The only high level cardioid crystal microphone with Dual Frequency Response. Gives you high fidelity for clear channel, or rising characteristic for extra crisp speech signals that cut through QRM. Brings more and better QSO’s. Also overcomes room reverberation, permits working at greater distance.

CARDAX, Model 950, lists at $37

ELECTRO-VOICE, INC.
Buchanan, Michigan

Send for Catalog and Selection Guide No. 101
HERE'S lots of power for your final—and lots of tube, too, in the best, most modern sense! Check the special features below. They help to make the GL-592 the superior product that hams are hurrying to buy.

COMPACT—only 6" in height, including pins.

ZIRCONIUM-TREATED ANODE. Surprised that the GL-592's carbon anode will dissipate 300 watts? That's because zirconium treatment permits bright-orange temperatures without gassing.

NO BASE—therefore minimum r-f losses.

NO SOLDERED TERMINALS. Fernico metal-to-glass seals are used throughout.

Study ratings at the right. Then, to learn how you can S-T-R-E-T-C-H your dollars to buy more watts plus better performance, see General Electric's great GL-592 at your nearby G-E tube distributor's! Or write Electronics Department, General Electric Company, Schenectady 5, N. Y.

GL-592 POWER TRIODE

<table>
<thead>
<tr>
<th>Rating (ICAS)</th>
<th>Class C</th>
<th>Class C telephony (plate-modulated)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Filament voltage</td>
<td>10 v</td>
<td>10 v</td>
</tr>
<tr>
<td>Filament current</td>
<td>5 amp</td>
<td>5 amp</td>
</tr>
<tr>
<td>Max plate voltage</td>
<td>3,500 v</td>
<td>3,000 v</td>
</tr>
<tr>
<td>current</td>
<td>350 ma</td>
<td>250 ma</td>
</tr>
<tr>
<td>input</td>
<td>1,000 w</td>
<td>750 w</td>
</tr>
<tr>
<td>dissip.</td>
<td>300 w</td>
<td>225 w</td>
</tr>
<tr>
<td>Frequency at max ratings</td>
<td>110 mc</td>
<td>110 mc</td>
</tr>
</tbody>
</table>

As is true with other new, modern-design G-E transmitting tubes—such as GL-4D21/4-125A and GL-5D24—the GL-592 triode attains its high watts-per-dollar value by utilizing the advantages of a small amount of forced-air cooling. An ordinary 8" household fan or a small furnace-type or other blower is all you need to cool a pair of GL-592's. See G.E.'s "Ham News" for January-February to learn how convenient and inexpensive forced-air cooling is for the amateur, and what that method will mean to you in high power output and long tube life, should you plan to develop your rig along the most modern lines.
Where every penny counts

SOLAR

For maximum reliability at minimum cost, radio amateurs everywhere specify Solar Capacitors. The extra dependability of capacitors bearing the Solar trade mark is attested to by old timers in ham radio, who learned the hard way.

Why take chances with your hard-earned gear? "Play It Smart" and make sure you specify Solar and get Solar Capacitors.

Get a complete catalog for your Ham Shack today. Write Solar Capacitor Sales Corp., 285 Madison Ave., New York 17, N. Y.

USE SOLAR CAPACITORS

SOLAR CAPACITORS

"Quality Above All"
“It Seems to Us...” ................................. 13
Operating the BC-645 on 420 Mc.  
John T. Ralph, and H. M. Wood, W3JYA 15
Silent Keys ........................................... 21
Transmitting Ratings on Receiving Tubes .... 22
A Stabilized 813 Amplifier  
Richard M. Smith, W1FTX 23
Technical Topics
L.F.-N.F.M. ........................................... 28
S-Meters — So What? ................................. 29
“Maybe It’s Just Conditions —” .................. 30
A Quiet Break-In System  
Claude L. Robinson, W6KJV 33
Happenings of the Month ............................ 36
A Stacked Array for 6 and 10  
Edward P. Tilton, W1HDQ 38
The Old Stand-By  .................................... 42
Tenth ARRL Field-Day Results .................... 45
Postwar Countries List ............................... 49
DX Operating ........................................... 51
In QST 25 Years Ago This Month ................... 54
Direct-Reading Modulation Meter
Dana W. Atchley, jr., W1HKK, and  
Richard E. Fricks, W6QUC 55
Dishing Out the Milliwatts on 10 KMc.  
James A. McGregor, W2RJM, Ex-WLZY/2 58
How’s DX? ............................................. 62
“I Just Put Up Another Antenna”  
Bill Lippman, W6SN 66
The World Above 50 Mc. ............................ 69
Correspondence From Members ..................... 73
Hints and Kinks ....................................... 74
Operating News ....................................... 76
Station Activities .................................... 84
WWV .................................................. 142
Book Review .......................................... 152
Hallicrafters Skyrider Panoramic, Model SP-44 is actually a "third hand" to help you reach for new horizons in ham radio. The Panoramic shows not only the received signal but every signal 100 kc on either side of the received signal... provided visual sweepwidth is set at maximum. By making a wide range of radio signals visible a new dimension is added to the field of radio operating. Listed at right are a few of the things Panoramic enables you to do:

1. Spot frequency modulation or parasitics on an amplitude modulated signal.
2. Measure percentage of modulation and the quality of the signal being transmitted under all conditions.
3. Read signal strength instantaneously, aiding in quickly adjusting the output stages of the transmitter or the field strength of directional antennas.
4. Check other frequencies against known standards or the receiver calibrations. Any frequency drift can be spotted immediately.
5. Show where and how much to shift frequency to avoid interference once a QSO is under way.

**MODEL SX-42.** Described by hams who have operated it as "the first real post war receiver." One of the finest CW receivers yet developed. Greatest continuous frequency coverage of any communications receiver—from 540 kc to 110 Mc, in six bands. FM-AM-CW. 15 tubes. Matching speakers available.

**MODEL S-40.** Function, beauty, unusual radio performance and reasonable price are all combined in this fine receiver. Overall frequency range from 540 kc to 43 Mc in four bands. Nine tubes. Built-in dynamic speaker. Many circuit refinements never before available in medium price class.

**MODEL S-38.** Overall frequency range from 540 kc to 32 Mc in four bands. Self contained speaker. Compact and rugged, high performance at a low price. Makes an ideal standby receiver for hams. CW pitch control is adjustable from front panel. Automatic noise limiter.

SEE THESE THREE GREAT NEW HALLICRAFTERS RECEIVERS!
Photo above shows Hallicrafters SP-44 Panoramic in use with Hallicrafters receiver, the Model S-40.

TEN TUBES INCLUDING CATHODE RAY TUBE $9950

No modifications are necessary in your receiver in order to connect the Model SP-44. It does not interfere in any way with normal receiver operation. The Skyrider Panoramic may be used with new and old Hallicrafters models or any receiver having an IF frequency range between 450 and 470 kc. The Panoramic picture which is presented on the scope screen through a specially processed green filter appears bright and sharp. Easy to read in a normally lighted room. Just four simple operating controls make it easy to handle. Get the help of this valuable "third hand" in opening new ham horizons. Order from your local distributor today. Specify: Hallicrafters Model SP-44 Panoramic.
Section Communications Managers of the ARRL Communications Department

Reports Invited. All amateurs, especially League members, are invited to report station activities on the first of each month (for preceding month) direct to the SCMs for inclusion in QST. All ARRL Field Organization appointments are now available to League members. Those interested are invited to report applications for SEC, EC, RM, and PAM. In addition to station and leadership appointments for Members, all amateurs are invited to join the ARRL Emergency Corps (ask for Form 7).

### ATLANTIC DIVISION

<table>
<thead>
<tr>
<th>State</th>
<th>SCM Name</th>
<th>Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Jersey</td>
<td>Jerry Bachelor</td>
<td>1030 Summerland Rd. N. Jackson</td>
</tr>
<tr>
<td>New York</td>
<td>Ray Tomlinson</td>
<td>138 E. 62nd St. Westfield</td>
</tr>
<tr>
<td>Pennsylvania</td>
<td>R. E. Rosenberg</td>
<td>927 East 23rd St.</td>
</tr>
<tr>
<td>Central America</td>
<td>Wesley E. Mariner</td>
<td>624 College Ave.</td>
</tr>
<tr>
<td>Midwest</td>
<td>Ted K. Clifton</td>
<td>580 P.r.O. St.</td>
</tr>
<tr>
<td>South Dakota</td>
<td>Raymond V. Barnett</td>
<td>406 17th St.</td>
</tr>
<tr>
<td>Minnesota</td>
<td>P. H. Stegler</td>
<td>118 N. Van Alstyke Ave.</td>
</tr>
</tbody>
</table>

### DELAWARE DIVISION

<table>
<thead>
<tr>
<th>State</th>
<th>SCM Name</th>
<th>Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delaware</td>
<td>Ernest E. George</td>
<td>2044 Lexington Park Ave.</td>
</tr>
<tr>
<td>New Jersey</td>
<td>Charles H. Hart</td>
<td>57 Sary St.</td>
</tr>
<tr>
<td>New York</td>
<td>John J. Vitale</td>
<td></td>
</tr>
<tr>
<td>New York</td>
<td>Edward J. Prater</td>
<td></td>
</tr>
<tr>
<td>New Jersey</td>
<td>Leslie B. Vennard</td>
<td></td>
</tr>
<tr>
<td>New York</td>
<td>Mrs. Letha A. DangFREE</td>
<td></td>
</tr>
<tr>
<td>New York</td>
<td>Oliver E. Olmsted</td>
<td></td>
</tr>
<tr>
<td>New York</td>
<td>1053 Beechwood Ave.</td>
<td></td>
</tr>
</tbody>
</table>

### HUDDISON DIVISION

<table>
<thead>
<tr>
<th>State</th>
<th>SCM Name</th>
<th>Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Mexico</td>
<td>James F. Wakefield</td>
<td>2940 Adolone Ave.</td>
</tr>
<tr>
<td>Arizona</td>
<td>August G. Hiebert</td>
<td>c/o K.F.A.R.</td>
</tr>
<tr>
<td>Idaho</td>
<td>Alan K. Ross</td>
<td>1017 East Jefferson St.</td>
</tr>
<tr>
<td>Montana</td>
<td>Albert Beck</td>
<td>2256 Amberst Ave.</td>
</tr>
<tr>
<td>Oregon</td>
<td>Ralph A. Monkers</td>
<td>Box 14</td>
</tr>
<tr>
<td>Washington</td>
<td>Lloyd Northers</td>
<td>P. O. Box 281</td>
</tr>
</tbody>
</table>

### PACIFIC DIVISION

<table>
<thead>
<tr>
<th>State</th>
<th>SCM Name</th>
<th>Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hawaii</td>
<td>John Souza</td>
<td>Box 2025</td>
</tr>
<tr>
<td>Nevada</td>
<td>S. Arthur Sowell</td>
<td></td>
</tr>
<tr>
<td>Santa Clara Valley</td>
<td></td>
<td></td>
</tr>
<tr>
<td>East Bay</td>
<td>Ray E. Pichak</td>
<td>1061 Fremont Ave.</td>
</tr>
<tr>
<td>San Francisco</td>
<td>Horace H. Greer</td>
<td>625 Fremont Ave.</td>
</tr>
<tr>
<td>Sacramento Valley</td>
<td>Samuel C. Vassilic</td>
<td>970 27th Ave.</td>
</tr>
<tr>
<td>Phillipines</td>
<td>John R. Kennedy</td>
<td>70 Columbia Ave., Gmasse</td>
</tr>
<tr>
<td>San Joaquin Valley</td>
<td></td>
<td>22 Foster St.</td>
</tr>
<tr>
<td>San Francisco</td>
<td>James F. Wakefield</td>
<td></td>
</tr>
<tr>
<td>Idaho</td>
<td>W. J. Worontz</td>
<td>c/o Duke Power Corp.</td>
</tr>
<tr>
<td>Montana</td>
<td>Ted Ferguson</td>
<td>4422 Rosewood Ave.</td>
</tr>
<tr>
<td>Oregon</td>
<td>W. R. Huntington</td>
<td>1320 B. E, Bennett &amp; Blvd.</td>
</tr>
<tr>
<td>Washington</td>
<td>Donald B. Morris</td>
<td>1033 Home St.</td>
</tr>
<tr>
<td>Nevada</td>
<td>Glen Bond</td>
<td>2500 Kendall</td>
</tr>
<tr>
<td>Utah</td>
<td>Victor Drablick</td>
<td>1024 Oak St.</td>
</tr>
<tr>
<td>Colorado</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Idaho</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oregon</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Washington</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Idaho</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Washington</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Idaho</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oregon</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Washington</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Idaho</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oregon</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Washington</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Idaho</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oregon</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Washington</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Idaho</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oregon</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Washington</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### SOUTHWESTERN DIVISION

<table>
<thead>
<tr>
<th>State</th>
<th>SCM Name</th>
<th>Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arizona</td>
<td>Hen W. J. Hustert</td>
<td>9531 3rd Ave.</td>
</tr>
<tr>
<td>California</td>
<td>Gladwin C. Elliott</td>
<td>1408 West Fresno St.</td>
</tr>
<tr>
<td>Nevada</td>
<td>Hal M. Cowell</td>
<td>7172 Eade St.</td>
</tr>
<tr>
<td>New Mexico</td>
<td></td>
<td></td>
</tr>
<tr>
<td>New Mexico</td>
<td></td>
<td></td>
</tr>
<tr>
<td>New Mexico</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### SOUTHEASTERN DIVISION

<table>
<thead>
<tr>
<th>State</th>
<th>SCM Name</th>
<th>Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alabama</td>
<td>Lawrence J. Smyth</td>
<td>808 Winona Ave.</td>
</tr>
<tr>
<td>Georgia</td>
<td>Robert B. Murphy</td>
<td>3322 W. Granada Blvd.</td>
</tr>
<tr>
<td>Florida</td>
<td>Le Comdr. Edward J. Collins</td>
<td>10163 East Bunt St.</td>
</tr>
<tr>
<td>Louisiana</td>
<td>Thomas M. Moss</td>
<td>570 Oak Drive</td>
</tr>
<tr>
<td>Mississippi</td>
<td>Everett Mayer</td>
<td>P. O. Box 1061</td>
</tr>
<tr>
<td>New Mexico</td>
<td></td>
<td></td>
</tr>
<tr>
<td>New Mexico</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### GREAT LAKES DIVISION

<table>
<thead>
<tr>
<th>State</th>
<th>SCM Name</th>
<th>Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indiana</td>
<td>David S. Hutchinson</td>
<td>327 Lovet St.</td>
</tr>
<tr>
<td>Illinois</td>
<td>Gordon F. J. Phelan</td>
<td>4820 Isabell Ave.</td>
</tr>
<tr>
<td>Kansas</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Michigan</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minnesota</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Missouri</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ohio</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wisconsin</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Michigan</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minnesota</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wisconsin</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Michigan</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minnesota</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wisconsin</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Michigan</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minnesota</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wisconsin</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### MARYLAND DIVISION

<table>
<thead>
<tr>
<th>State</th>
<th>SCM Name</th>
<th>Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maryland</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Delaware</td>
<td></td>
<td></td>
</tr>
<tr>
<td>District Of Columbia</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### ONTARIO DIVISION

<table>
<thead>
<tr>
<th>State</th>
<th>SCM Name</th>
<th>Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ontario</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quebec</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manitoba</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Saskatchewan</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ontario</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quebec</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manitoba</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Saskatchewan</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ontario</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quebec</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manitoba</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Saskatchewan</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ontario</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quebec</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manitoba</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Saskatchewan</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ontario</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quebec</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manitoba</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Saskatchewan</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ontario</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quebec</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manitoba</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Saskatchewan</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Officials appointed to act temporarily in the absence of a regular official.
UNITED V-70-D graphite anode triodes fire powerful sigs from the final of W9HOB. Following are a few of the rare DX QSO's that have elated the O.M. pictured above.

<table>
<thead>
<tr>
<th>Type</th>
<th>Filament</th>
<th>Max. Plate Dissipation</th>
<th>Max. Input per tube</th>
<th>Max. Plate</th>
</tr>
</thead>
<tbody>
<tr>
<td>V-70-D</td>
<td>V821</td>
<td>7.5</td>
<td>3.25</td>
<td>85 Watts</td>
</tr>
<tr>
<td>812-H</td>
<td>P427</td>
<td>6.3</td>
<td>4.0</td>
<td>85 Watts</td>
</tr>
</tbody>
</table>

Type V-70-D and similar type 812-H are briefly described below. See your electronic parts distributor or write us for further data.
To help you incorporate the many advantages of electronics in your business, the War Assets Administration is making available its enormous inventory of tubes and equipment now.

Qualified distributors all over the country have been appointed by WAA to represent it. In every field where electronic application has proved its worth, these distributors maintain inventories and have the technical "know-how" to service your needs.

Get in touch with your nearest distributor and see how government-owned war surplus can help you—electronically. Or—if it is more convenient—write to
Millions and millions of electronic tubes are at your disposal. Pictured are some of the types which are available to you.

- **RECTIFYING**
  - (No. 586A)

- **CATHODE RAY**
  - (No. 3891)

- **TRANSMITTING**
  - (No. 615)

- **VOLTAGE REGULATOR**
  - (No. 5R160)

- **RECEIVING**
  - (No. 5987)

- **RECEIVING**
  - (No. 616)

"No electronic device is better than its tube"
Today—virtually all methods of high-speed communication use electronic tubes. In the industrial field, heating, welding and various methods of control are being done better and faster because of electronics. From big broadcasting stations to tiny hearing aids—from induction heating to voltage regulation—the science of electronics is playing a major role in industry.
these Authorized Distributors will serve you:

Listed here are the names and locations of WAA appointed distributors. Not all of them will have complete stocks but it will pay you to consult them on your electronic problems.

120 Brookline Avenue
Boston 18, Massachusetts

Communication Measurements Laboratory
120 Greenwich Street
New York 6, New York

Tobe Deutschmann Corporation
Canton, Massachusetts

Electronic Corporation of America
352 West 48th Street
New York 19, New York

Electro-Voice, Inc.
Buchanan, Michigan

Emerson Radio & Phonograph Corporation
123 Duane Street
New York 7, New York

Essaax Wire Corporation
1601 Wall Street
R. Wayne 6, Indiana

General Electric Company
Building 292-1 River Road
Schenectady 5, New York

Hammarlund Mfg. Company, Inc.
460 West 34th Street
New York 1, New York

Hoffman Radio Corporation
3745 South Hill Street
Los Angeles 7, California

Hyten Radio & Electronics Corporation
70 Lafayette Street
Salem, Massachusetts

E. P. Johnson Company
206 Second Avenue S. W.
Waseca, Minnesota

Newark Electric Co., Inc.
242 West 55th Street
New York 19, N. Y.

Majestic Radio & Television Corporation
125 West Ohio Street
Chicago 10, Illinois

Raytheon Manufacturing Company
60 East 42nd Street
New York 17, New York

Smith-McMaster Engineering Company
128 Barclay Street
New York 7, New York

Sylvania Electric Products, Inc.
Emporium, Pennsylvania

Technical Apparatus Company
165 Washington Street
Boston 4, Massachusetts

Tung-Sol Lamp Works, Inc.
95 Eighth Avenue
Newark 4, New Jersey

American Condenser Co.
4410 Ravenswood Avenue
Chicago 11, Illinois

WAR ASSETS ADMINISTRATION
A UNITED STATES GOVERNMENT AGENCY
FOR THE DISPOSAL OF SURPLUS PROPERTY
THE AMERICAN RADIO RELAY LEAGUE, INC.,

is a noncommercial 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 noncommercial and no one commercially engaged in the manufacture, sale or rental of radio apparatus is eligible to membership on its board.

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

Inquiries regarding membership are solicited. A bona fide interest in amateur radio is the only essential qualification; ownership of a transmitting station and knowledge of the code are not prerequisites, although full voting membership is granted only to licensed amateurs.

All general correspondence should be addressed to the Secretary at the administrative headquarters at West Hartford, Connecticut.

Past Presidents
Hiram Percy Maxim, W1AW, 1914–1936
Eugene C. Woodruff, WBCMP, 1936–1940

Directors
President
GEORGE W. BAILEY, W2KH
821 19th St., N.W., Washington, D. C.
Vice-President
J. LINCOLN MCCCAROG, W6EY
66 Hamilton Place, Oakland 12, Calif.
Canadian General Manager
ALEX REID, VE2R, Montreal, Canada
Alternate: Leonard W. Mitchell, VE3AZ

Atlantic Division
EDWARD O. RASER, W2ZI
315 Beachwood Ave., Trenton 8, N. J.
Alternate: J. Victor Brotherson, W3BHN
1743 Ottawa Drive, Eliz., Pa.

Central Division
CLYDE C. RICHARDSON, W9ARE
4901 So. 30th St., Milwaukee 14, Wis.
Alternate: Harold H. Jensen, W6VO
3591 California Ave., Alton, Ill.

Dakota Division
TOM E. DAVY, W9SW, ex-W9YVA
915 W. Becker Ave., Willmar, Minn.
Alternate: Harold B. Love, W9ZRT
Box 429, Mandan, N. D.

Deer Division
GEORGE S. ACTON
W5BR
144 Hickey Dr., K. F. J. Z. Post Oak, Mendon, Mich.
Alternate: John H. Hruby, W8SPF

Great Lakes Division
HAROLD C. HOBBS, W9WDE
Alternate: John H. Hruby, W8SPF

Hudson Division
JOSEPH M. JOHNSTON, W3ABI
427 Lincoln Ave., Avon-by-the-Sea, N. J.
Alternate: Robert A. Kilbey, W2DSY
1910 Oak Drive, West Hempstead, N. J.

Midwest Division
C. A. COLVIN, W9VHR
47 Berkshire Rd., Avon-by-the-Sea, N. J.
Alternate: Jerry J. Smith, W9VPA
272 W. Becker Ave., Willmar, Minn.

New England Division
PERCY C. NOBLE, W1VBY
37 Broad St., Westfield, Mass.

Northeastern Division
HAROLD W. JOHNSTON, W9WDE
2727 Beulahide Ave., Seattle 6, Wash.
Alternate: R. Rex Roberts, W7CPY
110 W. Brennan St., Girode, Mont.

Pacific Division
WILLIAM A. LADLEY, W8RQB
206 Naylor St., San Francisco 14, Calif.
Alternate: Albert J. Amaranthus, W6FBB
1675 Dina Ave., San Jose, Calif.

