakingly: every joint pure nickel, upset electrolytically, every joint burnished. 

BUILT to order — transistor power pack. 46 amplifier and 46 doubler p.a. As recommended in QST, October 1932. Loss tubes and power supply, $50. Hendricks and Harvey, 408 Main St., Hartford, Conn.

BUILT to order — electron tube type, oscillating frequency meter. As recommended in QST, July 1932. Loss tube and power supply, $30. Hendricks and Harvey, 408 Main St., Hartford, Conn.

FOR phone — special power pack, 500 volts pure d.c. and 7% transformer. Stabilized, $2.50 each. 15 watt 210's — $1.50. Fifty watt sockets — $1.50.

DEALERS complete batteries, construction parts, enameled aerial wire, silicon steel. Available immediately, filament and plate tetrodes, 572-586 rectifiers, complete plate power units, Rectifier Engineering Service, 4837 Rockwood Road, Cleveland, Ohio.

OVER six pounds radio data, circuits, bulletins, 50c prepaid.

BROOKS, 75c, Kiskag, Ke. Ohio.

WANTED: Burnout 282A tube. WERB.

ECONOMICAL crystal control! Finished crystals 0.1% accurate, $3.00. Oscillating blanks, $1.50. All absolutely guaranteed. 282A, 200, 572, 300 South Allen Ave., Pittsburgh, Pa.

NEW Morton motor generators up to 2000V. Sold wholesale. Stewart, Chicago, 4130 N. Meridian, Indianapolis, Ind.

POWER Crystals: Guaranteed excellent oscillators, One inch square — accurately ground and neatly finished, 1750-3500 kc bands, $3.00. Dualproof transformers, accommodates 1¼ crystals, $1.50. Your satisfaction or money back. WDL1M, Rochester, Mich.

"MOST" snappy stationery, QSL's, that handy, practical most holder and listener, something different in Xmas and New Year QSLs. Cheap enough for every ham to use. Show your spirit, Brewer E., Camden, N. Y.


RECEIVERS, three tube screen grid ham sets. Sensitive, completely insulated, excellent bandspread, $10.50. C.O.D. Bernard Co., 2267 W. 22nd St., Brooklyn, N. Y.

LOOK at these bargains, REL Ribbon coil forms for receiver or low power transmitters 15a. ea., 100 watt hammer, 20, 30 kw. 860, 852, 211Es, 211Ds, 212Ds. Write for quotations. Baker Engineering Labs., Fort Wayne, Indiana.

SOLD out — 200 watt crystal transmitter, includes eight Jewel meters, REL inductances, 85 — less tubes. 2060 volt 1 kw supply, 3000 volt meter, new 572 tubes, $170. All highest grade equipment. Weston 547 Analyzer, like new, $5. W9AXM, 4130 N. Meridian, Indianapolis, Ind.

NEW Morton motor generators up to 2000V. Sold wholesale. Hanson, 4332 Rice St., Chicago, Ill.


WESTON plate milliammeters, $3.75; thermocouples, $2.25. (All used). Transformers, chokes, winding, repairing. New list, W9ELA, 1054 E. 36 Ave., San Los Angeles, Calif.

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WANTED 3A. W9GOF.

TRUMPET, clarinet, ham stuff. W9GOB, Columbus, Ala.
MICROPHONES, deck stand mounted, $1.02. — Two way telephone dia., complete, $2.31. Special: Western Electric Microphones 40c, 50c, Relays, clips, magnet wire, resistance wire, induction coils, etc. Salvage equipment bargains built by the Civilian Emergency Service Company, 1718 Aa. Soth, Lincoln, Neb.


QT35 prepaid. Excellent oscillators. Selected highest grade $40 relay racks, $6.50. That prized commercial look. See other $20. W6ACV.

Your approximate frequency 1750-3500 hand $1.35 A small transmitter, $15. W1KL.

W6ACV, Erie, Penna.

W8AQY, Erie, Penna. WILL swap few high grade crystals for radio apparatus. W6ACV, Erie, Penna.

Xttals: Hipower oscillators. Take advantage of our watt 1000-2000--3000 d. $10.00 800 watt 1500-2400-4400 c.t. $10.00 1" blanks 65c. Dustproof holders 75c. Plugs $1.00 Tour.

TRAMS: Compact file for sale. September 1923 to present date. $20. W6ACV.

WILL swap few high grade crystals for radio apparatus. W6ACV, Erie, Penna.

$40 relay racks, $5.00. That prized commercial look. See other hamad. Kecioffer Engineering Service.


CRUSTALS: Your approximate frequency, 50 and 160 meters. $1.00 each. Excellent! Selected highest grade Brazilian quartz one inch blanks 65c. Irregular shapes 25c. Standard, dust-proof, plug-in holders 75c. Fisher Laboratory, 123 5th Ave., New York City.

TRANSFORMERS-225 watt 1000-1500-2000 c.t. $2.00, 450 watt 1000-2000-3000 c.t. $1.00 800 watt 1500-2400-4400 c.t. $1.15 2500 cycle, filament transformers. WOCBS- Frank Greben, 1962 N. 2nd St., Peoria St., Chicago, Ill.

SELL fifty watt transmitter, $15. W1KEL.

Xials: Hipower oscillators. Take advantage of our 5 years experience. Your approximate frequency 1750-3500 band $1.35 Round 1.60 less strain more power. 7000 k.c. with holder $10.00 1" blanks Dustproof holders 75c plug in 1$0. 50c. Primaline with holders 7000 band $12.00 14,000 $14.00 Satisfaction or money refunded. Hipower Crystal Co., 3607 N. Luna Ave., Lincoln, Nebr.


W2WEL - RCA radio course. 72 lessons. Loan, rent or purchase. C.R. Weissmantel, 1725 Wilson Ave., Chicago, Ill.

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TETRAQUAD - QST May 1932 portable receiver with tubes, for $1500v .04mfd. $2.00. Klassen & Ross, 823 Garfield Kansas City, Mo.

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