Rural Division
H. L. CAVENESS, W4DW
2697 Vandalia Ave., Racine, N. C.
Alternate: Jerry J. Smith, W9VPA
272 W. Becker Ave., Willmar, Minn.

Rocky Mountain Division
FRANKLIN K. MATEJEK, W9YRD
P. O. Box 212, Lakes Park, Colo.
Alternate: P. Arthur Smoll, W9VYD
529 N. Nevada Ave., Colorado Springs, Colo.

Southeastern Division
WILLIAM C. SHELTON, W4ASR
527 Revillo Blvd., Daytona Beach, Fla.
Alternate: William P. Sides, W4AUP
Pleasant Road, Montgomery, Ala.

Southwest Division
HANN R. JEPSEN, W5AE
Alternate: Arthur E. Schiffler, Sr., W6RBF
1441 Revinor, Glendale 1, Calif.

West Gulf Division
WAYLAND M. GROVES, W5NW
6709 Bobbie Pl., Galveston, Tex.
Alternate: Jack T. Moore, W5AGA
4829 Fairway, Dallas 4, Texas

Officers
President
GEORGE W. BAILEY, W2KH
Washington, D. C.
Vice-President
J. LINCOLN MCCCAROG, W6EY
Oakland, California
Secretary
KENNETH B. WARNER, W1EH
West Hartford, Connecticut
Communications Manager
F. E. HANDY, W1BDI
West Hartford, Connecticut
Treasurer
DAVID H. HOUGHTON
West Hartford, Connecticut

General Counsel
PAUL M. SEGAL
1026 Woodward Building, Washington 5, D. C.
"It Seems to Us..."

BREATHER

The League announces to its members that, exclusively because of the imminence of a world telecommunications conference, the Board of Directors in December vacated the requests that have been on file with FCC since last May for the establishment of a 7-Mc. 'phone assignment and the widening of the 14-Mc. 'phone subband. It will now await the results of the world conference before making further requests in this matter.

When the question of widening the 'phone bands was under study a year ago, a world conference was only vaguely talked about and was in the dim future. When the Board's requests were transmitted to FCC in May it was expected that they could be put on the books some time during the past summer — to become operative when the rest of our frequencies were restored, as did occur in early November. But meanwhile a new federal law called the Administrative Procedure Act went into effect, requiring a much more formal procedure in general changes in rules by any of the Government regulatory agencies. So great are the necessary delays under the new procedure when unanimity doesn't exist that it became evident that it would be next spring before new rules could be put into effect. And similarly in the meanwhile the plans for a world conference — for three of them, in fact — progressed rapidly and it was announced that the conference will begin its work on May 15th, probably at a location in the United States not yet selected. Two of these conferences will respectively revise the Cairo regulations (including a general review of the frequency allocations of all radio services for the next several years) and the Madrid convention, and will be followed by a world h.f. broadcasting conference. It was obvious to our Board, as it must be to every amateur, that it would be exceedingly unwise to seek major changes in our interior assignments on the eve of a world conference dealing with the over-all allocations of every service, including amateurs. Despite the confidence that we may feel about the successful outcome of the affair for amateurs, a conference is never over until it ends and it would not be the part of wisdom to make such changes while possible rearrangements of the spectrum were under study. Considering the lateness of the hour and the inescapable delays that had occurred, the over-all interests of amateur radio made it necessary, in the Board's opinion, to withdraw the requests and put the subject on ice until the conference results are known.

Naturally this decision will be a disappointment to some amateurs. The Board appreciates that. It trusts that all amateurs will see that the action was a wise one, and it calls upon all hands to QRX now on the question of what the 'phone frequencies should be and let it go over until the service allocations for the next several years are announced. At an appropriate time thereafter we can again take it up and see whether the League has any recommendations to lay before FCC. (We're thinking in terms of frequencies below 25 Mc. As there was Moscow agreement on our 10-meter band, and no pressure on it anywhere that we know of, we think we may continue our present study of plans for making a more effective use of that band, as recently laid before you in QST."

In the meanwhile we shall need all our energies to preserve our frequencies. We are confronted by a critical period in our lives and we shall very much need to preserve a united front. The coming world conference will be a most severe test. It will be a full-panoplied meeting, of the sort held in various foreign countries at intervals of about five years before the war. There will be hundreds of delegates, representing somewhere around eighty countries and colonies, and the sessions will last many months. A general revision of the telecommunications convention and its regulations is in prospect, this of course including the allocation table.

It is now apparent that at that conference there is going to be great pressure to increase the allocations for h.f. broadcasting. A few months ago we expressed the hope that, with the war ended, the world could settle down to a saner point of view on international broadcasting but, as you can see from last month's report on the preliminary conference at Moscow, quite the contrary seems to be the case.
In America we are accustomed to a very extensive use of radio by innumerable civilian and Government activities. For this long list of services the allocation table is complexly subdivided, and it is always difficult to find room for anything new. It is not this way in many foreign countries. There are only two great maritime powers and only a few of the larger countries have extensive organizations in the fixed service. To many countries radio chiefly means broadcasting and they don’t see why they can’t have more of it, so they are all out for it. And to get it they would gladly throw amateur radio to the wolves.

This isn’t anything new. It was visible at Madrid and much more so at Cairo. We were preserved through those conferences, as an American institution worth preserving, by the unflinching protection of the United States delegations. The increase in radio problems will make that task much more difficult at the coming conference, even without an ugly new complication that has recently raised its head: As a result of the war, the h.f. propaganda broadcasting stations of the United States are now operated by a branch of our Government, and that agency has suddenly come to the point of view of so many foreign countries, that the allocations for h.f. broadcasting should be materially widened. It even thinks that parts of our amateur bands would make very nice broadcasting assignments. For a nation whose interests occupy the spectrum as thoroughly as our country’s do, this poses an exceedingly difficult national problem, since spectrum limitations make it impossible to provide both for great broadcasting expansion and for the undamaged preservation of the country’s other interests. At high policy-making levels in our Government the question of this country’s attitude on this question is now being decided. We hope for a sensible answer, since only the maintenance of a sensible attitude by the United States will prevent the world from going overboard for broadcasting at the next conference, to the considerable injury of the other services that mean so much in the life of a modern state.

We mention these things to show that we do have a difficult and uncertain time ahead—one in which we must be sure we are all pulling in the same direction. As far as the problems themselves are concerned, ARRL is on the job daily. We report them so that you will see how essential it is to our welfare that we now all agree to put such things as the question of ‘phone subbands on the shelf until we know for sure what our allocations are for the next several years.

YOU & WHO ELSE?

The other evening a friend telephoned from another state to invite himself for a short stay during the holidays. This particular guy is always welcome, being a savvy gent with a couple of years of M.I.T. engineering and several more years of practical stuff under his hat, and his visits always result in the generation of some new ideas and a few empty jugs of Highland Dew. The conversation was going along smoothly until he started talking about how “We’ll come by train” and “We’ll be there” at such-and-such a time, and “Yes, we had a nice Christmas,” and so on. Since his marriage had not been announced, and the guest room can handle only one person in its present condition, these statements came as a bit of a poser, until it was established that he had just finished several weeks on 10 and 20 ‘phone and meant “I” all the time! Holy saints! why didn’t he say what he meant? Prior to this experience, brief encounters with other ‘phone men had established their tendency to eliminate the first-person-singular pronoun in favor of the first-person-plural but this was always attributed to Lindbergh-worship and plain lack of education. But here definitely was a man who should know better, coming up with an utterly incorrect speech style under the delusion that he was using “ham language” or “QST English,” a habit that seems to be so prevalent that it’s about time to consider its justification.

Let’s take a look at the language, for those people who came in late. When you read the pages of QST or any other magazine or paper and the author, speaking in the first person, says ‘we-this or we-that, he is using what is known as the “editorial we,” in preference to the more personal pronoun “I.” The writer uses it to reflect the editorial thoughts or policies of his organization, as expressed and sometimes formulated by him. But when he knocks off at the end of the day and walks into a barbershop alone, he doesn’t say to Joe, “We would like a haircut and shave,” because Joe would look around for the others. And the same writer doesn’t say, “We are going to the store to buy us some new pants”—he would say “trousers,” anyway—unless he is dragging along one of the small fry who is also in need of new leg covering. In other words, when one completely eliminates the use of “I” for the editorial-we first-person-plural ambiguity one is asking for nothing but misunderstanding, since to any outsider it sounds like something coming from a spokesman for a group.

(Continued on page 196)
Operating the BC-645 on 420 Mc.

A War Orphan Comes into Its Own

BY JOHN T. RALPH,* AND H. M. WOOD,* W3IYA

One of the most interesting pieces of equipment recently declared surplus by the Armed Services is the BC-645, a specialized piece of i.f.f. equipment which, in its original form, served as an airborne transponder when interrogated by the ground radar station, and also acted as an interrogator-transponder for plane-to-plane identification. The equipment was operated in the frequency band 450-500 Mc., and consists of a complete transmitter and modulator system and a receiver which actuates a series of relays to control the transmitter, its frequency and type of emission being in accordance with the type of signal received. Power supply for both receiver and transmitter was obtained from a dynamotor, PE-101, operating from either 12 or 24 volts of airplane battery.

The schematic diagram of this equipment in its original form is shown in Fig. 1. We were unable to obtain instruction manuals or other technical information on the BC-645 equipment and, therefore, a considerable amount of time was spent in tracing the schematic diagram through a maze of cabling and terminal boards used in mounting resistors and capacitors. No information was available regarding the control and indicator accessories and connections to them from the various plugs and connectors on the BC-645, but, since conversion was our main interest, this lack presented no difficulty. Values of by-pass condensers are not shown in some instances because they are not critical and, in most cases, changes are not necessary in converting the equipment for ham use.

How It Worked

Up to the second detector the receiver is a conventional superheterodyne utilizing tuned lines for the antenna and oscillator circuits. Variable capacitors across the open ends of the lines provide adjustment about the operating frequency. The intermediate frequency is 40 Mc.

---

*Tower Lakes, Harrington, Illinois.

---

February 1947
Fig. 1 — Diagram of the BC-645 i.f. unit before conversion for use in 420-Mc. amateur communication.
and the three stages of i.f. amplification are coupled by slug-tuned transformers with bifilar windings. The rectified signal from the diode detector is amplified by three video stages, $VT-6$, $VT-7$ and $VT-8$. The signal is divided in the plate circuit of this last stage, one branch going to pulse-amplifier circuits ahead of the $6F6$ pulse-keying tube, $VT-13$. The other branch feeds the grid of $VT-9$ whose plate load consists of a tuned circuit resonant to 30 kc. If the received signal is modulated at 30 kc, this modulation is then fed to the diode portion of $VT-8$, the rectified d.c. filtered by $L_1$ and its associated capacitor and the negative d.c. envelope pulses coupled to the grid of $VT-10$. The plate voltage of $VT-10$ rises, firing the neon tube momentarily and producing a pulse in the cathode circuit of the "one-shot" multivibrator, $VT-11$, which builds up sufficient plate current to close Relay 3. The time constants of the circuit are so chosen as to keep Relay 3 closed for approximately one second. The action caused by operation of Relay 3 depends upon the position of Relay 4 which is energized from an outside control. In the de-energized position of Relay 4, Relay 3 energizes Relays 2 and 6. Relay 2 changes the frequency of the transmitter to the lower of two chosen frequencies (receiver frequency), and Relay 6 connects the 30-kc. oscillator-modulator in the $316A$ plate circuit so as to modulate the r.f. oscillator and grounds the filament center-tap of the $316A$ oscillator tube. In the energized position of Relay 4, Relay 3 controls the coil circuits of Relays 7 and 8 thus actuating external indicators through sockets $SO-127$ and $SO-129$.

If the received signal consists of standard i.f. pulses transmitted by a ground station operating in conjunction with a radar set, the pulse which has been amplified by three video stages is coupled to the grid of the first section of the $7F7$, $VT-12$. This pulse is further amplified by the second section of $VT-12$ and applied to the grid of the keying tube, $VT-18$, a $6F6$ in the cathode circuit of the $316A$ oscillator tube, thus repeating the received pulses in accordance with a prearranged code determined by coding cams on the dynamotor shaft. These coded pulses are received at the ground i.f. station and interpreted to identify the plane carrying the equipment as friendly, and incidentally to indicate the range of the plane for comparison against radar readings.

The transmitter consists of four tubes and associated circuits. The $316A$ ($VT-15$), is a self-excited power oscillator using tuned lines as the frequency-determining elements. Relay 2 moves a square of Micalex dielectric between two plates on the end of the line rods giving a choice of two operating frequencies. Two adjustable mechanical stops on the relay provide frequency adjustment. Two types of modulation are provided, the type depending upon the position of Relay 6. One type is pulse modulation as described in the preceding paragraph, while the other is provided by $VT-14$ operating as a 30-kc. oscillator and modulator. The antenna is coupled to the tuned lines by a pick-up loop whose coupling to the lines is adjustable. It connects to the antenna socket on the front panel through a short length of coaxial line.

**Conversion for 420 Mc.**

In converting the BC-645 for operation as communications equipment the basic thought in mind was to make the conversion with a minimum of changes in components and wiring from the original set. Improvements and refinements can be made in layout and circuit components for maximum performance in this new application at the expense of complicating the conversion.

Before proceeding with circuit rewiring, particularly in the receiver audio section and the transmitter-modulator section, it was felt advisable to remove excess components and relays. All relays except Relay 3, all potentiometers, the small two-position switch accessible from the front of the case and shown just to the left of $VT-18$ in the schematic, the 30-kc. oscillator coil and the fuse strip in front of the frequency-change relay were removed. This provided less congestion in which to work and left a neater chassis when the job was completed.

Conversion of the receiver required that the gain-control system be revamped and an audio system added which would be suitable for operation of a speaker or headset. In addition, it was necessary to make changes to enable one to tune to the 420-450-Mc. amateur band. The diode detector circuit was altered to provide a source of a.v.c. voltage and to decrease loading on the last i.f. transformer. Grid-return leads of the i.f.

---

**February 1947**
amplifiers were lifted from ground and returned to the a.v.o. line. Since it appeared that this equipment would find its greatest usefulness in 'phone work, no provision was made for an r.f. gain control or operation without a.v.c. The schematic diagram of the converted receiver, Fig. 2, shows the addition of cathode biasing resistors to provide initial bias for the i.f. amplifier tubes; however, operation was satisfactory without this initial bias. Although some improvement in residual noise is gained by biasing these tubes, the omission simplifies the conversion.

The range of the tuning condenser across the end of the antenna tuning stub was sufficient to cover the lower range to 420 Mc. and no changes were necessary here, but an increase in the length of the local oscillator lines was required. The 955 oscillator socket and tuning assembly were removed as a unit by taking out the four screws holding the assembly to the chassis and unsoldering the six leads going into the set proper. The line-shorting condenser, grid leak and plate choke were removed from the end of the line, the ends of the rods were drilled and ½-inch extensions were soldered in place, after which the components were replaced in the same relative position as in the original set.

The audio section following the detector may be as extensive as desired, with a selection of tubes for the purpose from which to choose (VT-7, VT-8, VT-9, VT-10, VT-18 and VT-19). In the sets converted by the authors, one-half of VT-9 and VT-18 were used and gave ample gain and power output. An output transformer was added for 'speaker' operation, and is recommended for headset operation although satisfactory headset volume may be obtained by resistance-capacity coupling to the first a.f. or output plate circuits.

Shifting the transmitter frequency down to the 420-450-Mc. amateur band involved removing frequency-shifting Relay 2 and adding a capacitor of the circular neutralizing type across the ends of the oscillator line. The condenser was made by soldering No. 8 flat-head screws to two ½-inch diameter copper disks. The extensions of the oscillator line consist of two metal strips approximately one inch long and ½ inch wide soldered to the capacitor ends of the original line so that the strips extend ½ inch beyond the ends of the line rods. At ¾ inch from the end of these strips a tapped hole was provided for the screws of the capacitor plates. The ends of the screws
Bottom view of the BC-645 in its original condition. Many of the parts are not used and may be removed to simplify the conversion operation.

were slotted and screwdriver clearance holes drilled in the side of the case for access to the slotted ends of the screws. Circuit details of the transmitter section are shown in Fig. 3.

The modulator system is of the Heising constant-current type using a single 6F6 as the modulator tube. Since power obtained from the 6F6 is not sufficient to completely modulate the carrier oscillator, this is one of the most inviting sections for the aforementioned improvements and refinements. However, results obtained in tests were quite satisfactory using this set-up. The speech amplifier ahead of the modulator was arranged to handle a crystal or dynamic microphone, but a carbon microphone may be used by adding a microphone transformer and a source of d.c. for microphone current. The Army T-17 microphone has been used by the authors and proved entirely satisfactory. A push-to-talk switch on the microphone is used to place the transmitter in operation and render the receiver inoperative when transmitting by opening the cathode circuit of the first a.f. stage.

For mobile operation, a dynamotor supply capable of delivering 400 volts d.c. at 150 ma. and 9 volts a.c. at 1.2 amp. is required. In the conversion made and tested by the authors the dynamotor used with the original equipment was employed. Since this dynamotor required 12 volts d.c. input, no changes were made in the filament wiring, and in the design of an a.c. power supply 12 volts a.c. was provided for the filament string in the set. The schematic of the a.c. power supply is shown in Fig. 4. Rearrangement of the filament wiring for 6-volt operation will present no problem.

The aircraft antennas intended for use with the BC-645 consisted of vertical quarter-wave faired rods working against the frame of the aircraft; however, any antenna which can be matched to the set at or near 50 ohms should prove satisfactory. Both dipoles and ground-plane antennas
...were tried in field tests with good results. More consistent results in mobile use were obtained with the ground-plane antenna, because of less-directional characteristics. For fixed stations any of several directional arrays may be chosen for higher gain in the desired direction. The reader is referred to either "The Radio Amateur's Handbook" or the ARRL Antenna Book for constructional details of directional arrays designed for low-angle radiation. At this frequency the propagation effects of directional antennas become an interesting study, with rhombics, in particular, taking on a very practical and easily-rotated size.

**On-the-Air Tests**

Two models of the BC-645 were converted as outlined and in accordance with the circuit diagrams shown. Also, an a.c. power pack for 115-volt operation was built and the dynamotor, PE-101, modified for operation with the converted equipment. The dynamotor modification consisted only of rearranging connections and re-...
moving the coding keyer on the end. In order to make field tests, the aid of W9WJM of Cicero, Ill. and W9BZK of Chicago was enlisted. Tests were conducted of point-to-point fixed-station operation and fixed-to-mobile operation. With one antenna mounted on the chimney of a two-story home at a height of approximately 39 feet and the mobile antenna mounted on the roof of an automobile, good reliable contact was maintained for a radius of two miles in residential and gently-rolling or lightly-wooded areas. In clear or essentially line-of-sight areas communication was good at slightly over 5 miles. Tests were not made to determine the maximum line-of-sight range, but with one antenna at a height of 30 feet and the other at 50 feet, signal strengths and quality were exceptionally good at 8 miles. At these elevations a line-of-sight range of 15 miles is possible and the signal strength at 8 miles indicated that contact at 15 miles or farther could be maintained very successfully.

In city industrial districts and among tall buildings difficulty with reflections and shadows, at times sufficiently serious to render speech unintelligible, was experienced in mobile operation. The phenomena are much like that of fast fading and in some cases it was necessary to stop the car in order to understand and be understood. In case signals were lost on stopping, a slight movement of the car would bring in the signal again to full strength.

Ideas for refinements are in mind and will be the subject of further experimentation. Among contemplated refinements are the use of push-pull 6F6s as modulators, the addition of an audio oscillator to be switched to the modulator circuit for m.c.w. or to the last i.f. tube of the receiver for modulating c.w. signals, and single-dial receiver tuning.

Silent Keys

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

W4DIB, Robert M. Slack, Black Mountain, N. C.

W6BIQ, T/4 Howard J. Meredith, USA, Sacramento, Calif.


W8YGB, Ernest W. Moreau, Detroit, Mich.

W9HRM, Erwin W. Kreis, Milwaukee, Wis.

W9YOQ, C. E. Black, Perry, Iowa

G5QF, Seymour A. Buckingham, London, England

HH2MC, Emile Cadet, Port-au-Prince, Haiti

VE7ER, Earl R. Streeter, Vancouver, B. C.
Transmitting Ratings on Receiving Tubes

Newly-Released Data on the More Popular Types

There is hardly an amateur transmitter in existence that does not have one or more receiving-type tubes somewhere in the r.f. line-up, tubes that were built and carry ratings only for audio service. Fortunately, they're cheap, so we haven't paid too much for the knowledge of what they'll stand in individual cases. But a manufacturer always has lots more tubes and facilities for finding out their limitations than we amateurs have, so it's nice to have the accompanying set of ratings on some of the more popular types. Furnished by RCA, it should be understood to apply primarily to tubes of RCA manufacture, but despite the manufacturing differences between tubes of different brands it is probable that these ratings will apply pretty closely to others as well.

In using the data, please note that these are maximum ratings, not operating conditions. You can use any operating conditions you please so long as no one of the maximum ratings is exceeded. Also note that the ratings appear conservative in the light of what some hams do to tubes, but the point is that the tubes will stand up under these ratings — and it won't be necessary to go through a half-dozen of them before finding one that will. Also (commercials please note), these are ratings specified for amateur use only.

The tubes listed in the table are ones frequently used as multipliers in exciters. It must be remembered that in frequency-multiplier service the plate efficiency is considerably lower than in straight-through amplification, and appropriate allowance for this reduction in efficiency must be made in determining permissible operating conditions. As a first approximation, assume an efficiency of 70 per cent for straight-through amplification, 50 per cent for doubling, and 33 per cent for tripling.

The maximum frequency limit should be observed in each case. RCA says that the octal-based types are usable in the six-meter band and the miniatures will work at 144 Mc., but for frequencies higher than those listed in the table all ratings should be reduced by 20 per cent. The ratings are based on nonmodulated service, and if the tubes are to be 100-per-cent amplitude-modulated a 20-per-cent reduction of all ratings is likewise in order.

<table>
<thead>
<tr>
<th>Type</th>
<th>6AQ7</th>
<th>6AK6</th>
<th>6AQ5</th>
<th>6C4</th>
<th>6F6</th>
<th>6L6</th>
<th>6N7</th>
<th>6G6GT</th>
<th>12AU7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. plate-supply volts</td>
<td>375</td>
<td>375</td>
<td>350</td>
<td>350</td>
<td>400</td>
<td>400</td>
<td>350</td>
<td>350</td>
<td>350</td>
</tr>
<tr>
<td>Max. control-grid volts</td>
<td>-75</td>
<td>-250</td>
<td>-250</td>
<td>-100</td>
<td>-100</td>
<td>-125</td>
<td>-100</td>
<td>-100</td>
<td>-100</td>
</tr>
<tr>
<td>Max. plate milliamperes</td>
<td>30</td>
<td>15</td>
<td>47</td>
<td>25</td>
<td>50</td>
<td>100</td>
<td>30</td>
<td>47</td>
<td>12</td>
</tr>
<tr>
<td>Max. screen-grid milliamperes</td>
<td>9</td>
<td>4</td>
<td>7</td>
<td>11</td>
<td>12</td>
<td>7</td>
<td>7</td>
<td>3</td>
<td>3.5</td>
</tr>
<tr>
<td>Max. control-grid milliamperes</td>
<td>5.0</td>
<td>3.0</td>
<td>5.0</td>
<td>8.0</td>
<td>5.0</td>
<td>5.0</td>
<td>5.0</td>
<td>3.0</td>
<td>3.0</td>
</tr>
<tr>
<td>Max. power output, watts</td>
<td>9.0</td>
<td>3.5</td>
<td>8.0</td>
<td>5.0</td>
<td>12.5</td>
<td>21</td>
<td>5.5</td>
<td>8.0</td>
<td>2.75</td>
</tr>
<tr>
<td>Max. screen-grid dissipation, watts</td>
<td>1.5</td>
<td>1.0</td>
<td>2.0</td>
<td>3.0</td>
<td>3.5</td>
<td>2.0</td>
<td>2.0</td>
<td>2.0</td>
<td>2.0</td>
</tr>
<tr>
<td>Max. plate dissipation, watts</td>
<td>7.5</td>
<td>4.0</td>
<td>11.0</td>
<td>5.5</td>
<td>14</td>
<td>28</td>
<td>14.5</td>
<td>11.0</td>
<td>6.0</td>
</tr>
<tr>
<td>Power output, watts</td>
<td>10</td>
<td>54</td>
<td>54</td>
<td>54</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>54</td>
</tr>
<tr>
<td>Approx. amp. factor for grid-bias calculations</td>
<td>22</td>
<td>9.5</td>
<td>10</td>
<td>18</td>
<td>7</td>
<td>8</td>
<td>35</td>
<td>9</td>
<td>18</td>
</tr>
<tr>
<td>Maximum frequency, Mc.</td>
<td>10</td>
<td>54</td>
<td>54</td>
<td>54</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>54</td>
</tr>
<tr>
<td>Capacitance (grid-plate)</td>
<td>0.08</td>
<td>0.12</td>
<td>0.35</td>
<td>1.6</td>
<td>0.2</td>
<td>0.4</td>
<td>0.7</td>
<td>0.7</td>
<td>1.5</td>
</tr>
<tr>
<td>Input</td>
<td>13</td>
<td>3.6</td>
<td>7.6</td>
<td>1.8</td>
<td>6.5</td>
<td>10</td>
<td>9.5</td>
<td>1.6</td>
<td>0.5</td>
</tr>
<tr>
<td>Output</td>
<td>7.5</td>
<td>4.2</td>
<td>6.0</td>
<td>1.3</td>
<td>13</td>
<td>12</td>
<td>7.5</td>
<td>0.5</td>
<td>0.5</td>
</tr>
</tbody>
</table>

1 Maximum value of grid resistor, 0.1 megohm.
2 Power output based on plate-circuit efficiency of 70%.
3 Maximum frequency for full power input and output.
4 For pentodes this is the screen-grid amplification factor.
A Stabilized 813 Amplifier
Single-Adjustment Neutralization Applied to a Beam-Power Tube
BY RICHARD M. SMITH,* WIFTX

How many times have you built an amplifier using a beam tetrode only to find that in spite of everything "the book" said about its stability, and in spite of all the pains you took to do a careful job, the thing just couldn't be tamed? Quite a few times, we'll bet, and if you have finally achieved the desired stability, you are a very fortunate guy. There are plenty of beam tetrodes in use today, and many of them put out very respectable signals, but there are altogether too many of them around which put out those clean signals only under certain rather precarious conditions of adjustment. If the grid circuit isn't tuned "just so," or if the drive falls below a certain point, the tube takes off by itself. In other words, most amplifiers of this sort are stable under one set of conditions, but are as unstable as an 1898 dime standing on edge under a lot of other conditions. This was brought home quite forcibly during the recent Sweepstakes contest, when a lot of sloppy signals showed up from stations that normally put clean signals on the air. Hasty adjustments made necessary by the "quick-QSY" method of operation used in contests undoubtedly caused much of the spurious racket which was heard.

While it is true that not all of the sloppy signals heard were caused by beam tetrodes, they undoubtedly contributed more than a fair share. The reasons for this are obvious if you've read "No Neutralization Required," which appeared in *QST* for June, 1946. It is a problem that has been with us ever since the first tetrode appeared on the scene, and one that will always be with us, from the look of things.

The solution to the problem seems to lie in either of two directions. One school of thought advocates the complete abolition of all beam tetrodes! The other solution is to neutralize the beam tube. Maybe a few eyebrows will be raised at this suggestion, because after all, you just don’t do that sort of thing in polite ham society. Why not? In our estimation it all boils down to the fact that we like to take pride in saying "Yep, the rig here uses a --- beam tetrode in the final, and it doesn't need neutralization." Maybe it doesn't, but dollars to doughnuts you can make it oscillate merrily if you take the load off, or if you just happen to get things tuned up a certain way. If your amplifier will oscillate under such conditions, brother, beware! It needs neutralization, and you are looking for a QSL from Grand Island if you don’t fix it pronto!

The amplifier described here uses an 813. It oscillated. We neutralized it ... and now it works like a charm. It just can't be made to oscillate under any conditions of misadjustment. In addition, readjustment of the neutralizing condenser is not required when changing bands. Thus, the principal objection to having the thing neutralized is overcome. If you'd feel bashful about "confessing" that it was neutralized, forget about it. More pride should be taken in the fact that you recognize the dangers involved in not having it neutralized, and in the assurance that you will always have a clean signal, instead of just "usually." All of the usual precautions were taken in the design and construction of this amplifier, yet when we tested it in the lab, we found that it could be made to oscillate without any difficulty at all. Yes, it would have been possible to use the thing under some conditions of adjustment without neutralizing the 813, but...
the risks involved were too great, and when we discovered how easily the tube can be stabilized, and how beautifully it then handles in operation, we decided that the few minutes involved in making a homemade neutralizing condenser were definitely worth while. The original layout was such that it was simple to add a neutralizing circuit. A balanced tank circuit was used, because it is impossible to buy plug-in coils with anything but center-mounted swinging links. It was therefore only necessary to take a little r.f. from the "out-of-phase" end of the plate tank coil and feed it to the grid. The details are explained in a later paragraph.

As shown in the photographs, the unit is very compact, requiring only a 19 × 9-inch panel, and 9 inches behind the panel. On the front panel are the main tuning dial, a meter for measuring grid, screen, and cathode currents, a four-position bandswitch for selection of the proper grid coil, a coaxial input jack, the grid tuning dial, and a key jack. The neutralizing condenser is mounted behind the panel, as it needs to be adjusted only once. Mechanically, the unit is comprised of three separate assemblies requiring few interconnections, thus making construction much simpler than would be apparent at first glance. The panel assembly includes the meter, the plate tuning condenser, and a Barker & Williamson swinging-link assembly for the TVII series of plug-in coils used in the plate tank. The grid coils and their bandswitch, the grid tuning condenser, the meter switch, and the key jack make up the second assembly, constructed on the cover of a standard 6 × 6 × 6-inch steel utility box. The framework of the box itself supports the socket for the 813 tube, the screen dropping resistors, a socket for a 6Y6G screen-protecting tube, and terminals through which filament and d.c. voltages are supplied.

The circuit is shown in Fig. 1. A bandswitched grid circuit is used to permit easy band change from 80 to 10 meters inclusive without requiring the removal of the rear shield plate. Meter switching is accomplished by the usual means of switching the meter across low-resistance shunts. Resistors of 100 ohms are used as the shunts in the grid and screen leads.

![Schematic diagram of the 813 amplifier.](image-url)

- **C1** = 100-µfd. mica.
- **C2** = 68-µfd. mica.
- **C3** = 50-µfd. receiving-type variable (Millen Type 19050).
- **C4** = 0.0022-µfd. mica.
- **C5, C6** = 0.01-µfd. paper.
- **C7** = 0.001-µfd. 5000-volt mica.
- **C8** = 0.001-µfd. 5000-volt mica.
- **C9** = 50-µµfd. per-section dual transmitting type, 0.171-inch spacing (Cardwell XG-50-XD).
- **C10** = 0.001-µfd. 5000-volt mica.
- **Cn** = See text.
- **R1** = 10,000 ohms, 5 watts. (See text.)
- **R2, R3** = 100 ohms, ½ watt.
- **R4** = 35,000 ohms, 50 watts, with slider.
- **R5** = 15,000 ohms, 50 watts.
- **R6** = Meter shunt. Wound with No. 30 d.s.e. wire, length as required to multiply meter scale by ten.
- **L4** = 27 turns No. 22 d.c.e. spaced to occupy 1½ inches on a 1-inch diam. form.
- **L5** = 15 turns No. 18 d.c.e. spaced to occupy 1½ inches on a 1-inch diam. form.
- **L6** = 10 turns No. 18 d.c.e. spaced to occupy 1½ inches on a 1-inch diam. form.
- **L7** = 5 turns No. 18 d.c.e. spaced to occupy 1½ inches on a 1-inch diam. form.
- **L8, L9, L10** = Two-turn links, No. 18 insulated stranded wire, wound over ground ends of L4 through L8 inclusive.

**Fig. 1 — Schematic diagram of the 813 amplifier.**
and a shunt wound from No. 30 d.c. wire is used to multiply the range of the 0-50-ma. meter by ten for measurement of total cathode current. The plate tank circuit is arranged so that the plate-supply voltage is applied to both the rotor and stator of the tuning condenser, thus permitting the use of smaller plate spacing than would otherwise be possible. If only c.w. operation is desired, the blocking condenser, $C_s$, and $RFC_2$ may be omitted. In this case, the rotor of the condenser should be grounded to the steel box.

The neutralizing condenser $C_N$ is home-built, made of two copper disks, each 1 inch in diameter. Its construction is discussed in a later paragraph. The 6Y6G tube serves a dual purpose, protecting the tube by cutting off plate current in the event of excitation failure, and also permitting the exciters to be keyed without requiring any fixed bias. Operating bias for the 813 is developed across $R_1$, which at the same time applies a cut-off bias to the 6Y6G when excitation is present. When excitation is removed, however, the 6Y6G is without bias. It therefore conducts heavily, causing the voltage drop across screen resistors $R_4$ and $R_5$ to be large. This reduces the screen voltage to a negligible figure, which in turn cuts off plate current. If the break-in method of keying is not desired, the amplifier may be keyed in the center-tap of the filament transformer at $J_2$.

The value of bias resistor $R_1$ may have to be changed if the tube is to be operated at other than maximum ratings. The value shown in Fig. 1 will be satisfactory in most cases, but if optimum performance is desired at lower input, the grid-leak value should be adjusted to provide rated bias under the particular operating conditions used, as set forth in the tube manufacturer’s data sheets. The filament transformers, $T_1$ and $T_2$, are shown in the diagram merely to indicate how they are to be connected. They are not included in the amplifier unit itself.

A word should be said about the ratings and values of the screen dropping resistors, $R_4$ and $R_5$. The total resistance required to reduce the screen voltage to 400 volts from the plate supply is in the neighborhood of 35,000 to 45,000 ohms, depending upon how much screen current is flowing. Screen current normally runs somewhere between 30 and 40 ma., thus requiring a resistor capable of dissipating about 65 watts. Since the resistors are mounted within an enclosure, a wide margin of safety is needed. Therefore two fifty-watt resistors in series were used, producing a combination rated for 100 watts dissipation. The resistance values were proportioned so that the slider on $R_4$ would normally be set near the screen end of the resistor, thus utilizing almost all of this resistor, and all of $R_5$, to make maximum use of the heat-dissipating ability of each.

Construction

The r.f. input jack, the grid coils, grid tuning condenser, bandswitch, key jack, and the meter switch are built as one assembly constructed on one of the cover plates of the utility box. All ground connections in this assembly are made to soldering lugs slipped under the screws which mount the coil forms. The coils themselves are held away from the chassis by National GS-10 stand-off insulators. Care should be taken in locating the mounting holes for the coils and the bandswitch to be sure that they will clear the lip of the utility box when the time comes for final assembly. If required, additional clearance may be obtained by filing semicircular notches in the lips of the box. The coils should be connected to the bandswitch before the coupling links are wound. This keeps the assembly clear of obstructions and makes wiring easier. Padding condensers $C_1$ and $C_2$, used with the 40- and 80-meter coils respectively, are connected from the grid end of the coil to the same soldering lugs used for grounding the cold ends of the coils. When the links are wound on later, their ground connections are also made to these same lugs.

The meter switch provides mounting terminals for meter shunts $R_2$, $R_3$, and $R_6$, and for the grid resistor, $R_1$. The leads to the meter itself are passed through the top of the box through a grommet-lined hole after assembly. The other leads to the metered circuits are cabled and are run along the top of the box.

The socket for the 813 is submounted to the depth of the shield plate inside the tube and is held inside the box on an aluminum bracket. All of the by-pass condensers associated with the screen and filament circuits are mounted right on the socket and should, if possible, be grounded at a common point. All of this wiring, together with the filament and screen leads, should be soldered in place before the bracket is mounted within the box. The grid blocking condenser, $C_4$, may also

Rear view of the 813 amplifier. The steel utility box used to shield the input circuits is bolted to the rear of the panel. The home-built neutralizing condenser is visible just below the micro-by-pass condenser which forms a part of the rear support for the plate condenser. The plate condenser and the swinging link assembly are mounted directly on the panel with stand-off insulators.

February 1947
be soldered in position, leaving one end free to be connected to the stator plates of the grid tuning condenser after assembly. The mounting of the screen dropping resistors is shown in the photograph of the interior of the box. Both are supported by small ceramic stand-off insulators. High voltage for the plate and screen supply enters the top of the box through a Millen safety connector, and is passed through the side of the box to the plate coil through a ceramic bushing. A bushing requiring a \( \frac{3}{4} \) inch hole was used to provide maximum insulation. The fixed plate of the neutralizing condenser is mounted on a similar bushing just above the socket for the 6Y6G. The exact location of this hole should be determined after temporarily assembling the panel, the plate tuning condenser, and the box, because the fixed plate must be aligned with the variable plate, which is supported by the plate tuning condenser.

The plate tuning condenser is mounted on the front panel by three ceramic stand-off insulators. This is necessary because the condenser rotor is at full plate potential above ground. The rotor shaft is cut off about \( \frac{1}{2} \) inch from the rotor bushing, to permit the insertion of a high-voltage type shaft coupling. An insulated shaft made of \( \frac{3}{4} \) inch bakelite rod couples the rotor of the condenser to the dial. Both r.f. chokes used in the plate tank circuits are mounted on the jack bar into which the coils plug. The high-voltage lead runs from the center-tap of the coil to the ceramic bushing on the side of the box, at which point the plate by-pass condenser, \( C_{10} \), is mounted. The ground end of this condenser is mounted on a spacer which is held in place by one of the screws which passes through the side of the box to hold the socket's mounting bracket in place. The rear of the plate tuning condenser is held to the rear of the box by a small aluminum bracket, bent to provide adequate clearance between itself and the rotor. Blocking condenser \( C_8 \) is made a part of this bracket. If \( C_8 \) is not used (as discussed in a previous paragraph) the bracket may be extended to the rotor of the condenser itself.

The variable plate of the neutralizing condenser is supported by a small bracket bolted to the stator connectors of the tuning condenser. The copper disks used are each 1 inch in diameter. A hole is drilled in the center of each disk to pass a mounting screw. The "stator" disk is bolted to the ceramic feed-through bushing, and is held away from it by a \( \frac{1}{4} \) inch spacer. The other end of the screw which goes through the bushing is fitted with a soldering lug to which the grid connection is soldered. The "rotor" disk is fastened to a 2-inch machine screw with a nut. The threaded end of the screw is then passed through the mounting bracket and is held in position firmly by two nuts, one on each surface of the bracket. This plate should be put in position first, after which the location of the hole for the bushing can be determined to provide proper alignment of the two plates. The plates of the neutralizing condenser do not of necessity have to be circular, but they should be of about the same surface area as those specified here to permit the required neutralizing capacitance to be obtained without having to reduce the plate spacing to less than \( \frac{1}{8} \) inch, necessary to prevent flash-over on modulation peaks.

After the three separate assemblies have been built and wired, the few remaining interconnections should be made. These include the connection of the metering leads to the proper points of the circuit, the connection of the grid coupling condenser to the stator plates of the grid tuning condenser, and the connection of the leads between the common terminals of the meter switch and the meter itself. The entire box assembly is then bolted to the front panel using homemade angle brackets as shown in the photographs.

**Adjustments**

Before applying plate voltage to the unit, a few preliminary adjustments are required. The circuit should be neutralized first, after which...
the slider on the screen resistor should be set. The neutralization adjustments are best made with the aid of a sensitive absorption-type wavemeter. The crystal-detector unit described in recent editions of *The Radio Amateur's Handbook* is very useful in this respect. It should be coupled closely to the plate tank coil. Excitation should be applied to the grid of the tube, with the filaments lighted, but with the high-voltage lead disconnected at the safety terminal. It will probably be easiest to neutralize with the amplifier set up for operation in the 3.5-Mc. band. With the grid circuit tuned to resonance, rotate the plate tuning condenser and the tuning condenser of the wavemeter until a reading is obtained on the indicator of the wavemeter. Then adjust the spacing between the plates of the neutralizing condenser, a little bit at a time, until the desired reading is obtained. If it is not possible to actually tune the neutralizing condenser through a minimum, the plates specified here will have to be changed, but with the plates spaced about 1 1/4 inches apart.

After the neutralizing adjustment has been made, the slider on the screen resistor should be set. The preliminary setting can be made with the aid of an ohmmeter, referring to the tube operating data supplied by the manufacturer. For example, the tube data sheet sets forth the following operating conditions for Class C telegraphy: plate voltage 2250 max., screen voltage 400 max., screen current 40 ma. Using these figures in an Ohm's Law formula we find that to drop the plate voltage from 2250 to 400 volts with 40 ma. current, it is necessary to use a series screen resistor of 46,000 ohms. Similar relationships can be worked out for other operating voltages. For maximum output, it is desirable to keep the screen voltage close to the maximum as possible. As a preliminary adjustment, therefore, the slider should be set so that there is 46,000 ohms between it and the high-voltage end of Rs. This should produce the desired operating conditions for the screen, but it should be checked under the following conditions: Excitation to produce rated grid current should be applied, and the plate tank tuned to resonance, and a dummy load capable of dissipating 300 to 350 watts should be connected to the swinging link. Then with full plate voltage applied, the link should be pushed in until full plate current (225 ma. for the conditions set forth above) is indicated. If it is impossible to load the final to this input, assuming that about 14 ma. grid current is flowing, it may be necessary to tap the dummy load across a few turns of the tank coil itself until the desired loading is accomplished. If it is still impossible to load the plate circuit to 225 ma. plate current, it is probable that excessive screen current is pulling screen voltage down so low that the plate will not behave properly. This can be caused by excessive drive or insufficient loading. In circuits which use a screen dropping resistor from the plate supply, excessive drive is highly undesirable, for the greater the grid drive, the greater the screen current, which merely pulls screen voltage down and reduces output. In other words, it becomes one of those carefully-balanced situations where excitation, load, and the value of the screen dropping resistor must be adjusted a little bit at a time until the rated operating conditions are obtained. However, once the desired screen-voltage and screen-current conditions are obtained, with rated excitation at the same time, maximum output will be obtained, and if 'phone operation is used, modulation will be linear. Most cases of fluctuating plate current under modulation can be attributed to an undernourished screen.

If the screen operating conditions are not "according to the book," the performance of the tube just can't be satisfactory, especially where plate-and-screen modulation is planned. Therefore, make sure that all of the above conditions are met before considering the adjustment complete.

After both screen and neutralizing adjustments are made, test the amplifier for stability by oper-
Technical Topics —
LF-N.F.M.

No, it isn't an advertising slogan. It's simply a shorthand way of saying "narrow-band frequency-modulated 'phone on amateur frequencies below 14.4 Me." — which is quite a mouthful if you have to say it often.

In early October a series of on-the-air tests of n.f.m. was begun on the 75-meter 'phone band by W1AW and W2GDG, under special temporary authority from FCC. The primary object of the tests was to determine whether any untoward effects would show up when n.f.m. was used under ordinary operating conditions in a crowded amateur 'phone band — effects which either theory or laboratory tests might not anticipate. The two stations have been maintaining communication schedules and promoting round-tables in which other stations could join and observe. The frequencies were chosen to be 2 kc. apart so that interference possibilities could be checked, W2GDG being on 3920 kc. and W1AW on 3922.

W1AW, with a kilowatt input available on either n.f.m. or a.m., has many times switched from one method to the other while W2GDG was transmitting simultaneously on n.f.m. only, using 100 watts. At both stations the deviation ratio has been kept below 0.75 so that all sidebands of any appreciable amplitude would be confined to the normal a.m. channel.

To date, opinions of those who have heard the tests have been practically unanimous:

1) The n.f.m. transmissions are certainly no broader, and often appear to occupy less channel space than the a.m. signal.
2) When W1AW and W2GDG are transmitting simultaneously, the interference to W2GDG is much greater when W1AW is on a.m. than when using n.f.m.

In other words, there have been no unanticipated effects.

We believe it is necessary, now, to consider seriously from the technical standpoint whether narrow-band f.m. as previously defined1 should not be permitted on all amateur frequencies that are now exclusively a.m. The arguments for such permission can be summed up as follows:

1) The system as defined does not occupy a wider channel than a.m. and has no inherent peculiarities that result in more interference than a.m. In fact, the interference is less because the sideband power in an n.f.m. signal is less than in 100-per-cent amplitude modulation, when the n.f.m. channel is kept within the defined limits.
2) There is no reason for discriminating against any particular system so long as its use does not increase congestion in the amateur bands.
3) Interference to nearby broadcast reception is reduced by a large factor and, depending upon the transmitting frequency, may be completely eliminated.
4) With f.m. there is no such thing as "overmodulation" in the same sense that it exists in a.m. Increasing the frequency swing does cause the channel occupied to widen out, but the limit on modulation extent is primarily set by the width of the channel for which the receiver is designed. "Overmodulation" in f.m. is therefore a receiver phenomenon. If the swing is too wide for the receiver there is a great deal of distortion of the resultant audio but not the increase in volume that goes with overmodulation in a.m. The volume may actually decrease, in fact. If the same thing were true of overmodulation in a.m. it's a certainty that we'd have much less of it.
5) With properly-designed receivers, effective noise suppression is possible and an improvement of the order of 6 db. in signal-to-noise ratio can be expected with signals at the threshold level.2 However, no special receiver is required for n.f.m.
6) The modulating equipment is inexpensive and not complicated in principle, although differing from the better-known a.m. system. The requirements for linear operation of the r.f. section of the transmitter are much less rigorous than for a.m.

In our opinion, these arguments are pretty strong — particularly those that tend to result in better technical practices in the 'phone bands. However, there is also a "con" side as well as a "pro":

1) It can be argued that the use of n.f.m. will increase heterodyne interference because the power in the first pair of sidebands is not as great as in a 100-per-cent amplitude-modulated signal of the same carrier power, at deviation ratios that come within the definition of n.f.m.3 In other words, in a.m. terms the modulation is less than 100 per cent, which means that a stronger carrier is radiated than is actually needed to carry the same voice power.
2) N.f.m. is so easily and inexpensively applied to a c.w. transmitter that its use, if permitted, will encourage 'phone operation to such an extent that congestion in the 'phone bands will increase tremendously.
3) The only solution to the question of enough space for 'phone eventually must be the adoption

---

of single-sideband suppressed-carrier technique. F.m. is inherently unusable in such a case.

The last of these arguments probably has more real validity than the first two, but at that is rather nebulous. Single-sideband transmission without a carrier is not out of the question for amateur work, but would require such a complete overhauling of our transmitting and receiving methods that it is not likely to come about overnight. There may be easier methods, both operating and technical, to achieve the same end or to approximate it. Anyhow, amateur radio is a flexible art, and the privilege of using one or another method of communication is not the sort of thing that can be frozen forever; conditions change and methods must also change with them.

As for the No. 1 contra argument, it seems to us that this is simply one of the penalties of the system that has to be accepted along with the benefits. Numerically, it is not as great as the possible signal/noise-ratio improvement in weak-signal reception, so may not really constitute a penalty. Audio gain is easy to get in a receiver. The real disadvantage is in the presence of a.m. interference. No. 2 is not a technical argument at all.

The W1AW-W2GDG tests will continue until March 31st under the present authorization. By the time this appears in print it is hoped that the W1AW schedules can be expanded to permit alternate n.f.m. and a.m. on the regular 'phone broadcast periods on both 75 and 20 meters so that all those interested can have an opportunity to listen and judge for themselves. There seems small doubt but that the question of authorizing n.f.m. on our low-frequency 'phone bands will be brought up at the ARRL Board meeting in May and, if a favorable decision results, be followed by a recommendation to the FCC to open all bands where a.m. is now exclusive. It is important, therefore, that those who have any technical reasons to advance against it should make themselves heard now. Such correspondence is invited.

There are many questions of technical interest which can better be answered on a laboratory basis than in air tests, and we are now engaged in a lab project which aims to uncover some quantitative data on relative interference and so on. However, it seems quite certain by now that n.f.m. as such does not increase interference. That, we think, is the critical point. It does not matter a great deal at this juncture whether there would be loss-over-all interference if all 'phone were n.f.m. and a.m. were washed out, nor whether the man on a.m. has an advantage over the n.f.m. operator. Those things can be determined on a leisurely basis, with accuracy the object.

Should n.f.m. eventually be permitted below 14.4 Mc., it will not only be necessary to set up standards but, in line with present a.m. regulations, amateurs undoubtedly will be required to have means available for ensuring that the frequency deviation does not exceed the permissible values. Such things as whether or not the system should be phase modulation rather than frequency modulation also deserve full consideration, because there is considerable background in the field to help in arriving at the best answer for amateur communication. We expect to discuss these questions at some length in succeeding issues. -- G. G.

S-Meters – So What?

A casual listener to any of the 'phone bands must be considerably impressed by the high technical development of amateurs when he hears their sage reports of “20 db. over S9” and the like that are so common. But he must become a little confused when, after learning that S9 means “extremely strong signals,” he hears a report of “You’re 10 db. over S9 but so-and-so is giving you trouble,” and wonders how a signal 10 db. above “extremely strong” can be troubled by anything. He has a right to be puzzled – the paradox is one of long standing – but the trouble lies not with the S-meter, as some would have it, but with the manner in which it is used. S-meter readings are neither as sacred as some say nor as black as others would paint them, but they do have to be used intelligently to mean anything.

It is probably a safe assumption that 90 per cent of any group of hams asked, “What does the S-meter indicate?” would reply that it tells how loud the signal is. Forget it! A properly-calibrated S-meter can give you a comparison of the relative strengths of signals, but only if certain conditions prevail. These conditions are that the antenna gain be similar for the two signals, that there be no other signals within the receiver pass-band at the time of measurement (remembering that noise and splatter rate as signals), and that the readings be made on the same amateur band because of the variation in receiver gain with changes in frequency. The antenna gain will be similar if a rotary beam is used, except in cases where the signals arrive at considerably-different vertical angles or where the horizontal bearings are different and the gain changes because of the loading effects of surrounding objects, but at lower frequencies and with simple wire antennas there is a good chance that the antenna gain will not be similar for the two signals if they come from different directions. That there be no other signals
within the receiver pass-band is a condition rarely obtained, except perhaps on 50 Mc. and during slack hours on 28 Mc. If all of the above conditions are satisfied, the S-meter can be used for the comparison of one signal with another. With the exceptions mentioned, a snowball in the well-known place has about the same chances.

Even if a minor miracle took place and all of the conditions were met, the report would probably come back as "so many db. above S9" and once again the usefulness of the S-meter would be thrown out the window, unless the operator went on to define S9 in his particular receiver—and assuming that the db. scale on his S-meter were accurate. Manufacturers have made an attempt to standardize on their S9s, and it seems to be the reading obtained for either a 50- or 100-microvolt signal in most cases. But unless the receiver has some compensation for change in gain at different frequencies, the S9 definition is correct at only one frequency. But forgetting these minor points, the "db.-above-S9" reports indicate to the receiving operator that his carrier strength is so many db. above one that would put 50 or 100 microvolts at the input of the receiver, and no mention is made of the gain of the antenna. A preselector, of course, throws everything off, because its gain boosts the noise and the signal, and in an extreme case it is possible to get an S9 reading from the amplified noise alone. In this case, a "20-db.-over-S9" report indicates a weaker carrier than an S6 reading on the same receiver without a preselector (assuming 6 db. per S point and a noise level of S1).

But that S-meter came with the receiver, and you can't sit down to the operating table without staring at it while calling CQ or waiting for someone to sign, so let's look for some sensible way to use it. Even if you have a receiver in which the manufacturer has made an effort to give you an accurate calibration on the S-meter, production variations and other variables make it unlikely that even the best receivers can be depended upon for their S scales. However, if a signal generator can be borrowed for an evening, the S-meter can be calibrated in decibels above S1 or whatever your minimum noise reading is, and it then becomes a useful measuring device in several ways. If it isn't calibrated by comparison with a signal generator it is an "indicating" device, but now we're talking about measurements and there is a big difference. During those rare occasions when the station you are working is "in the clear," you can give the operator at the other end an excellent idea of how well you are receiving him—not how loud he is!—by giving him the db. reading that his carrier indicates above noise. (How loud he is depends on where you set your audio gain control.) All this requires is a reading on his channel when his signal isn't on and one when it is, and subtracting the no-signal db. reading from the carrier db. reading measures how well he comes in over the noise. Obviously, this requires a clear channel, so it can't be done during crowded hours. But the same principle can be used at any time, if the no-signal reading includes outside noise and other signals on the channel. Here is a way to use the S-meter intelligently, because it tells the other fellow how well you are receiving him! If you have a lot of outside noise or if the channel is crowded, your report to him will go down, even though your S-meter reading is up above what it would be with his carrier alone. A report like this would mean something, instead of the conventional "10-db.-above-S9—but-so-and-so-is-giving-you-trouble" business. It may be a new concept of S-meter use to many, but it will be just as impressive to the eavesdropper, and a whale of a lot more useful to the operator at the other end. Throw your S readings out the window, unless you are ready to define S9 or whatever you use for a reference, and simply give your reports in "db. above background." Or give your readings per the S scale, with no reference to the meter but with plenty of looks at the S scale printed in your logbook. After all, S7 or S8 is still a respectable report!

Your calibrated S-meter will also measure the extent of the fading of his signal, provided the background conditions aren't changing, and this is particularly useful in propagation studies and the identification of ionosphere peculiarities of the 28- and 50-Mc. bands. And, properly calibrated, your S-meter is a very useful device for checking a rotary-beam pattern and tuning—with a local observer or signal source. Occasionally you can overhear someone adjusting his 28-Mc. beam-element lengths with an observer several thousand miles away but, with 10 to 20 db. of fading, there isn't much hope for the instigator of the tests! — B. G.

"Maybe It's Just Conditions—"

One need listen only a short time on any of our higher-frequency bands to realize that many amateurs have little or no conception of the means by which their signals are propagated to distant points, yet even a little knowledge of propagation phenomena and the application of common sense in our daily observations can save us a lot of time and wasted effort, if we are interested in making the most of the time we spend in operating on 28, 50 or 144 Mc. If amateur communication is worth the time and money required to assemble and operate a modern station,
certainly it is worth a bit of study to determine the best ways of capitalizing on the opportunities afforded us by natural phenomena.

Contrary to the general impression, it is not necessary that one be a combination of astronomer, meteorologist, and mathematician to know his way around in this department. One will find most of what he needs to know in the propagation section of the ARRL Handbook, and intelligent and systematic observation will supply the rest. For a quick summary, the principal ways in which signals are propagated on the frequencies near the v.h.f. range are listed below.

**Atmospheric Bending**

The principles involved in this type of propagation, which ties in with easily-recognized weather phenomena, have been explained countless times in the pages of QST, yet the possibilities seem to be little understood, especially by operators now using the 10-meter band. By this medium contacts may be made on 10, 6 or 2 meters at distances up to 300 miles or more, and opportunities for unusual work can be foretold in advance if we take a little time to observe local weather signs, or, better still, by studying the daily weather maps now being published in many newspapers.

One's working range will vary from night to night, but distances up to 50 miles or so should be workable from the average location under normal conditions. The variation in working range is least on 28 Mc., as the amount of refraction increases with frequency. The 50-Mc. band is more responsive to changes in atmospheric conditions, and signals at a given distance are generally somewhat stronger, all other things being equal, on 50 than on 28 Mc. The 2-meter band is more variable than either 6 or 10, and under summer conditions it produces the most amazing signals at quite frequent intervals, often at times when 6 and 10 are exhibiting only slightly improved propagation. At this frequency, and on up through the microwave region, atmospheric duct effect begins to appear, and on occasion it may be possible for signals to get out to hitherto unbelievable distances. Little is known along this line in amateur work, but the fact that strong signals have been exchanged over distances up to nearly 400 miles on 144 Mc. gives some indication of the possibilities.

**Sporadic-E Skip**

Patchy concentrations of ionization in the E-layer region are often responsible for reflection of signals on 28 and 50 Mc. This is the popular "short skip" which provides fine contacts on both bands in the range between 400 and 1200 miles. It is most common in May, June and July, but may occur at any time, as is evidenced by its having shown up at some time during every month of the postwar period. It is most common during the evening hours, but it has been observed around the clock. It is largely unpredictable, at our present state of knowledge, and consequently it is of high "surprise value."

Multiple-hop effects may show up, when sporadic-E ionization develops over large areas simultaneously, and contacts beyond 2000 miles are made on 28 and 50 Mc. by this medium. As far as is known, no 144-Mc. reflections have been observed, the known limit of sporadic-E work being somewhere in the vicinity of 90 Mc.

**F2-Layer Reflection**

The "normal" contacts on 28 Mc. are made by means of reflection from the F2 layer, the ionization density (and consequently its ability to reflect high-frequency waves) of which varies with solar activity. The highest frequencies are reflected at the peak of the 11-year solar cycle. The maximum usable frequency (m.u.f.) varies with other fairly well-defined cycles, including daily, monthly, and seasonal variations, all related to the movement of Old Sol. Generally speaking, the F2 m.u.f. will be highest for a given day at shortly after noon at the midpoint of the path under consideration. Turning of the sun on its axis each 27 days accounts for the m.u.f. peaks which roll around slightly less than a month apart. In northern latitudes, there are peaks each fall and spring, with a low period during summer and a slight drop-off during midwinter. At or near the Equator conditions are more or less constant at all seasons.

At the low point of the 11-year cycle (we were approaching the bottom at the outbreak of war) the m.u.f. may go as high as 28 Mc. only during a short period each spring and fall, and even then we may have many dead days, and others when the low end of the band is open and the high end dead. For the years near the peak (the present period) the 10-meter band will be open practically the year around, and the part of the band used has little bearing on the strength of signal. The high end may actually have stronger signals than the low end, most times, as the optimum working frequency is only slightly lower than the maximum usable. The m.u.f. is rising above 50 Mc. currently in some areas, and DX contacts on 6 will be made more often as the top of the cycle approaches.

Unlike sporadic-E skip, which may break at any time, F2 opportunities arrive on a well-defined schedule, and the v.h.f. DX aspirant need not make many shots in the dark if he has some cooperation lined up in the right places. Knowing, for instance, that the October peak came about the 26th, it took no clairvoyance to guess that the weekend of November 23rd and 24th was a good time to be trying for a European contact on 6. The first F2 communication in v.h.f. history, on November 24th, set off a furor of interest in 50-Mc. DX and for the next few days plenty of people were monitoring the 50-Mc. band for DX

February 1947 31
signals, but they were too late. The peak had passed, and such a chance was not likely to return before the spring peak in March.

Increased ionization density, in addition to raising the m.u.f., results in a shortening of 28-Mc. skip and a general weakening of DX signals. When 10 is just opening up, the skip is about 2000 miles or more, signals from beyond this distance are very strong, and contacts between the two Coasts are common. In recent months, however, the skip has been as short as 1000 miles, and stations in the Middle West have been able to work both ways on most days. A condition simulating that of the low point of the cycle is noted each evening, when only transcontinental contacts are possible from the East in the last hour or so that the band is open.

**Aurora Effect**

At times of ionospheric disturbances associated with variations in the earth's magnetic field, low-frequency communication may be wiped out by absorption of these frequencies in the ionosphere. Conversely, the 10- and 6-meter bands act up in a most interesting fashion, and contacts are made over distances not normally workable on either band. Magnetic storms may be accompanied by an aurora borealis display, if the disturbance occurs at night and visibility is good. If the display is confined to the northern sky, aiming a directional array at the auroral curtain will bring in signals strongest, regardless of the true direction to the transmitting station. When the visible display is widespread there may be only a slight improvement noted with the array aimed north. Such a condition is most common at the high point of a sunspot cycle, when solar activity is spread well over the sun's surface, instead of being concentrated in the region near the solar equator.

Aurora-reflected signals are characterized by a rapid flutter, which lends a dribbling sound to 28-Mc. carriers, and may render modulation completely unreadable on 50-Mc. signals. The only satisfactory means of communication is then straight cw, a fact which is still not appreciated by enough of our v.h.f. fraternity. Many opportunities for interesting 50-Mc. work are lost by ignoring warning signs which precede the appearance of aurora-reflected signals. A general fade-out on the lower frequencies, a wavery quality on 28-Mc. signals, the tendency of north-south paths to be better than east-west ones, the appearance of an aurora — any or all of these signs should be enough to cause the experienced v.h.f. enthusiast to turn his beam north and start in making cw. transmissions. No authentic instance of aurora reflection has been seen on 144 Mc., but with the advent of more crystal-controlled transmitters and improved receivers it is possible that it may be observed. Advanced 144-Mc. workers should be on the lookout for it.

**Ionization by Cosmic Dust**

Probably the least-observed means of propagation of v.h.f. waves is that resulting from streaks of ionization caused by the passage of meteors across the signal path. This may be noted as a Doppler-effect whistle on the carrier of a station already heard, or it may cause the signal to be reflected to a point where it was not previously audible. It may also cause sudden large increases in signal level of a station which is normally only barely audible. Meteor showers of some magnitude and duration, such as that which occurred when the earth passed through the tail of the Giacobini-Zinner comet in October, may make communication possible for considerable periods. Signals so reflected may have a combination of the characteristics heard during sporadic-E and aurora sessions.

**Miscellaneous “Scatter Signals”**

There are many signals to be heard on 14 and 28 Mc., and occasionally on 50 Mc., which cannot be accounted for by any of the explanations given above. In this category are the wavery signals heard in the early morning hours on 28 Mc., when the band is just opening up. A listener in New England can hear W1s, W2s, W3s, and even W4s and W5s, almost any morning, when the early birds are busy working the Europeans and Africans on 10. These signals are heard best when everyone's antenna is turned in one direction — east, and the wavery quality of the signals indicates the presence of multipath reflections. Usually such signals will disappear when two stations a couple hundred miles apart turn their antennas toward one another, giving rise to the belief that they are being reflected back at a sharp angle from one or more distant points. This effect is explained by the Bureau of Standards1 with the example of a beam of light which is reflected by a mirror, with a thin layer of smoke in between the light source and the reflecting mirror. In the ionosphere the mirror is the $E'$ layer, smoke is the $E$ layer. The light beam (the signal from a directive antenna) passes through the smoke $(E$ layer) but is diffused somewhat thereby, accounting for the reception of the signal at points within the normal skip zone.

Such signals, and others one encounters when he begins to try to catalog them according to the type of propagation involved, point up the fact that there still are many things to be learned about wave propagation. The above is merely a partial inventory of the known means by which a signal may get through from a distant point. There may be various combinations of any of these media, which make identification of the cause difficult.

— **E. P. T.**

---

A Quiet Break-In System

Effective Receiver Silencing for Efficient C.W. Operation

BY CLAUDE L. ROBINSON, * W6KJV

Those c.w. operators who have never tried a good break-in system do not realize what they are missing in the way of operating convenience. Not only is there a considerable saving in time and power, but a QSO takes on the nature of a conversation rather than a one-way broadcast. In this article, the author describes a smooth receiver-silencing system—a prime requirement for an effective break-in system.

It has long been the writer's conviction that break-in operation is the most perfect form of ham communication. It eliminates excessively long calls and fruitless calling when your signal is blanketed by another. Since you know when your signals are being interfered with, pleasanter QSOs and more efficient operation when handling messages results. Long repeats are made unnecessary. Switching the rig on and off becomes unnecessary and a host of other desirable things that make operation a distinct pleasure are provided.

Break-in on a spot frequency requires some special considerations that are not usually necessary when working off your own frequency. It is believed that many more operators would make fuller use of break-in if they were convinced of the advantages and if complete information were at hand. Periodically, mention of one break-in system or another has been made in QST. But they have all been tried and found wanting in one or more details.

My requirement was that the system should be absolutely noiseless except for the signal used for monitoring purposes—no clicks or thumps to paralyze the ear making it difficult to hear the breaking signal. The system shown here in Fig. 1 does this and more. When the key is closed, the transmitter is keyed, the receiver input is short-circuited and the gain of the receiver is reduced. \( R_2 \) is an auxiliary r.f. gain control which sets the level of the transmitter signal in the receiver. When the key is opened, this auxiliary gain control is short-circuited, restoring normal receiver gain.

By proper use of the potentiometer, \( R_2 \), the signal can be reduced from more than headphone volume to inaudibility, leaving the keying absolutely quiet. This suggests the use of an auxiliary audio oscillator for monitoring when working off one's own frequency, or for mixing with the transmitter signal when on frequency. The receiver is protected from r.f. and the attendant danger of burn-outs. The antenna used in experimenting with the system was 66 feet long and when the transmitter is on 80 meters the antenna picks up enough r.f. to give your fingers a good burn. It can be seen that the system must be really effective. In some of the other systems tried at W6KJV unless the monitoring signal was brought up to a certain volume, it would be accompanied by thumps or clicks, and even then when the receiver was tuned slightly off frequency the clicks again were noticeable.

Relay Characteristics

A few inquiries from operators working spot frequencies and a perusal of back issues of QST started me off on my quest. I had been using negative bias on the a.v.c. line of the receiver, obtained from the voltage drop across the biasing resistor in one of the stages of my VFO exciter unit, keying the oscillator directly with a “bug,” as shown in QST for May, 1945. This system

* 2345 N. McCall Ave., Selma, Calif.

---

operated fairly well for off-frequency work but for spot-frequency use it was noisier than I liked. Searching the junk box I came up with two keying relays which I modified into the contact combination I wished. Each one then had one set of normally-closed and one set of normally-open contacts, the moving contacts or armature of each relay being grounded. The normally-open contact of one relay keyed the oscillator and the normally-closed set opened, placing a potentiometer in the receiver r.f. gain-control lead to ground. The normally-open contact on the second relay grounded the antenna post of the receiver and the normally-closed set opened, disconnecting the antenna from the receiver.

These particular relays proved a dismal failure because of their construction. The spring leaves were too flexible and "bouncing" contributed to the noise in the headphones, although from all reports this noise was not audible on the signal heard at other stations. It was sort of a raspy click on the "make" of the signal. I cured this by bracing up the bottom leaf of each relay, but at best this was only a makeshift arrangement. One other thing I noticed was a surge in the phones every time the key was released. This was traced to excess capacitance across the keying contacts. I found that this condenser really was not needed because the signal was clean without it. Only the capacitance of the shielded keying leads and the by-pass condenser in the oscillator are across the key contacts now. R.f. chokes are used in series with the keying leads merely as a precaution rather than because they are actually needed.

Relay Adjustment

Searching further I ran across a d.p.d.t. 110-volt a.c. relay that had served as an antenna change-over relay at one time. I decided to try it to see if it would key fast enough. I hooked it up and whether because of residual magnetism in the pole piece, age, wear or some other reason, it was sluggish on dots. A piece of Scotch Tape across the pole piece livened the action up but created an a.c. hum because of the spacing. I hooked $67\frac{1}{2}$ volts of battery to it and it then worked to perfection except for the heavy load it placed on the battery. I then placed it in the circuit. A click became evident on the make. This was traced to the receiver not being grounded slightly before the transmitter went on the air. This was cured by shimming up the lower-contact holding post so that it was higher than the keying contact. This assured proper action. A very slight scratchy click was noticed on the "break" and this was traced to the shock of connecting the antenna to the receiver. The remedy for this did not occur to me until later on when experimenting with the relay I am now using.

A few other things might be mentioned in connection with the above discussion. I have found several other operators who prefer to key with a relay rather than directly with the bug. The reason for this seems to be that the bug contacts tend to bounce at times, causing keying noises. Select a good place to key whatever stage you are keying. Usually cathode keying of an oscillator does not give a good keying characteristic because it is tied up in some way or other with part of the tuned circuit. Plate- or screen-lead keying can give good results. At W6KJV the negative lead to "ground" of the battery which supplies plate power for the oscillator is keyed, and the keying sounds perfect without any sort of lag circuit, both on "make" and "break." The stages following the keyed stage should be free from parasitics if you are to get good keying.

Alternative Circuit

An alternative hook-up is given in Fig. 2 for those who do not key to ground. Of course, with a d.p.d.t. relay, it is impossible to gain all of the advantages which keying to ground will give, but it is well worth while anyway. In this particular arrangement the key goes from relay coil to ground. If you wish to key an audio oscillator, the key can be changed to the other side of the coil; or I suppose you could hook the cathode of the audio oscillator to the bottom of the relay coil in the circuit shown, grounding it and placing it in operation when the key is closed. A separate keying relay could also be used for the audio oscillator, using the same power supply. The voltage for my relay comes from a divider in the power supply for the VFO exciter unit.
Auxiliary Gain Control

$R_2$ functions as an auxiliary gain control, merely for the purpose of setting the level of the transmitter signal in the receiver at the proper point. With the value I am using, the receiver may be completely silenced by advancing the control. With the key held down, the potentiometer should be set to the point which satisfies the ear. With the key up $R_2$ is shorted out and the receiver gain control again operates normally. No adjustment of this gain control is necessary beyond that of normal use. Look at the circuit diagram of your receiver and trace the lead from the receiver gain control to the point where it is grounded. Open this line between ground and the gain control and bring a lead outside the receiver for the auxiliary potentiometer which may be mounted in some handy spot. It is all very simple and works nicely. It is my prediction that once you have tried break-in under the correct circumstances, you will not be satisfied with the old method of operation.

The results obtained were so gratifying that I knew I was on the right track so I decided to contact the Leach Relay Co. of Los Angeles to see if they could provide me with a relay that would draw a much lighter load and still do the work I wanted. In reply they outlined to me some of the characteristics of a good relay for keying — light contacts and moving assembly so that the percentage keying, that is, the time the contacts are actually closed as compared to the time the coil is energized would be as high as possible. They suggested the use of their Type 1037 sensitive relay which is d.p.d.t. The stock relay has a very light contact pressure and return spring and a small contact opening. Equipped with a 10,000-ohm coil it will operate on as low as 2 ma. and consumes 0.04 watt. With this standard adjustment it would not be satisfactory for keying service. By using a 10,000-ohm coil and 100 volts d.e. on the coil, causing it to draw 10 ma. or 1 watt, the contact spacing can be increased by adjustment of the screws for that purpose. Then it is equipped with a heavier return spring, Type J-301. This makes an excellent keying relay; it will follow the bug as fast as you can send. In addition to being small in size, it is comparatively noiseless and the spacing of the contacts is adjustable. No doubt other relays of a similar type can be used just as successfully. The audio oscillator can be keyed by the 100 volts applied to the relay or by the voltage drop from a biasing resistor in the transmitter.

The adjustment of the relay is simple. On the keying side, adjust the spacing of the contacts exactly as you do your bug for the proper making of the dots. You will find that it is not nearly as critical in adjustment as your bug. On the receiver side, bend up the bottom contact a bit so that the receiver will ground before the transmitter goes on; then screw down the top contact until the slight rasp caused by the antenna making connection is at a minimum. I dispensed with this noise entirely here by simply placing an r.f. choke as shown in Fig. 1. This leaves the antenna electrically connected to the receiver but dead so far as the ham bands are concerned when the key is pressed. When the key is up the choke is shorted out and everything is normal again. Merely connecting the antenna to the receiver and grounding it will not give as good results. Operation is much quieter the other way. The relay should be placed as close to the antenna and ground posts as possible to reduce the size of the pick-up loop formed by the leads from the relay to the receiver. The larger this loop the more pick-up the receiver will have which the relay cannot affect. I tried two separate midget single-pole relays, one wired right into the receiver and the other outside. Results weren’t as good as with the other relay because, no doubt, of the lack of proper coordination which is assured in the d.p.d.t. type when properly adjusted.

I mounted the relay on a sheet of polystyrene spaced 1 inch from the bottom cover of a 3×4×5-inch shield box. After the wiring was completed the rest of the box was screwed to the base, making a nice-looking job. The box also provides shielding as well as forming a dust cover for the relay. The lead-ins for the antenna proper and to the antenna post of the receiver were made through small-sized feed-through insulators. The value of $C_1$ is not critical, although if it is made too large, it will affect the operation of the relay. The size of the auxiliary gain control, $R_2$, also is not limited closely. Any maximum value from about 20,000 ohms upward will serve.

About the Author

- Claude L. Robinson, W6KJV, returns to our pages this month with another splendid article on making hamming a still more pleasant pursuit. In May of ’45 he helped us stabilize our VFOs; this time it’s tranquil break-in. W6KJV has been in radio since 1919 when he enlisted in the Marines at the age of 15. Pearl Harbor duty and long-wave sparks filled his service life. He waited until ’34 to become KJV, but since then he has earned WAS and WAC and built a reputation as an inveterate tinkerer and experimenter.

**SWITCH**

**TO SAFETY!**
OVERSEAS OPPORTUNITIES

The appeal for "Hams for Overseas" in August QST received an excellent response and the Government department concerned reports its satisfaction with the excellent quality of the men who applied and its regret that it could not employ more of them. All routine positions have now been filled.

Another Government department, however, is in need of a limited number of radio men, and old and new letters addressed to "Overseas Operations" are being delivered to it. Therefore it is unnecessary to write again if you have already applied through "Overseas Operations." But now applications are welcomed from single men who are interested in a base pay of between $3000 and $3400 (plus a quarters-and-subsistence allowance while outside the U.S.A.), who like to travel, and who are proficient both as operators and technicians. There is usually opportunity for a bit of ham operation "on the side," signing truly-DX calls. No jobs are available in the United States except for top-notch engineers. Inquiries can be sent to "Overseas Operations," c/o ARRL Headquarters. Please state fully radio operating and technical experience, licenses held, code speed, etc. Full statements will decrease the delay in processing applications. The minimum time between application and employment is estimated by this Government department as three months.

TRAFFIC WITH JAPAN

Apparently there has been a little embarrassment over some message traffic with GI stations in Japan. The War Department invites the attention of amateurs to their regulations governing GI stations in the Japanese area, which confine such message traffic strictly to persons in the United States military service. Even then, pecuniary interest may not be involved. Traffic to or from Japanese civilians is strictly prohibited. You will save both yourself and the GI operators embarrassment if you govern yourself accordingly.

PROOF OF USE AGAIN WAIVED

FCC has again waived, until June 30th next, the requirement of proof of use of operator licenses as a condition to their renewal. This was done by Order No. 77-G on December 17th, effective January 1st. This action postpones for another six months the effective date of the requirement to show three c.w. contacts on renewal applications. Meanwhile the applying portion of the application form may be ignored.

HANDY AWARDED LEGION OF MERIT

Amateurs the country over will be proud to learn that ARRL Communications Manager Handy has been decorated for his wartime services in the organization of military communications. We are all aware of the manner in which amateur apparatus and circuit technique contributed to the success of military apparatus. In much the same way Colonel Handy was able to draw upon his long experience in organizing amateur communications to assist in the problems confronting a prodigiously-expanding AAF. Cited for the Legion of Merit, the official presentation was made to him at Westover Army Air Base by the commanding officer of that station on November 16th. His citation reads as follows:

Colonel Francis E. Handy, O-064193, Air Corps, Army of the United States. While serving with the Air Communications Office, Headquarters, Army-Air Forces, from May 1942 to September 1945, Colonel Handy introduced new and improved procedures, techniques and military organizations into the worldwide use and contributed substantially to the successful employment of air power in the war. Colonel Handy’s outstanding achievements and exceptional ability reflect great credit upon himself and the Army Air Forces.

K CALLS

The first amateur K calls in continental United States have now made their appearance. In the ninth call area, where the bottom of the barrel was being scraped on W calls, a new series has been started beginning with K9AAA. The amateur stations of the electronic warfare companies of the Naval Reserve are also receiving K calls, with the suffix USN for the head station of the Naval District and the suffixes NRA, etc., for the unit stations.

Hawaiian and Alaskan amateur calls are being changed to KH6 and KL7 calls, respectively, with two-letter suffixes, as rapidly as they are renewed. If you have a prewar K6 or K7 call you should apply immediately for renewal, so as to get your call changed to the new series to prevent confusion with the new use of K calls on the mainland.

WHAT BANDS AVAILABLE?

Below is a summary of the U. S. amateur bands on which operation is permitted as of January 10th. Future changes will be announced by W1AW broadcasts. Figures are megacycles. A0 means an unmodulated carrier, A1 means c.w. telegraphy, A2 is m.c.w., A3 is a.m. ‘phone, A4 is
as consisting not only of the Territory of Hawaii but also of the "outlying Pacific possessions except Alaska and adjacent islands."

**S-BAND DIATHERMY**

In December FCC held a hearing on proposed rules for diathermy and industrial heating equipment. One of the matters considered was the need for an additional frequency assignment in the vicinity of the wartime radar S Band. The penetration of such frequencies apparently offers some interesting possibilities in both fields.

FCC solved the matter, by an order on December 26th, by the unusual procedure of superimposing a new allocation on existing ones, without altering the latter. The band 2300–2450 Mc. is amateur. The band beginning at 2450 is non-Government fixed and mobile. FCC assigned the border frequency of 2450 Mc. nonexclusively for industrial, medical and scientific purposes, without license, on the conditions that the emitted bandwidth be reduced as much as possible, be in any event confined to 2400–2500 Mc., and cause no interference through spurious or harmonic radiation.

While we dislike this allocation philosophy and believe it dangerous, there is one silver lining for amateurs. The diathermy and heating market is many times greater than the communications market. The establishment of this service will result in the availability of much equipment, including continuous-wave magnetrons, useful in our adjacent amateur band. While it is believed that the commercial equipment will be used extensively, its nature and method of employment seem to assure limited interference range and quite brief operating cycles. Considering that we shall certainly use highly directive antenna systems, we do not believe we should experience interference of serious proportions and in a practical way we may benefit considerably from the availability of gear.

Among the devices that will now operate on 2450 is Raytheon’s “Radarange,” the r.f. cooker that does a hot-dog in a few seconds, a frozen steak in a few minutes. Anybody know the natural period of a hamburger?

---

**F.C.C. DISTRICT CHANGES**

As part of the recent reorganization of its field establishment, FCC has made quite a few changes in its inspection districts. Where states are split by counties, the detail is too long for us to publish here but we can give you a general idea and, in case of doubt, particulars can be learned from HQ. or the nearest FCC district office.

The State of West Virginia has been split, the eastern part now being administered by the Baltimore office, the western part remaining under the Detroit office.

While FCC still maintains a suboffice in Galveston, the district office has been moved to 216 U.S. Appraisers Building, Houston, Texas, and its territory has been expanded to take in the southern third of Texas.

The Denver office now administers the western overhang of Nebraska and a comparable area in South Dakota, which have been removed from St. Paul’s jurisdiction.

Winnebago County, Wisconsin, has been transferred from St. Paul to the jurisdiction of the Chicago office, Kentucky has been split. The eastern part remains under the Detroit office but western Kentucky is now under Chicago.

The area of the Honolulu office is now specified as consisting not only of the Territory of Hawaii but also of the "outlying Pacific possessions except Alaska and adjacent islands."

---

**ARE YOU LICENSED?**

* When joining the League or renewing your membership, it is important that you show whether you have an amateur license, either station or operator. Please state your call and/or the class of operator license held, that we may verify your classification.

---

**W1OAB recommends a cribbage board as a handy container for octal-base crystal holders. Don’s holds 24.**
A Stacked Array for 6 and 10
Beams for Two Bands Working in Close Harmony

BY EDWARD P. TILTON, W1HDQ

The possibility of v.h.f. DX on an international scale, as a result of the approaching sunspot peak, has generated interest in the 50-Mc. band on the part of many of the ham fraternity who normally have no concern with the frequencies above 30 Mc. The current activity on 10 indicates that F2 DX work on 6 is not far off, and the two bands, 28 and 50 Mc., make an ideal combination for the man who is interested in new amateur horizons. In many ways the two bands are alike, the condition of the lower band often giving a clue as to what may be expected on the higher. Thus it becomes obvious that an antenna set-up which will provide good performance on the two bands is a highly desirable feature for anyone who wants to make the most of the interesting opportunities now coming up.

The mounting of two arrays in such a position that the line of directivity is common has many obvious advantages, such as the use of a single tower, rotating mechanism, and direction indicator. In tests with distant 50-Mc. stations it is nice to know that the array is aimed correctly, and such aiming can be accomplished readily if the two workers are in contact on 28 Mc. How closely together two such arrays may be mounted without harmful interaction is a point about which there has been much conjecture in amateur circles. The dual array shown in these pages is the result of a series of experiments aimed at finding some of the answers.

One commonly-used means of avoiding interaction is to mount the arrays at right angles, but this makes for bulky structures and eliminates the desirable features associated with a common line of fire. Another is the separation of the two arrays by at least a quarter wavelength at the higher frequency, but any safe reduction of this makes for bulky structures and eliminates the freedom from critical adjustment that results from the higher center impedance of wide-spaced systems. On both 10 and 6 we want broad frequency coverage, and in this dual array (where it was anyone's guess as to what the center impedance might turn out to be) we wanted as much latitude as possible in the matter of feeding and adjustment. The spacing of about three feet finally employed was the minimum at which completely satisfactory operation could be obtained, particularly in the case of the 50-Mc. system.

The dual array started out as a 3-element 10-meter beam, with provision for mounting the 6-meter elements after the 10-meter portion had been worked out satisfactorily. It was guessed, correctly, that the 50-Mc. elements would have little effect on the performance of the 28-Mc. section, so the lower-frequency part was built first. The original model allowed only two inches clearance between the two arrays, and even at this point there was almost no effect on the 10-meter performance when the smaller elements were mounted in place. Getting the 50-Mc. part to work was something quite different, however, and several models were constructed, erected and tested before the performance on 6 approached that of a similar 4-element array alone.

The 10-Meter Array

The merits of various element spacings have come in for considerable debate in recent times, with close and wide spacing both having their strong adherents. The problems involved have been discussed at length previously, and our earlier findings on 50 Mc. influenced the design of this dual array. The principal point in favor of wider spacing than the conventional 0.1 wavelength is the freedom from critical adjustment which results from the higher center impedance of wide-spaced systems. On both 10 and 6 we want broad frequency coverage, and in this dual array (where it was anyone's guess as to what the center impedance might turn out to be) we wanted as much latitude as possible in the matter of feeding and adjustment. The spacing selected for the 10-meter section was 0.2 wavelength for the director and 0.175 wavelength for the reflector, as these dimensions fitted nicely into the picture we had in mind for the 6-meter section, and the work with 50-Mc. arrays, referred to above, had shown that these spacings would do a good job.

The method of matching the line to the center of the array is the familiar "T-match," described by W7OWX in Hints & Kinks in QST for April, 1946. The "T" has the decided advantage that its use eliminates guessing as to the probable

* V.H.F. Editor, QST;

• It is probably not news to many readers that international work on 50 Mc., predicted in the first paragraph of this article, is now an accomplished fact. News of the first 50-Mc. work across the Atlantic, reported in these pages last month, went around the world in a single day, and interest in v.h.f. DX work is growing rapidly. For those who wish to work both 6 and 10 with one antenna, here are the details of the two-band array used in the 28- and 50-Mc. work with G6DH and G3BY.

center impedance of the array, a figure which must be known before such devices as the folded dipole and the "Q" section can be used. With the "T," it is simply a matter of making the point of connection between the "T" and the driven element adjustable for minimum standing-wave ratio. The setting is not particularly critical, and a satisfactory adjustment can be made without the use of fancy measuring instruments or mathematics. The feeder used is the popular 300-ohm flexible line. This has the disadvantage of being somewhat weather-sensitive, but if a good matching job is done it will be found that the loading will not vary beyond usable limits except in extremely heavy rain, when any antenna system is apt to give some trouble.

Provision was made for varying the element lengths for maximum forward gain, but careful adjustment, using a remote-indicating field-strength meter, showed that there was no magic figure at which superperformance was obtainable, and we ended up close to conventional Handbook information. The serious worker may wish to tune his array for maximum forward gain, or for best front-to-back ratio, and some improvement in performance may result when the job is done carefully; but the fellow who has neither time nor patience for such work need not worry greatly. The driven element can be cut according to the following formula:

\[
\text{length (in inches)} = \frac{5540}{f_{\text{Mc}}}
\]

The director and reflector are made 5 per cent shorter and longer respectively. Frequency response is sufficiently broad that fine adjustment is not required for good results.

The 6-Meter Array

The 4-element array, using a folded dipole having a 4-to-1 conductor ratio as the driven element, with 0.2-wavelength spacing on the reflector and first director and 0.25 wavelength on the forward director (the array in use at W1HDQ since last March), had given a very good account of itself. It had a useful frequency range of at least 2 Mc., the gain was all that could be expected, and the standing-wave ratio on the line was low. We had spent enough time on it to feel that we could do a little better, and we wanted to use a similar arrangement in the new dual array if at all possible. In the first dual model, where the two sets of elements were separated by about two inches, this type of array could not be made to perform satisfactorily. Standing-wave ratio was high, and the gain was about 5 db. below that of the old array, this type of array could not be made to perform satisfactorily. Thinking that perhaps only matching trouble was at the bottom of this discrepancy in performance, a "T-match" was installed. This made it possible to get the standing-wave ratio and loading within reason, but the forward gain and off-the-side attenuation left quite a bit to be desired. The new array worked, but not good enough.

The next step was a separation of approximately 6 inches, and this resulted in some slight improvement, but left the new array at least 3 db. below the old one in forward gain, and there was more pick-up off the sides than we liked.
However, the results obtained with this arrange-
ment indicate that the fellow who is really
 cramped for space can do a fairly good job with
a dual array wherein the spacing is 6 inches or
more. The performance of several outstanding
50-Mc. stations using such arrays bears this out.
A 4-element array so mounted is probably at
least the equivalent of a good 3-element job
mounted alone, and that's not bad!

(A) 1" tubing
10' long
4" tubing
300-ohm line

(B) Adjusting clips—set at
about 2 ½" from center
300-ohm line

(C) 4" hole in blocks
for driven element only

Detail drawing of the driven elements used in the
dual array for 6 and 10 meters. A is the folded dipole
used in the 50-Mc. array. It has a 4-to-1 conductor ratio,
to provide a match to the 300-ohm line. B shows the
"T-match" employed in the 28-Mc. array. The matching
section is composed of two pieces of tubing which
are held in alignment at the center by a polystyrene
rod which is turned down to fit tightly inside the tubing.
The adjusting clips are set at the point which provides
the lowest standing-wave ratio. C shows the details of
the bakelite blocks used for mounting the 6-meter
elements.

We were prepared to go to a quarter-wave
length spacing between the two sections, if neces-
sary, in order to get optimum performance from
the 6-meter portion, but it was decided to try
one spacing in between, and the array shown in
the accompanying photograph is the result.
Here the spacing is approximately three feet, a
separation which lends itself to fairly lightweight
construction with a minimum of cross-bracing.
The folded dipole was tried in this array again,
and the match was good enough so that it was
included in the final model.

Structural Details

The two arrays are mounted on 150-inch booms
of good-quality seasoned 2 X 2. The selection of
these two pieces is important; they should be
free of knots and well seasoned, otherwise some
distortion of the frame is likely to develop. Aluminum
or dural tubing or channel stock might be
substituted, if such material happens to be
available. The two booms are separated at the
proper distance and held in place by four vertical
members, two pairs mounted about 30 inches in
from each end. These were 1 X 2 stock, as is the
"Z" brace between the booms, and the crossarms
on which the 10-meter elements are mounted.
Alignment of the 10-meter elements is main-
tained by means of triangular bracing of 1 X 1-
inch stock. These braces were fastened in place
in such position that the element crossarms were
exactly horizontal when the booms were in a verti-
cal plane. A large porch floor, a level, and a
helper are handy here. Two small antisway
braces were added, one on each side, when it was
found that the whole assembly had a weaving
tendency. The complication which appears near
the center of the array in the accompanying
photograph is largely the result of the rotating
device, a temporary measure pending the ac-
quision of suitable motor-drive mechanisms.
The vertical support is a section of 1 ½-inch pipe,
which fits inside a bearing which is part
of the Trylon tower used. The pipe is fastened to
the lower boom by means of a strap of sheet
aluminum which is bent to fit the boom and is
pinned to the pipe by means of two bolts. The
boom is braced fore and aft by two sets of braces
made of 1-inch aluminum angle stock. The cross-
arm on which the driven element is mounted is
also braced to the vertical support.

The elements of the 10-meter array are
mounted on cone insulators in the conventional
manner, but the 6-meter elements are handled in
a somewhat unusual fashion, the suggestion of
W1PFJ, Waltham, Mass. Two blocks of good-
quality bakelite, approximately ¼ X 2 X 4
inches in size, are used for each element. These
blocks are drilled to fit the elements used, in this
case 1-inch diameter, and are screwed to each
side of the boom. A setscrew is inserted in a
tapped hole in the edge of each block, to keep
the element in place. The blocks which carry
the driven element have a ½-inch hole below
the 1-inch one, to hold the driven section of the
folded dipole in place.

Both arrays are fed with 300-ohm Amphenol
line, which is light in weight and easy to use in
such installations. One precaution must be taken
to avoid breakage, however. If the line is left
dangling for any appreciable length from the
point at which it is fastened to the elements it is
sure to break off in a few days. A handy device for
preventing this trouble is the new stand-off in-
sulator produced by Workshop Associates, Needham, Mass. This neat little gadget which grips the line tightly, clothes-pin fashion, may be fastened to any support by means of a wood screw or bolt. The line will stand any reasonable load or strain when mounted in this way.

The elements are all of the same material: 1-inch aluminum tubing, the size being determined by what happened to be available at a local junk yard. As anyone knows who has shopped around for such things, aluminum or dural tubing is seldom easy to find these days. As a tip: try the second-hand yards and the smelting outfits, particularly those in or near cities where there are aircraft plants. There is a vast quantity of reject or surplus tubing being disposed of through such channels, and it's quite OK for antennas.

Electrical and mechanical details of the 50-Mc. array, other than the points mentioned above, are contained in QST for June, 1946. The element lengths are derived by the formula mentioned above, except that the forward director is 6 per cent shorter than the driven element. Spacing is 46 inches for the reflector and first director, and 57 inches for the forward director. Element lengths for the low half of the band are 116 inches for the reflector, 110 inches for the driven element, 105 inches for the first director and 103 inches for the second. The driven element is a folded dipole having the fed section made of 1/4-inch tubing or rod, spaced approximately one inch from the parallel section which is 1-inch tubing.

Typical examples of the "T-match" used on the 10-meter array are contained in QST for April, 1946, page 148, and the August issue, page 67. Almost everyone will have his own ideas on how this may be worked out, the main idea being to provide a pair of strap connectors which may be slid along the "T" section and the driven element, to provide a good electrical connection between the two, at the point which will give the best match. The two portions of the "T" are insulated at the center, and held in alignment by a piece of polystyrene rod which may be turned down to fit the inside of the tubing used. The 300-ohm line may be attached to the two portions of the "T" by means of soldering lugs and bolts. The "T" section should be made at least 30 inches long each side of center, to provide a range of adjustment.

Tuning Up

Tuning adjustments turned out to be relatively unimportant on the final model. With everything adjusted for best performance it was found that we had no unusual dimensions. In fact, the first experimental model of the 10-meter portion was cut according to the information given above and erected without any tuning whatsoever. The "T"-section clips were set at two feet out from the center, and the beam provided very satisfactory performance in that form, even though mounted on a temporary mast only 12 feet above ground. Though several days were spent in adjusting element lengths and resetting the "T-match," only a slight improvement was effected. We learned this the hard way, however, and a few pitfalls we encountered may be of interest.

In setting the position of the "T" clips, for instance, we found it impossible to get a low standing-wave ratio at first. There seemed to be two resonance points in the system when we checked the working range with our VFO, and one of these turned out to be caused by feeder resonance. It gave us some strange results on element length adjustment, until we added a few feet of line. Then the elements tuned up according to formula, and the setting of the "T" adjustment proved to be quite uncritical, the best position being at about 25 inches out from the center of the "T." Another source of trouble was the antenna relay. We found it much easier to flatten the line when it was connected directly to the transmitter coupling coil, instead of running it through the send-receive relay. Any relay we've yet seen affects the standing-wave ratio adversely, and makes adjustment of matching devices just that much more difficult. We want to use the relay, of course, but it is well to make adjustments without it and hope for the best when it is inserted. If the match is close, the result will not be too bad — we ended up with an indicated ratio of less than 2 to 1, even after the relay was inserted.

Standing-wave ratio can be checked in several ways. The field-strength indicator may be used, by running the pick-up antenna along the line and noting the variation in reading. Another and even simpler method is to grasp the line in one hand and note the variation in radiated power as indicated on the field-strength meter set up at a distance. If the line is flat there will be only a very small change as the line is gripped, and this change will be the same at any point along the line. Another method is the use of a fluorescent tube, the length of the illuminated portion giving a fairly sensitive indication. This is not suitable for low power, however, as no indication will be obtainable with low-powered rigs if the line is flat. None of these methods gives an accurate measurement of standing-wave ratio, but they serve well as a basis for comparison in making adjustments, and the best setting is readily discernible. Eliminating the last vestige of standing waves is not particularly important, as may be determined by examination of the tables for losses with 300-ohm line at various lengths and ratios. A fairly close match will help in insuring a good frequency response, and if the antenna loads well over a

(Continued on page 138)
The Old Stand-By

A Four-Tube Regenerative Receiver

BY GEORGE D. KNIPE,* W7IGE

The receiver to be described is a "new-and-improved" model of a receiver used at this station for about two years before the war. The old model used a 75 detector, two 6J5s as audio amplifiers and a pair of 6F6s in the output stage. There were several objections to that particular arrangement—it drew 120 ma. of plate current, it was large physically, and the audio gain was too low. The present model overcomes these objections by using only one 6F6 in the output stage and substituting 6SQ7s for the 6J5s, thus bringing the current demand down to 45 ma. No audio interstage transformers or cathode by-pass condensers are used, and the space saved allows the receiver to be housed in a 6 × 9 × 5-inch utility cabinet. The 6SQ7s give more gain than the 6J5s.

The Circuit

The circuit, shown in Fig. 1, is conventional in most respects. The Type 75 tube was used in the detector stage because it proved to be very smooth in control of regeneration, the plate current is so low that resistance coupling can be used, a minimum of condensers and resistors are necessary with a triode, and the tube gives considerable gain. Condenser control of regeneration through \( C_6 \) is smooth and noiseless, and with the resistance plate load, \( R_2 \), there are no troubles with fringe howl. A mica condenser, \( C_{15} \), from one heater lead to ground, was included because it seemed to reduce the noise level. The 10-\( \mu \)fd. bandspread condenser, \( C_4 \), gives full-scale coverage on the 7- and 14-Mc. bands and about half-scale coverage on the 28-Mc. band. On 3.5 Mc. the band-set dial must be reset once to cover 3500 to 3900 kc., and a second time to cover the 75-meter 'phone band. This method of coverage on 80 may seem objectionable, but in these days most amateurs seldom tune across more than half of the band when looking for an answer to a CQ, and many only tune a few kc. either side of their own frequency.

*A Route 3, Nampa, Idaho.

A four-tube regenerative receiver, all dressed up and ready to go places. The main tuning dial is in the center—the band-set dial is at the left. The lower knobs are for regeneration and audio gain control.

QST for
A bottom view of the receiver shows how the components in the audio circuit are grouped around their respective tube sockets, leaving the rest of the chassis comparatively free of parts. Part of the antenna coupling condenser can be seen in the lower left-hand corner.

The power supply is conventional in every respect, as can be seen from the wiring diagram in Fig. 2, and any well-filtered 250-volt supply will suffice. The two mica condensers, C₁ and C₂, are a safeguard against "tunable hum," a bugaboo of regenerative receivers operated from a.c. power supplies.

Construction

A 70-µfd. adjustable condenser, C₄, in series with the antenna lead is used to adjust the coupling to a proper value. To obtain optimum performance, this condenser should be reset on each band. It should be adjusted while the detector is on the threshold of oscillation and a 'phone station is being received. Adjustment will be made for maximum signal and at the same time to make the setting of the regeneration control least critical; i.e., so that the regeneration control can be moved slightly without appreciable effect on the amplification of the received signal.

The wiring diagram is shown in Fig. 1. The components are identified in the list below.

- **Fig. 1** — Wiring diagram of the four-tube regenerative receiver.

```
C₄ — 70-µfd. adjustable mica (Hammarlund MICS-70).
C₂, C₃ — 140-µfd. variable (Hammarlund MC-140-M).
C₅ — 10-µfd. variable (Cardwell ZR-10AS).
C₆, C₇, C₈, C₉, C₁₀ — 0.01-µfd. paper or mica, 400 volts.
C₁₁ — 8-µfd. electrolytic, 250 volts.
C₁₂, C₁₃ — 2-µfd. electrolytic, 250 volts.
C₁₄, C₁₅ — 4-µfd. electrolytic, 250 volts.
C₁₆ — 10-µfd. electrolytic, 50 volts.
C₁₇ — 0.005-µfd. mica.
R₁ — 4.7 megohms, ½ watt.
R₂ — 0.2 megohm.
R₃, R₄ — 47,000 ohms.
R₅ — 0.5-megohm potentiometer (Mallory Type N).
R₆, R₇ — 1000 ohms.
R₈ — 40,000 ohms, wirewound (Mallory 1 HJ).
R₉ — 4700 ohms.
R₁₀ — 47,000 ohms.
R₁₁ — 0.56 megohm.
R₁₂ — 390 ohms, 2 watts.
Resistors are 1-watt composition unless otherwise mentioned.
L₁, L₂ — 80 m: 9 turns. 40 m: 4 turns. 20–10 m: 2 turns.
L₃ — 80 m: 39 turns tapped at 1 ¾ turns. 40 m: 11 ½ turns tapped at 1 turn.
L₄ — 20–10 m: 4 turns tapped at ¾ turn.
RFC — 2½-μh. r.f. choke (National R-100).
T₁ — Output transformer, 6F6 to speaker.
```

February 1947

43
tude of the signal. This corresponds to a loaded condition of the detector — if the coupling is too loose the regeneration control will be quite touchy. The condenser is mounted in the receiver on the back lip of the chassis, and is adjusted with an insulated screwdriver.

The 6SQ7s make use of cathode degeneration to stabilize the amplifier and this, incidentally, eliminates the need for cathode by-pass condensers. The value of plate load resistor is low for these tubes, and this keeps the stage gain down to about 20, further adding to the stability of the amplifier. Decoupling networks in the plate leads furnish the final contribution to stability of the audio channel. Each 6SQ7 draws only about 1 ma., so the power-supply demand is insignificant.

The 6F6 used in the output stage provides plenty of audio power and drives a 8-inch p.m. speaker nicely. No 'phone jack was provided, but one could be added, as shown by the dotted lines in Fig. 1. The condenser should be 0.25 µfd. or larger.

It will be noted that a wirewound resistor is called for at Ra. One was used in this receiver because a carbon resistor at that point was noisy.

It is probably not necessary to use a wirewound resistor, because the noise from the detector should be sufficient to mask any noise developed in later stages, but it is well to bear in mind that composition resistors can be noisy.

The receiver chassis measures 7½ × 2½ × 4½ inches. It must be at least 2½ inches deep so that the regeneration-control condenser can be unmeshed without the rotor plates touching the bottom of the receiver cabinet. The other two dimensions could vary slightly without causing any construction difficulty, so long as the chassis will fit conveniently into the cabinet to be used.

The placement of the parts is shown in the photographs. Referring to the bottom view of the chassis: the resistor between the volume control and the detector socket, just to the right of the 8-µfd. condenser, is the detector decoupling resistor. The detector plate-load resistor is underneath the 8-µfd. condenser just referred to. The heavy wire running from one of the lugs on the terminal strip to the detector decoupling resistor is the B+ line. The cathode bias resistors (Continued on page 138)
CAST: Total of 1036 amateur radio operators, 187 portable stations and 53,622,879 (estimated) assorted insects.

TIME: June 22-23, 1946.

PLACE: Hamdom.

SETTING: "The Great Outdoors" — a canyon in Utah ... lakes in New Hampshire, California, Michigan, Vermont, Ontario, Illinois and Massachusetts ... Boy Scout camps in Ohio, Illinois, Connecticut and New Jersey ... a Nova Scotia hill overlooking the Atlantic ... mountains in California, Idaho, Arkansas, Oregon, South Carolina, Washington and Maryland ... a university stadium in New York ... a city zoo in Wisconsin ... a prairie in Washington ... a battlefield national park in Virginia ...

A reservoir in California ... a ski-slide tower in Illinois ... farms in Pennsylvania, Ohio, Illinois and New Jersey ... a boat anchored at a Maryland yacht club ... Skyline Drive, Virginia ... a camp in Rocky Mountain National Park ... California hills overlooking the Pacific ... a state park in New York ... a state forest in Illinois ... city parks in Indiana and Connecticut ... fair grounds in Minnesota, Iowa, Wisconsin and Ohio ... a valley in California ...

A dock 300 yards out in Puget Sound, Washington ... fire towers in Massachusetts and Maryland ... an Army observation tower in California ... a bluff on Long Island Sound ... an abandoned air-raid warning tower in Washington ... a National Guard camp in South Dakota ... beaches in California and Nova Scotia ... creeks in Wisconsin and Iowa ... locations of every description, with elevations ranging from sea level to 9000 feet.

PROPS: Transmitters, receivers, gomemotors, Vibrapacks, dynamotors, storage batteries, gas-driven generators, dry batteries, rotary converters, gas-driven alternators, antennas, poles, microphones, keys, sectional masts, crystals, rotary beams, headphones, meters, feed lines, enthusiasm ...

Battery chargers, spare parts, gasoline, funnels, wire, insulators, blow torches, BX, rope, Selys, ladders, guy wire, tools, Kytoons, oil, intercom systems, soldering irons, elbow grease ...

Chairs, stools, boxes, tents, tarpaulins, clocks, watches, oil lamps, blankets, flashlights, automobiles, mattresses, trucks, tables, benches, cuts, oil stoves, trailers, electric heaters, pencils, paper, logbooks, station wagons, electric lights, Jeeps ...

### FIELD-DAY LEADERS

<table>
<thead>
<tr>
<th>Class</th>
<th>Leader</th>
<th>Participants</th>
<th>Call Used</th>
<th>Contacts</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Club Groups</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>One Transmitter</td>
<td>Narragansett Association of Amateur Radio Operators</td>
<td>7</td>
<td>W1LWA/1</td>
<td>199</td>
<td>3051</td>
</tr>
<tr>
<td>Two Transmitters</td>
<td>The Greater Cincinnati Amateur Radio Association</td>
<td>15</td>
<td>W8JIN/8</td>
<td>306</td>
<td>4290</td>
</tr>
<tr>
<td>Three Transmitters</td>
<td>Motor City Radio Club, Inc.</td>
<td>11</td>
<td>W8ONK/8</td>
<td>319</td>
<td>4500</td>
</tr>
<tr>
<td>Four Transmitters</td>
<td>Four Lakes Amateur Radio Club</td>
<td>16</td>
<td>W9RXN/9</td>
<td>305</td>
<td>4239</td>
</tr>
<tr>
<td>Five Transmitters</td>
<td>Northwest Amateur Radio Club</td>
<td>20</td>
<td>W9T/9</td>
<td>511</td>
<td>6363</td>
</tr>
<tr>
<td>Six Transmitters</td>
<td>San Fernando Valley Radio Club</td>
<td>26</td>
<td>W8SD/6</td>
<td>300</td>
<td>5081</td>
</tr>
<tr>
<td>Seven Transmitters</td>
<td>Frankford Radio Club</td>
<td>25</td>
<td>W9BES/3</td>
<td>651</td>
<td>8568</td>
</tr>
<tr>
<td>Eight Transmitters</td>
<td>Jersey Shore Amateur Radio Association</td>
<td>27</td>
<td>W2EC/2</td>
<td>809</td>
<td>9621</td>
</tr>
<tr>
<td><strong>Nonclub Groups and Individuals</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>One Transmitter</td>
<td>W9RCQ</td>
<td>1</td>
<td>W9RCQ/1</td>
<td>132</td>
<td>2115</td>
</tr>
<tr>
<td>Two Transmitters</td>
<td>W5FW-W8GW-W8GD-W8EBJ-W8BSS-W8AYH</td>
<td>7</td>
<td>W8GW/8</td>
<td>167</td>
<td>2529</td>
</tr>
<tr>
<td>Four Transmitters</td>
<td>W3KJH-W4IFV-W5EPJ-W6PXU-W7HDF-W8MIH-W8EYU-W9STB-W9VDY</td>
<td>9</td>
<td>W3KJH/3</td>
<td>46</td>
<td>381</td>
</tr>
<tr>
<td><strong>AEC Groups</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>One Transmitter</td>
<td>W6HD-Tope-Vallette-Shroyek</td>
<td>4</td>
<td>W6HD/6</td>
<td>45</td>
<td>758</td>
</tr>
<tr>
<td><strong>High Scorer</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( Erie County (Pa.) ABC Members)</td>
<td></td>
<td>(12)</td>
<td>W3KLD/3</td>
<td>9</td>
<td>108</td>
</tr>
<tr>
<td>Two Transmitters</td>
<td>Warren County (Pa.) Emergency Corps</td>
<td>9</td>
<td>W8KYW/3</td>
<td>99</td>
<td>1368</td>
</tr>
</tbody>
</table>

February 1947
Coffee, cameras, field kitchens, fly swatters, bottle openers, canned milk, sunburn lotion, "vittles," water (?), portable cook-stoves, field glasses, paper cups, first-aid kits, mosquito netting, sunglasses, cooking utensils, cigarettes, citronella, can openers and strong constitutions!

It would be pointless to compare prewar scores with those made in the '46 FD, since the operating conditions were so different. The Tenth FD found us without the 1.75-, 7-, and 14-Mc. bands, which served us so well in earlier years. So let's consider the results of the first postwar FD on their own merits.

Leading the entire field was the Jersey Shore Amateur Radio Association operating W2FC/2 on Crawford's Hill, believed to be the highest point in Monmouth County, N. J. Twenty-seven operators, manning eight simultaneously-operated rigs, made 809 contacts, 234 with FD stations, 575 with fixed stations. Final score was 9621. Power was obtained from two 5-kw. gas-driven generators. All available frequency bands were used from 3.5 through 144 Mc., 'phone and c.w. A 420-Mc. rig was also on hand. Antennas ranged from doublets on 3.5 Mc. to an 8-element rotary beam on 144 Mc. Incidentally, the J.S.A.R.A. crew placed second in the last three prewar FDs, and have set the postwar pace with a vengeance. The laurels are yours, Jersey Shore! I

Second-high was the Frankford Radio Club, that well-known group of Philadelphia contest experts. Operating W3BES/3 at Fairview, Pa., with seven rigs, twenty-five operators amassed 8568 points (651 contacts) under the F.R.C. banner. Transmitters were used simultaneously on 3.5-Mc. c.w., 3.9-Mc. 'phone, 27-Mc. 'phone, 28-Mc. 'phone and c.w., 50-Mc. 'phone, and 144 Mc. Eight transmitters were operated simultaneously. Power source was a 3-kw. gas-driven generator. The site was Watchung, N. J., the call W2KHK/2, and the personnel numbered twenty. A job well done brings its own reward. FB, T.C.R.A.

The Tri-County Radio Association placed third with a score of 6921. A total of 544 contacts was made using 3.5-Mc. c.w., 3.9-Mc. 'phone, 27-Mc. 'phone, 28-Mc. 'phone and c.w., 50-Mc. 'phone, and 144 Mc. Eight transmitters were operated simultaneously. Power source was a 3-kw. gas-driven generator. The site was Watchung, N. J., the call W2KHK/2, and the personnel numbered twenty. A job well done brings its own reward. FB, T.C.R.A.

TEN HIGH SCORES

<table>
<thead>
<tr>
<th>Club</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>W2FC/2</td>
<td>9621</td>
</tr>
<tr>
<td>W3BES/3</td>
<td>8568</td>
</tr>
<tr>
<td>W2KHK/2</td>
<td>6921</td>
</tr>
<tr>
<td>W2IT/9</td>
<td>6363</td>
</tr>
<tr>
<td>W2AC/3</td>
<td>6237</td>
</tr>
<tr>
<td>W2SD/6</td>
<td>5951</td>
</tr>
<tr>
<td>W2KF/3</td>
<td>5549</td>
</tr>
<tr>
<td>W3AC/3</td>
<td>5304</td>
</tr>
<tr>
<td>W6QINX/8</td>
<td>5024</td>
</tr>
<tr>
<td>W3JYY/4</td>
<td>4500</td>
</tr>
</tbody>
</table>

Top scorer among the nonclub groups was the gang at W9ERU/9 on the grounds of the Rockford (Illinois) Ski Club. The ten operators conducted their operations on 3.5-Mc. c.w., 3.9-Mc. 'phone, 28-Mc. 'phone and c.w., and 144-Mc. 'phone. Three transmitters were operated simultaneously. Two gas-driven generators furnished power for all equipment. The 28-Mc. 'phone rig, complete station, operators, antenna and all, were over 150 feet above the earth, atop the ski-slide tower. True to its name, the "plumber's delight" rotary beam was turned by means of a pipe wrench! Congratulations to the W9ERU/9 line-up: W9ERU, W9AIO, W9BRY, W9OA, W9EZQ, W9NTV, W9MNL, W9AGV, W9YEP and W9BNO!.

Seven operators, who call themselves "The Old Timers" Group of the Cuyahoga Radio Association...
The Inglewood Amateur Radio Club picked a site in the Palos Verdes Hills, Calif. The v.h.f. set-up included a 50-Mc. rig in the car and a 144-Mc. station in the tent. Antennas for each are shown. Used at other positions were 3.5-Mc. c.w., 3.9-Mc. 'phone, and 28-Mc. 'phone.

AEC Members

Although most FD participation by ARRL Emergency Corps members was with clubs or other parties, a number took part as AEC groups. These are shown with special heading in the score listings. Leader among AEC groups was WSKYW/3, the Warren County (Pa.) Emergency Corps. The nine operators in this group made 99 contacts, 1368 points. They write, “Our Field Day operation demonstrated local ability to maintain contact with outside communities using our emergency equipment and power units.”

Miscellany

The activity at any Field Day station, whether a simple battery-powered rig or an elaborate layout backed up by a 10-kw. generator, would make an interesting story regardless of score. Space permitting, we would give you the details of all locations. However, that would take several issues of QST, so we’ll do the next best and pass along a few sidelights.

The importance of advance planning, both for equipment and operation, cannot be overemphasized. Gear will pick an FD every time for “break-downs.” With a number of operators available, a systematic plan of operations must be formulated before the event — either that, or confusion reigns. To avoid duplication of contacts with stations worked before and to keep.

February 1947
June, according to closing remarks on many logs. Experience gained in '46 will "pay off" in '47. Make your plans early!

--- E. L. B.

**CLUB GROUPS**

<table>
<thead>
<tr>
<th>One Transmitter</th>
<th>QSOs</th>
<th>Power*</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>WILWA/1</td>
<td>195</td>
<td>A-</td>
<td>351</td>
</tr>
<tr>
<td>WILN/3</td>
<td>156</td>
<td>A-</td>
<td>264</td>
</tr>
<tr>
<td>W1HE/1</td>
<td>145</td>
<td>A-</td>
<td>237</td>
</tr>
<tr>
<td>W8SLO/8</td>
<td>145</td>
<td>A-</td>
<td>233</td>
</tr>
<tr>
<td>W1TF/9</td>
<td>133</td>
<td>B-</td>
<td>156</td>
</tr>
<tr>
<td>W1X/5</td>
<td>128</td>
<td>A-</td>
<td>130</td>
</tr>
<tr>
<td>W2NFP/2</td>
<td>101</td>
<td>B-</td>
<td>126</td>
</tr>
<tr>
<td>W3WER/3</td>
<td>87</td>
<td>A-</td>
<td>123</td>
</tr>
<tr>
<td>W8NLQ/8</td>
<td>67</td>
<td>A-</td>
<td>102</td>
</tr>
<tr>
<td>W8AB/A</td>
<td>59</td>
<td>A-</td>
<td>99</td>
</tr>
<tr>
<td>W1AQ/1</td>
<td>39</td>
<td>A-</td>
<td>72</td>
</tr>
<tr>
<td>W8AK/9</td>
<td>24</td>
<td>A-</td>
<td>71</td>
</tr>
<tr>
<td>W3LN/3</td>
<td>22</td>
<td>A-</td>
<td>70</td>
</tr>
<tr>
<td>W3KO/2</td>
<td>20</td>
<td>B-</td>
<td>67</td>
</tr>
<tr>
<td>W3WB/6</td>
<td>19</td>
<td>A-</td>
<td>64</td>
</tr>
<tr>
<td>W7IWU/7</td>
<td>14</td>
<td>A-</td>
<td>57</td>
</tr>
<tr>
<td>W8HBE/1</td>
<td>13</td>
<td>B-</td>
<td>55</td>
</tr>
<tr>
<td>W8TWE/2</td>
<td>12</td>
<td>A-</td>
<td>54</td>
</tr>
<tr>
<td>W9LX/6</td>
<td>11</td>
<td>A-</td>
<td>53</td>
</tr>
<tr>
<td>W8TMK/6</td>
<td>10</td>
<td>B-</td>
<td>52</td>
</tr>
</tbody>
</table>

*The "power classification" used computing the score is indicated by A, B, or C after the number of QSOs shown. A indicates power up to and including 30 watts (multiplier of 1); B indicates power over 30 up to and including 100 watts (multiplier of 2); C indicates over 100 watts (multiplier of 3). More than one letter means that at different times power inputs fell within different classifications.

**Club participants:**

**W1WOG, KYK, LCH, LQI, LWA, MJI, MQC, W3ADW, ADX, AXT, BTP, CEB, DEI, DFO, DRO, EOB, EBW, FHV, HOA, KAK, KEB, KIE, KKW, LN, W4XHA, Simons, Carrell, W7HIL, BUD, DX, LVQ, PEK, W8SWS, SLH, SLO, SMC, UOD, BFO, OFE, TZE, TYM, Corcoran.**

**Nineteen.**

**186. W2PJF, NPP, TIE.**

**Six. W8QQK, SW, MGQ, GP, MOB, DOR, RMI, DX, DOD, BIL.**

**46. W8WAD, HIC, JW, INJ, IPY, BLU, ISH, W8WVS, WOSCT, and two more.**

**153. W7HEJ, YXH, IY, ODV, AAB, JBI, Norborg.**

**Five. W1EAX, LTY, LXE, W4HXA, Simons.**

**22. W8HBE, W7IWU, W8HBE.**

**12. W8TWE, W8WAC, W8WAC.**

**13. W3LZ, W3LZ.**

**9. W8TMK, W8TMK.**

(Continued on page 154)

**QST for**
Many of the DX men have been at a loss to appraise accurately their postwar DX accomplishments because the last revised Countries List was made up back in 1939 and, since that time, many areas have been shuffled about and postwar stations have cropped up in locations never before considered. To reach as satisfactory a revision as possible, a committee made up of G9MI for the R.S.G.B. slant, W6QD and his advisory group of several prominent W6s, and a five-man ARRL Headquarters group has been collaborating during the past few months to revise the list and polish off the rough edges. A number of changes have been made, but they have been made almost unanimously, so it is felt that the present list is a good cross-section of opinion. A careful check of the list will show that a number of countries have been added and that several have been deleted or combined.

Naturally there will be some difference of opinion by some of the DX men, and the collaborators will be pleased to entertain any criticisms. In the meantime, it becomes your yardstick in the ARRL DX Contest and DXCC.

<table>
<thead>
<tr>
<th>Country</th>
<th>Call Sign</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aden and Socotra Island</td>
<td>VS9</td>
</tr>
<tr>
<td>Afghanistan</td>
<td>YA</td>
</tr>
<tr>
<td>Alaska</td>
<td>KL7</td>
</tr>
<tr>
<td>Albania</td>
<td>VA</td>
</tr>
<tr>
<td>Aldabra Islands</td>
<td></td>
</tr>
<tr>
<td>Algeria</td>
<td>FA</td>
</tr>
<tr>
<td>Andaman Isds. and Nicobar Isds.</td>
<td></td>
</tr>
<tr>
<td>Antarctica</td>
<td>PX</td>
</tr>
<tr>
<td>Anglo-Egyptian Sudan</td>
<td>ST</td>
</tr>
<tr>
<td>Angola</td>
<td>CR6</td>
</tr>
<tr>
<td>Argentina</td>
<td>LU</td>
</tr>
<tr>
<td>Ascension Island</td>
<td>ZD1</td>
</tr>
<tr>
<td>Australia (including Tasmania)</td>
<td>VK</td>
</tr>
<tr>
<td>Austria</td>
<td>OE</td>
</tr>
<tr>
<td>Azores Islands</td>
<td>CT2</td>
</tr>
<tr>
<td>Bahamas Islands</td>
<td>VP7</td>
</tr>
<tr>
<td>Bahrain Island</td>
<td>VU7</td>
</tr>
<tr>
<td>Baker Island, Howland Island and Am. Phoenix</td>
<td>KB6</td>
</tr>
<tr>
<td>Baltrier Isds.</td>
<td>EA6</td>
</tr>
<tr>
<td>Barbados</td>
<td>VP6</td>
</tr>
<tr>
<td>Raratoland</td>
<td>ZS4</td>
</tr>
<tr>
<td>Beshuanaland</td>
<td></td>
</tr>
<tr>
<td>Belgian Congo</td>
<td>OQ</td>
</tr>
<tr>
<td>Belgium</td>
<td>ON</td>
</tr>
<tr>
<td>Bhutanian Islands</td>
<td>VP9</td>
</tr>
<tr>
<td>Bolivia</td>
<td>CP</td>
</tr>
<tr>
<td>Bonin islands and Volcano</td>
<td></td>
</tr>
<tr>
<td>Brunei Island</td>
<td>VU6</td>
</tr>
<tr>
<td>Bornoe, British North</td>
<td>VS4</td>
</tr>
<tr>
<td>Bornoe, Netherlands</td>
<td>PK5</td>
</tr>
<tr>
<td>Brazil</td>
<td>FY</td>
</tr>
<tr>
<td>British Honduras</td>
<td>VP1</td>
</tr>
<tr>
<td>Brunei Island</td>
<td>VU6</td>
</tr>
<tr>
<td>Bulgaria</td>
<td>LZ</td>
</tr>
<tr>
<td>Burma</td>
<td>Z2</td>
</tr>
<tr>
<td>Cameroun, French</td>
<td>FE5</td>
</tr>
<tr>
<td>Canada</td>
<td>VE</td>
</tr>
<tr>
<td>Canal Zone</td>
<td>KZ5</td>
</tr>
<tr>
<td>Canary Islands</td>
<td>EA8</td>
</tr>
<tr>
<td>Cape Verde Islands</td>
<td>CR4</td>
</tr>
<tr>
<td>Carolina Islands</td>
<td>VP5</td>
</tr>
<tr>
<td>Cayman Islands</td>
<td>VP5</td>
</tr>
<tr>
<td>Celebes and Molucca Islands</td>
<td>PK6</td>
</tr>
<tr>
<td>Caylon</td>
<td>VS7</td>
</tr>
<tr>
<td>Changos Islands</td>
<td>VS8</td>
</tr>
<tr>
<td>Channel Islands</td>
<td>GC</td>
</tr>
<tr>
<td>Chile</td>
<td>CE</td>
</tr>
<tr>
<td>China</td>
<td>XU, C</td>
</tr>
<tr>
<td>Christmas Island</td>
<td>ZC3</td>
</tr>
<tr>
<td>Clipperton Island</td>
<td>TI</td>
</tr>
<tr>
<td>Cocos Islands</td>
<td>ZC2</td>
</tr>
<tr>
<td>Colombia</td>
<td>HK</td>
</tr>
<tr>
<td>Comoro Islands</td>
<td>ZK1</td>
</tr>
<tr>
<td>Cook Islands</td>
<td></td>
</tr>
<tr>
<td>Cuba</td>
<td>CM, CO</td>
</tr>
<tr>
<td>Cyprus</td>
<td>ZC4</td>
</tr>
<tr>
<td>Czechoslovakian</td>
<td>OK</td>
</tr>
<tr>
<td>Denmark</td>
<td>OZ</td>
</tr>
<tr>
<td>Dodecanese Islands (e.g., Rhodes)</td>
<td>SV5</td>
</tr>
<tr>
<td>Dominican Republic</td>
<td>HI</td>
</tr>
<tr>
<td>Easter Island</td>
<td></td>
</tr>
<tr>
<td>Ecuador</td>
<td>HC</td>
</tr>
<tr>
<td>Egypt</td>
<td>SU</td>
</tr>
<tr>
<td>Eire (Irish Free State)</td>
<td>EI</td>
</tr>
<tr>
<td>England</td>
<td>G</td>
</tr>
<tr>
<td>Eritrea</td>
<td>IO</td>
</tr>
<tr>
<td>Ethiopia</td>
<td>ET</td>
</tr>
<tr>
<td>Faeroes, The</td>
<td>OY</td>
</tr>
<tr>
<td>Falkland Islands</td>
<td>VP6</td>
</tr>
<tr>
<td>Fanning Island (Christmas Island)</td>
<td>VB3</td>
</tr>
<tr>
<td>Fiji Islands</td>
<td>VB2</td>
</tr>
<tr>
<td>Finland</td>
<td>OH</td>
</tr>
<tr>
<td>Formosa (Taiwan)</td>
<td>FY5</td>
</tr>
<tr>
<td>France</td>
<td>F</td>
</tr>
<tr>
<td>French Equatorial Africa</td>
<td>FG8</td>
</tr>
<tr>
<td>French India</td>
<td>FN</td>
</tr>
<tr>
<td>French Indo-China</td>
<td>FS6</td>
</tr>
<tr>
<td>French Oceania (e.g., Tahiti)</td>
<td>FO8</td>
</tr>
<tr>
<td>French West Africa</td>
<td>FF8</td>
</tr>
<tr>
<td>Fridtjof Nansen Land (Franz Josef Land)</td>
<td></td>
</tr>
<tr>
<td>Galapagos Islands</td>
<td></td>
</tr>
<tr>
<td>Gambia</td>
<td>ZD3</td>
</tr>
<tr>
<td>Germany</td>
<td>D</td>
</tr>
<tr>
<td>Gibraltar</td>
<td>ZB2</td>
</tr>
<tr>
<td>Gilbert &amp; Ellice Islands and Ocean Island</td>
<td>VB1</td>
</tr>
<tr>
<td>Goa (Portuguese India)</td>
<td>CR8</td>
</tr>
<tr>
<td>Gold Coast (and British Togoland)</td>
<td>ZD4</td>
</tr>
<tr>
<td>Greece</td>
<td>SV</td>
</tr>
<tr>
<td>Greenland</td>
<td>OX</td>
</tr>
<tr>
<td>Guadeloupe</td>
<td>FG8</td>
</tr>
<tr>
<td>Guantanamo Bay</td>
<td>NY4</td>
</tr>
<tr>
<td>Guatemala</td>
<td>TG</td>
</tr>
<tr>
<td>Guinea, British</td>
<td>VP3</td>
</tr>
<tr>
<td>Guinea, Netherlands (Surinam)</td>
<td>PZ</td>
</tr>
<tr>
<td>Guinea, French and Inini</td>
<td>FY8</td>
</tr>
<tr>
<td>Guinea, Portuguese</td>
<td>CR5</td>
</tr>
<tr>
<td>Guineas, Spanish</td>
<td></td>
</tr>
<tr>
<td>Haiti</td>
<td>HH</td>
</tr>
<tr>
<td>Hawaiian Islands</td>
<td>KH6</td>
</tr>
</tbody>
</table>

February 1947
<table>
<thead>
<tr>
<th>Country</th>
<th>Call Sign</th>
</tr>
</thead>
<tbody>
<tr>
<td>Honduras</td>
<td>HR</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>V86</td>
</tr>
<tr>
<td>Hungary</td>
<td>HA</td>
</tr>
<tr>
<td>Iceland</td>
<td>FP</td>
</tr>
<tr>
<td>Ifni</td>
<td></td>
</tr>
<tr>
<td>India</td>
<td>VU</td>
</tr>
<tr>
<td>Iran</td>
<td>EP-EQ</td>
</tr>
<tr>
<td>Iraq</td>
<td></td>
</tr>
<tr>
<td>Ireland, Northern</td>
<td>GI</td>
</tr>
<tr>
<td>Italy</td>
<td>I</td>
</tr>
<tr>
<td>Jamaica</td>
<td>VP5</td>
</tr>
<tr>
<td>Java</td>
<td>PK</td>
</tr>
<tr>
<td>Johnston Island</td>
<td>KJ6</td>
</tr>
<tr>
<td>Korea</td>
<td>J</td>
</tr>
<tr>
<td>Jarvis Island, Palmyra group (Christmas Island)</td>
<td>KP6</td>
</tr>
<tr>
<td>Java</td>
<td></td>
</tr>
<tr>
<td>Johnston Island</td>
<td></td>
</tr>
<tr>
<td>Korea</td>
<td></td>
</tr>
<tr>
<td>Kasym</td>
<td></td>
</tr>
<tr>
<td>Kerguelen Islands</td>
<td></td>
</tr>
<tr>
<td>Lesser Antilles</td>
<td></td>
</tr>
<tr>
<td>Latvia</td>
<td></td>
</tr>
<tr>
<td>Leeward Islands</td>
<td>VP2</td>
</tr>
<tr>
<td>Liberia</td>
<td>EL</td>
</tr>
<tr>
<td>Liechtenstein</td>
<td></td>
</tr>
<tr>
<td>Little America</td>
<td>EC4</td>
</tr>
<tr>
<td>Luxembourg</td>
<td>LX</td>
</tr>
<tr>
<td>Macau</td>
<td>CR9</td>
</tr>
<tr>
<td>Madagascar</td>
<td>ZB</td>
</tr>
<tr>
<td>Maldives Islands</td>
<td></td>
</tr>
<tr>
<td>Malta</td>
<td>ZB1</td>
</tr>
<tr>
<td>Manchuria</td>
<td></td>
</tr>
<tr>
<td>Marianas Islands (Guam)</td>
<td>KG9</td>
</tr>
<tr>
<td>Marshall Islands</td>
<td></td>
</tr>
<tr>
<td>Martinique</td>
<td>FM8</td>
</tr>
<tr>
<td>Mauritania</td>
<td>VQ8</td>
</tr>
<tr>
<td>Mexico</td>
<td>XE</td>
</tr>
<tr>
<td>Midway Island</td>
<td>KM6</td>
</tr>
<tr>
<td>Niue</td>
<td>ZK2</td>
</tr>
<tr>
<td>Norfolk Island (British)</td>
<td></td>
</tr>
<tr>
<td>New Hebrides</td>
<td>F8S, YJ</td>
</tr>
<tr>
<td>New Zealand</td>
<td>ZL</td>
</tr>
<tr>
<td>Nigeria</td>
<td>ZD2</td>
</tr>
<tr>
<td>Niue</td>
<td></td>
</tr>
<tr>
<td>Norway</td>
<td>LA</td>
</tr>
<tr>
<td>Nyaaland</td>
<td>ZD6</td>
</tr>
<tr>
<td>Oman</td>
<td></td>
</tr>
<tr>
<td>Palau (Pelew Islands)</td>
<td>ZC6</td>
</tr>
<tr>
<td>Palestine</td>
<td>ZC6</td>
</tr>
<tr>
<td>Panama</td>
<td>HP</td>
</tr>
<tr>
<td>Papua Territory</td>
<td>VK4</td>
</tr>
<tr>
<td>Paraguay</td>
<td>ZP</td>
</tr>
<tr>
<td>Peru</td>
<td>OA</td>
</tr>
<tr>
<td>Phillip Islands</td>
<td>KA</td>
</tr>
<tr>
<td>Phoenix Islands (British)</td>
<td></td>
</tr>
<tr>
<td>Pitcairn Island</td>
<td>VR6</td>
</tr>
<tr>
<td>Poland</td>
<td>SP</td>
</tr>
<tr>
<td>Portugal</td>
<td>CT</td>
</tr>
<tr>
<td>Puerto Rico</td>
<td>KP4</td>
</tr>
<tr>
<td>Reunion Island</td>
<td>FR8</td>
</tr>
<tr>
<td>Rhodesia, Northern</td>
<td>VQ2</td>
</tr>
<tr>
<td>Iceland, Southern</td>
<td></td>
</tr>
<tr>
<td>Rio de Oro</td>
<td></td>
</tr>
<tr>
<td>Roatania</td>
<td></td>
</tr>
<tr>
<td>Ryukyu Islands (e.g., Okinawa)</td>
<td></td>
</tr>
<tr>
<td>St. Helena</td>
<td>ZD7</td>
</tr>
<tr>
<td>St. Vincent</td>
<td>YS</td>
</tr>
<tr>
<td>Samos, American</td>
<td>KS6</td>
</tr>
<tr>
<td>Samos, Western</td>
<td>ZM</td>
</tr>
<tr>
<td>Sarawak</td>
<td>VS8</td>
</tr>
<tr>
<td>Saudi Arabia (Hedjas and Nejd)</td>
<td>HZ</td>
</tr>
<tr>
<td>Scotland</td>
<td>GM</td>
</tr>
<tr>
<td>Seychelles</td>
<td>VQ6</td>
</tr>
<tr>
<td>Senegal</td>
<td>JS</td>
</tr>
<tr>
<td>Sierra Leone</td>
<td>ZD1</td>
</tr>
<tr>
<td>Sikkim</td>
<td>(AC3)</td>
</tr>
<tr>
<td>Solomon Islands</td>
<td>VR4</td>
</tr>
<tr>
<td>Somaliland, British</td>
<td>VQ8</td>
</tr>
<tr>
<td>Somaliland, Italian</td>
<td></td>
</tr>
<tr>
<td>South Georgia</td>
<td>VP8</td>
</tr>
<tr>
<td>South Orinsey Islands</td>
<td>VP8</td>
</tr>
<tr>
<td>South Sandwich Islands</td>
<td>VP8</td>
</tr>
<tr>
<td>South Shetland Islands</td>
<td>VP8</td>
</tr>
<tr>
<td>Southwest Africa</td>
<td>ZS3</td>
</tr>
<tr>
<td>Soviet Union: European Russian Socialist</td>
<td></td>
</tr>
<tr>
<td>Ukraine</td>
<td>UP6</td>
</tr>
<tr>
<td>White Russian Soviet Socialist Republic</td>
<td>UCS</td>
</tr>
<tr>
<td>Georgia</td>
<td>UFE</td>
</tr>
<tr>
<td>Armenia</td>
<td>UG6</td>
</tr>
<tr>
<td>Turkmenistan</td>
<td>UH3</td>
</tr>
<tr>
<td>Uzbekistan</td>
<td>UZ6</td>
</tr>
<tr>
<td>Tadzhikistan</td>
<td>UL7</td>
</tr>
<tr>
<td>Kirghizia</td>
<td>UM8</td>
</tr>
<tr>
<td>Karelo-Finnish Republic</td>
<td>UN1</td>
</tr>
<tr>
<td>Moldavia</td>
<td>UOS</td>
</tr>
<tr>
<td>Lithuania</td>
<td>UP</td>
</tr>
<tr>
<td>Latvia</td>
<td>UQ</td>
</tr>
<tr>
<td>Estonia</td>
<td>UR</td>
</tr>
<tr>
<td>Spain</td>
<td>EA</td>
</tr>
<tr>
<td>Sumatra</td>
<td>PK4</td>
</tr>
<tr>
<td>Svalbard (Spitzbergen)</td>
<td>SB5</td>
</tr>
<tr>
<td>Swan Island</td>
<td>KS4</td>
</tr>
<tr>
<td>Swaziland</td>
<td></td>
</tr>
<tr>
<td>Sweden</td>
<td>SM</td>
</tr>
<tr>
<td>Switzerland</td>
<td>HB</td>
</tr>
<tr>
<td>Syria</td>
<td>(AR)</td>
</tr>
<tr>
<td>Tangier Zone</td>
<td>(E)</td>
</tr>
<tr>
<td>Tannu Tuva</td>
<td></td>
</tr>
<tr>
<td>Tibet</td>
<td>AC4</td>
</tr>
<tr>
<td>Timor, Portuguese</td>
<td>CR10</td>
</tr>
<tr>
<td>Tonga (Union) Islands</td>
<td></td>
</tr>
<tr>
<td>Tonga (Friendly) Islands</td>
<td>VR5</td>
</tr>
<tr>
<td>Trans-Jordan</td>
<td>ZC1</td>
</tr>
<tr>
<td>Trinidad and Tobago</td>
<td>VP4</td>
</tr>
<tr>
<td>Tristan da Cunha and Gough Island</td>
<td>ZD9</td>
</tr>
<tr>
<td>Tunisia</td>
<td>FT4</td>
</tr>
<tr>
<td>Turkey</td>
<td>TA</td>
</tr>
<tr>
<td>Turkmenistan</td>
<td></td>
</tr>
<tr>
<td>Turks and Caicos Islands</td>
<td>VP5</td>
</tr>
<tr>
<td>Uganda</td>
<td>VS5</td>
</tr>
<tr>
<td>Union of South Africa</td>
<td>ZS</td>
</tr>
<tr>
<td>United States of America</td>
<td>WS</td>
</tr>
<tr>
<td>Uruguay</td>
<td>CX</td>
</tr>
<tr>
<td>Venesuela</td>
<td>YY</td>
</tr>
<tr>
<td>Windward Islands</td>
<td>VP2</td>
</tr>
<tr>
<td>Yemen</td>
<td>VP1</td>
</tr>
<tr>
<td>Zanzibar</td>
<td>ZV1</td>
</tr>
<tr>
<td>Zanzibar</td>
<td>VQ1</td>
</tr>
</tbody>
</table>
DX Operating

A Poll of the Opinions of Foreign Amateurs

BY BYRON GOODMAN,* W1DX

- Back in September a few of the Hq-gang were chinning about DX tactics and operating in general, and we got to wondering how the Ws and their practices look to some of the outstanding DX stations throughout the world. After a lot of conjecture which proved nothing, it was decided that the best way to find out would be to ask a few. (We were pretty brilliant on that particular day!) It didn't take very long to cook up a letter and a list of some of the most savvy DX stations, and the rest was left up to the air-mail service. In due time enough replies were received for the thing to shape up, and we were pleasantly surprised at the general uniformity of opinion of these old hands at the game. We think you'll be interested in the opinions of these fellows you've been calling and working — or not working!

I'm making a poll of opinion of some of the outstanding DX stations, we trust that none of the twenty or thirty other stations we might have asked will feel slighted because we didn't consult him, but space limitations precluded any such action. However, those we did ask are among the top operators and will require no introduction to any seasoned DX man. John J. Alvares, CR9AG, is one of the most consistent Asian signals, and is well known to prewar DX men as VS6AG. Arthur O. Milne, G2MI, is one of England's top DX men, and conducts the DX column in the R.S.G.B. Bulletin. Camilo J. Raffo, LU7AZ, is one of South America's outstanding signals and operators, and he will be found active in any contest. Jacques Mahieu, ON4AU, is an old timer who has stood high in DX circles for many years, and W. M. Richards, VK5WR, is probably the top DX station "down under." Rex Basman, ZS2X, was the No. 1 ZS in the prewar DXCC and does the DX column for the Port Elizabeth Radio Association Bulletin. O. W. Reid, ZS6DO, is not yet quite as well known under that call as he was with ZS2A before the war, but any old hand from the early 30s will tell you that when you worked a ZS it was probably ZS2A, and if you took the weights off the bug it was ZS2A!

Eight questions were asked of these friends across the seas. Their replies follow each question, in order.

* Assistant Technical Editor, QST.

Operating

The first question was, "What is your general reaction to the operating habits of W stations, prewar and postwar?"

CR9AG: Before the war the Ws were more spread out and didn't QRM each other as they do now. Even during the past DX Contests there was not as much QRM as we have now, and I can just imagine what it is like back there. At present when conditions are favorable you can hear only a jumble of signals at the edge and very few after that.

G2MI: It seems now that the only replies one receives are always on the exact spot of one's own frequency. I think I haven't had a single 14-Mc. c.w. contact that has been anywhere but on my own frequency. This is a bad practice because often a half-dozen Ws line their VFOs on the same frequency and I have to wait for the last man out in order to decipher a call sign. Balked of their prey, the unlucky ones usually start calling "CQ," thus mining my contact.

Would all Ws calling a G listen carefully when he replies with some other W call? He may answer three stations at once and ask the others to wait. I have tried this method of giving several chaps a break but usually only the first call in my list answers. The others, say a W3 and W5, will hear me start to reply to a W1 and then flip the dial, thus they never know that I called W1ABC/W3ADC/W2XYZ and gave reports to all three.

LU7AZ: I think there is no great difference except the new custom of asking for the operator's name!

ON4AU: Generally W's operating habits were and are OK.

VK5WR: The operating habits of W stations postwar seem very much the same as they were prewar — perhaps more use is being made of VFOs.

ZS6DO: There doesn't seem to be an appreciable change so far as I'm concerned. I do notice, however, that almost invariably one of the first questions put is, "QTH?" Before the war nobody seemed to worry what part of South Africa you were in. This sudden interest is probably only force of habit in our case and originated as a means to pinpoint all these new stations popping up in real out-of-the-way places for which there are no commonly-known calls.

ZS6DO: Generally excellent, except for the 0.5 per cent who just don't know how. From what I have heard lately, postwar operating is still excellent if not better than prewar. Quite a few Ws are using break-in.

Ed.

February 1947

51
Likes & Dislikes

The next query was, "What operating practices of Ws do you like, and what practices do you dislike?"

CRAG: Some of the Ws call you at the band edge and QSX when asked to do so and QSQ, but others with crystals close to the edge will be QRMed so badly that every QSO is spoiled. The operating practice that I dislike is that some Ws call on the frequency of the station I am working before I am quite finished, and they cause unnecessary QRMs.

GM1: I have no serious criticisms of W operating practices. I dislike this "hamb" nonsense, but note that most Ws now ask for your name.

LUTAZ: I like all operating practices with the exception of calling me on the same frequency of the station I am working before I am working, before I sign off, or calling me when I call a directional CQ. I don't like to call "CQ no Ws" as others fellows do, but I use directional CQ sometimes.

ON4AU: No special remarks against W practices. Always I find and have found Ws display excellent ham spirit and friendship, and are least exclusive in their working. I wish all DX stations would take W and K stations as their example.

VK5WR: First part no reaction. I dislike practice of some Ws with VFOs parking their signals on my frequency.

ZS6X: The practice which appeals most to me is the one of interspacing the Ws own call signly, and soon after, commenting the calling of a DX station. With this method you don't have to sit for nearly three minutes wondering who is calling, and it gives the station being called an opportunity to take his choice.

The practices which I find really annoying are the utter disregard of a lot of Ws have for directional CJQs and the bad habit of continuing to call even after a QSO has started when they know they're on the same frequency as the W being worked. I, like many others, am trying to get back into the DXCC but would stand mighty little chance if I didn't rely on directional calls to raise the rare ones, especially when most of the ones I still want come through at the same time as the Ws, and the band isn't open very long.

ZS6DO: I like the chap who gets down to business, uses break-in and snappy operating procedure, and doesn't try to hold me when I say QRQ. There are lots of these fellows on the air right now.

One thing I dislike intensely and which drives me almost nuts is to have Ws answer my calls made specifically to Ws. I, like many others, am trying to get back into the DXCC but would stand mighty little chance if I didn't rely on directional calls to raise the rare ones, especially when most of the ones I still want come through at the same time as the Ws, and the band isn't open very long.

ZS6DO: I like the chap who gets down to business, uses break-in and snappy operating procedure, and doesn't try to hold me when I say QRQ. There are lots of these fellows on the air right now.

One thing I dislike intensely and which drives me almost nuts is to have Ws answer my calls made specifically to Ws. I, like many others, am trying to get back into the DXCC but would stand mighty little chance if I didn't rely on directional calls to raise the rare ones, especially when most of the ones I still want come through at the same time as the Ws, and the band isn't open very long.

ZS6DO: I like the chap who gets down to business, uses break-in and snappy operating procedure, and doesn't try to hold me when I say QRQ. There are lots of these fellows on the air right now.

One thing I dislike intensely and which drives me almost nuts is to have Ws answer my calls made specifically to Ws. I, like many others, am trying to get back into the DXCC but would stand mighty little chance if I didn't rely on directional calls to raise the rare ones, especially when most of the ones I still want come through at the same time as the Ws, and the band isn't open very long.

ZS6DO: I like the chap who gets down to business, uses break-in and snappy operating procedure, and doesn't try to hold me when I say QRQ. There are lots of these fellows on the air right now.

One thing I dislike intensely and which drives me almost nuts is to have Ws answer my calls made specifically to Ws. I, like many others, am trying to get back into the DXCC but would stand mighty little chance if I didn't rely on directional calls to raise the rare ones, especially when most of the ones I still want come through at the same time as the Ws, and the band isn't open very long.

ZS6DO: I like the chap who gets down to business, uses break-in and snappy operating procedure, and doesn't try to hold me when I say QRQ. There are lots of these fellows on the air right now.

One thing I dislike intensely and which drives me almost nuts is to have Ws answer my calls made specifically to Ws. I, like many others, am trying to get back into the DXCC but would stand mighty little chance if I didn't rely on directional calls to raise the rare ones, especially when most of the ones I still want come through at the same time as the Ws, and the band isn't open very long.

ZS6DO: I like the chap who gets down to business, uses break-in and snappy operating procedure, and doesn't try to hold me when I say QRQ. There are lots of these fellows on the air right now.

One thing I dislike intensely and which drives me almost nuts is to have Ws answer my calls made specifically to Ws. I, like many others, am trying to get back into the DXCC but would stand mighty little chance if I didn't rely on directional calls to raise the rare ones, especially when most of the ones I still want come through at the same time as the Ws, and the band isn't open very long.

ZS6DO: I like the chap who gets down to business, uses break-in and snappy operating procedure, and doesn't try to hold me when I say QRQ. There are lots of these fellows on the air right now.

One thing I dislike intensely and which drives me almost nuts is to have Ws answer my calls made specifically to Ws. I, like many others, am trying to get back into the DXCC but would stand mighty little chance if I didn't rely on directional calls to raise the rare ones, especially when most of the ones I still want come through at the same time as the Ws, and the band isn't open very long.

ZS6DO: I like the chap who gets down to business, uses break-in and snappy operating procedure, and doesn't try to hold me when I say QRQ. There are lots of these fellows on the air right now.

One thing I dislike intensely and which drives me almost nuts is to have Ws answer my calls made specifically to Ws. I, like many others, am trying to get back into the DXCC but would stand mighty little chance if I didn't rely on directional calls to raise the rare ones, especially when most of the ones I still want come through at the same time as the Ws, and the band isn't open very long.

ZS6DO: I like the chap who gets down to business, uses break-in and snappy operating procedure, and doesn't try to hold me when I say QRQ. There are lots of these fellows on the air right now.

One thing I dislike intensely and which drives me almost nuts is to have Ws answer my calls made specifically to Ws. I, like many others, am trying to get back into the DXCC but would stand mighty little chance if I didn't rely on directional calls to raise the rare ones, especially when most of the ones I still want come through at the same time as the Ws, and the band isn't open very long.

ZS6DO: I like the chap who gets down to business, uses break-in and snappy operating procedure, and doesn't try to hold me when I say QRQ. There are lots of these fellows on the air right now.

One thing I dislike intensely and which drives me almost nuts is to have Ws answer my calls made specifically to Ws. I, like many others, am trying to get back into the DXCC but would stand mighty little chance if I didn't rely on directional calls to raise the rare ones, especially when most of the ones I still want come through at the same time as the Ws, and the band isn't open very long.

ZS6DO: I like the chap who gets down to business, uses break-in and snappy operating procedure, and doesn't try to hold me when I say QRQ. There are lots of these fellows on the air right now.

One thing I dislike intensely and which drives me almost nuts is to have Ws answer my calls made specifically to Ws. I, like many others, am trying to get back into the DXCC but would stand mighty little chance if I didn't rely on directional calls to raise the rare ones, especially when most of the ones I still want come through at the same time as the Ws, and the band isn't open very long.

ZS6DO: I like the chap who gets down to business, uses break-in and snappy operating procedure, and doesn't try to hold me when I say QRQ. There are lots of these fellows on the air right now.
band, and when I discover an interesting DX I try to reply not far from that frequency.

VK5WR: I tune from the end nearest to that where the CQ was called to the other end. It takes about a minute on the average. Band-edge crowding by Ws and other countries tends to keep me off the edge when calling CQ, and to use the edge when answering CQs.

ZS6DO: I have no definite tuning procedure. I generally start from the edge of the band inward, but if I know there is a station on that I want I always tune to his frequency first after a CQ, in the hopes that he has come back. Band-edge crowding, as far as I'm concerned, is just a waste of time — there's so much QRM there that no one gets anywhere. It takes me about one minute to cover 100 kc. on 20 or about 500 kc. on 10.

ZS6DO: After calling CQ I usually start from the low-frequency edge of the c.w. band and cover this band in about 5 or 10 seconds if no call for me is heard. When conditions are good, I rarely have to cover much more than about 50 kc. There are enough Ws in the first 50 kc. to keep an edge when calling CQ, and when I discover a DX and make a contact, I should like to see it encouraged. Many Ws know the advantages. "What do you think of Ws using 'break-in' when calling you? Would you encourage it?"

LU7AZ: I think break-in should be used wherever possible. In my operating procedure. It decreases QRM and saves time. It's just a waste of time. Strangely enough, on 'phone it's possible occasionally to answer successfully a W's CQ. Very rarely do I answer any W calling "CQ DX." Any W making this call is, to my mind, wasting time and power. We stand a better chance if they answer foreign CQs. Most of my countries have been obtained by calling the country desired. It would be better for the rare DX to call "CQ DX."

Speed of Calling

Out of curiosity about some of the calls sent at about 3 w.p.m., we asked, "At what speed do you think the stations answering your CQ should call you?"

CB8AG: The Ws should call about 20 w.p.m., but the rest, particularly the East Coast stations, should call about 15 w.p.m., as invariably they all come in here with an echo, especially in the early evenings.

ZSSX: In my opinion any reasonable speed is satisfactory provided characters are well spaced. In this regard I'm glad to say that on the whole Ws are not shoddy in their sending and most are a pleasure to listen to.

ZS6DO: The golden rule is to answer at the speed of the called station. I, personally, don't mind anything up to 50 w.p.m. and even more! Most of your speed merchants know me and give me the works!

Signal Reporting

The last question dealt with that subject dear to the hearts of all DX men, the signal report. You will gather from the question that our suspicions have been aroused on several occasions. "Do you have two scales of signal reports, one for domestic signals and one for DX stations, or do you try to be consistent? Have you any suggestions to make on signal reporting?"

CB8AG: No, since all signals from domestic stations are

February 1947
about 88 to 89, so when I give a station an 87 or S8 they sound like domestic signals. The method we have been using for reporting signals is OK and I don’t think any changes are necessary, although the tone report seems apparently useless, as 99 per cent of the signals heard are T9 anyway. Once in a while you meet up with a T6 signal.

GMMI: I think everyone has a different scale for local and DX signals. Often unconsciously, but none the less true. Probably on 25 Mc. the local scale is used for W signals because they come in at such terrific strength. I have one suggestion regarding signal reports. When reporting on ‘phone, say “Your signals are RS 87,” not “Q5 R7.” We have the RST system for c.w., why not use the appropriate part for ‘phone? The height of absurdity is reached when some guy says, “You’re R7 on my S-meter”!

LUTAZ: I use the same scale for reporting signals both domestic and foreign. Any difference is absurd. I suggest the “QR” system used on ‘phone be replaced by “RS,” in an effort to standardize with the R8T system. Perhaps it is possible to add a quality report of the modulation, as we do here in Argentina. We use the letter “M” to classify the quality from 1 to 9.

ON4AU: Consistent — it is not possible to use many scales.

VK5WE: Yes, the DX report being one to two points higher up in the scale. I gave up trying to be consistent years ago.

Z38X: One of the most difficult questions to answer although I try to be consistent. I’m afraid there are times when a candid report, in my opinion, would be misleading. Naturally, if carried to extremes, an exaggerated report is worse than useless and is decidedly unfair. If an abbreviated form of explanation could be coupled to the report to indicate that beams and preselectors are being used, it might also help to give a truer picture of how signals are actually breaking through.

ZS8DO: The old RST system still seems OK with me, although I prefer to leave out the “T” unless the note is bad. It is a sound idea to give the QSA at the end of an answering call and the rest later as the QSO develops. If this is done, the station called knows immediately what conditions prevail.

Well, there you are. It probably represents a good cross-section of opinion, and questioning of more stations would result only in elaboration on some of the ideas expressed. But notice that there are a few things about which our DX friends are unanimous: breaking up QSOs, calling on the exact frequency of the DX station, disregard of directional CQs, the use of break-in, “CQ DX” by Ws, and “RS” instead of “QR” for ‘phone operating. The business on signal reports boomeranged — apparently it is too much a problem of individual cases!

February 1922 QST is a “Paragon Paul” issue, taking for its theme, “Welcome Home, Our Conquering Hero!” An amazed world learned last month of our accomplishment, but within our own circle there still are notes to be compared . . . congratulations proffered . . . bows taken . . . “What next?” weighed. This issue records for posterity the full account of our spanning of the North Atlantic. Paul Forman Godley is pictured in full-page portrait along with the “Official Report on the Second Transatlantic Tests,” Mr. Godley’s story of how we fared at the receiving end. In “The Story of the Transatlantics,” QST’s editor recounts the work and planning which went into making our League’s project a success, and he looks forward to an era of “international prime radio.” At press time word arrives that in January 1AFV succeeded in transmitting 3 messages to W. W. Burnham in London!

Station 1BCG, star c.w. performer during the Tests, is pictured on this issue’s cover and described in detail within. Messrs. Armstrong, Amy, Grinan, Inman, Cronkhite and Burghard have reason to be proud of their handicraft. Built especially for the Transatlantics, the Greenwich, Conn. amateur station boasts a lofty T-cage antenna working against a radial counterpoise. The transmitter is a stabilized MOPA outfit employing a U.V. 204 oscillator, which drives three similar tubes in parallel in the amplifier. A generator supplies the 990 watts plate power, 99% efficiency being realized in the rig. Reports have IBCG heard in practically every state, in Holland, and Vancouver, B. C.

There is room for only one technical article this month, Robert C. Higgy’s “Practical Radio Amplification.” Methods of using present-day receiving tubes in 200-meter r.f. amplifiers are discussed. Under the title “Governors’ — President’s Relay” we learn that in March we hope to deliver to President Harding 48 messages, one from the governor of each state. Traffic is off because of time spent on the Tests, but of the total handled, c.w. carried upward of 40% of the load! “Who’s Who in Amateur Wireless” introduces Bob Trump, 9BT, now located at Ottawa, and Robert C. Higgy, SIB, a new member of the QST staff. Stations described are 4GL, Savannah, 2BB, Ossining, and 8WM, Ridgewood, L. I.

Director Howard L. Stanley, 2FS, has resigned his League office because of new commercial affiliations, according to Strays. Other items tell us of 8LF’s new c.w. DX record — 5500 miles on 46 watts! . . . Westinghouse announces a receiving tube which will operate from a single dry cell at a current of 0.2 amp. . . . Reinartz, 1QP, reports that mice have been eating away the real spaghetti he has been using for insulation! . . . One ampere in the antenna on the extremely low wavelength of 125 meters is 9ZT’s claim! Clapp-Eastham announces a new regenerative receiver and audio amplifier in an ambitious many-paged advertising campaign. Dealers across the country have tied-in in force — it should be emulated!
Direct-Reading Modulation Meter
Simplified Construction with the 1N34 Crystal Diode

BY DANA W. ATCHLEY, JR.,* WIHEK, AND RICHARD E. FRICKS,* W6QUG

A meter presenting a visual indication of modulation percentage is one of the most essential instruments for the proper operation of an amplitude-modulated 'phone transmitter. A popular misconception, particularly among newcomers to the 'phone ranks, is that a modulation meter is only necessary to prevent overmodulation. It is true that the FCC — and hams operating on adjacent frequencies — frown on overmodulation, and it is further true that a visual indicating meter will greatly assist in keeping the splatter down, but what is overlooked by most is that a modulation meter will also allow the operator to keep his average level up in the fertile region between 50- and 95-per-cent modulation, allowing him to use his transmitter near its maximum effectiveness at all times. Yet a quick survey conducted any evening, on any 'phone band, will show that a majority of stations are not equipped to monitor their modulation in even a qualitative manner. One or two will mutter something about watching their Class B meters, but are completely unable to correlate that meter reading with what is actually taking place. Those rare stations that do have good modulation meters swear by them — and, incidentally, are not usually sworn at! It is felt that this universal absence of such an essential instrument is closely coupled with the complexity and expense of previously-described modulation meters. More than one potential builder has been frightened away from the story when he hit the "calibrate" section of a descriptive article.

The modulation meter described herein is simple, compact and inexpensive, and if the components recommended are used, the constructor can build an accurate reading instrument with comparative freedom from subsequent calibration difficulties.

The inspiration for this meter came from the introduction to the amateur market of the new 1N34 germanium crystal diode, and an article entitled "Vacuum Tube Modulation Meter," by P. M. Honnell, in the Electronics Engineering Handbook. It seemed that a great simplification of the existing art could be accomplished by substituting a 1N34 for the vacuum-tube diode, such as the classic 6H6, with the redesign it permitted.

1) The useful frequency range of the meter was greatly extended over models utilizing conventional diodes. Two commercial modulation meters tested operated very erratically when used with carrier frequencies over 14 Mc., while the 1N34 allowed operation up through 54 Mc.

2) Utilization of the crystal diode eliminated the necessity for any plate or filament power supply.

3) The sensitivity of the 1N34 was sufficient to eliminate the triode amplifier stage customarily used in previous meters.

4) Finally, the 1N34s tested were sufficiently similar in characteristics to allow the builder to construct the modulation meter with "off-the-shelf" components without the necessity for an elaborate calibration procedure for each instrument.

* Sylvania Electric Products, Inc., Electronics Division, 70 Forsyth St., Boston 15, Mass.
Fig. 1 — Circuit of the direct-reading modulation meter.

C1, C4 — 1000-µfd. ceramic.
C2 — 100-µfd. variable midget.
C3 — 12-µfd. mica.
C5 — 470-µfd. mica.
R1 — 16,000 ohms, 5%, ½ watt.
R2 — 11,000 ohms, 5%, ½ watt.
J1 — Closed-circuit jack.
MA — 0–1 ma., 100 ohms.
RFC — 20 µh.
S1a, S2, S3 — D.p.d.t., toggle.
T1 — Push-pull interstage transformer, 1:1 ratio (Stan-­
cor A-4711).

Construction

The modulation meter shown in the photographs is straightforward in both circuit and construction. The whole unit is constructed in an ordinary commercial meter case, both for compactness and to ease the problem of procurement. The metal bottom (not shown in the photograph) was cut from a piece of sheet steel and mounted by four small angle brackets. Small rubber bumpers can be used in conjunction with the sheet-metal screws which secure the bottom plate, or a piece of felt can be glued on to protect the table top. The r.f.-input terminal strip is mounted on the upper rear of the case. The inner left-hand terminal is grounded to the case, and is bonded to the positive terminal of the meter, and in turn to all other grounds in the circuit.

Because of the compactness of the meter cabinet, precautions must be taken to prevent r.f.-energy coupling into the a.f. crystal circuit. All the components associated with the r.f. section of the meter are mounted on a common terminal strip which is located at the rear between the trimmer C2 and the transformer T1.

The audio crystal and the a.f. by-pass condenser, C6, are mounted in the front of the case between the two switch terminals, as shown in the photograph. The reader is advised to adhere to the general layout shown, or troubles may be experienced in the form of r.f. leakage into the audio rectifier circuits at the higher frequencies.

Installation

The size and general design of the unit are such that it will readily fit on even the most cramped operating table. Hence it is recommended that it be placed on the operating table in front of the microphone, in such a place that it can be easily seen by the operator. It is necessary to couple the unit to the modulated final by means of a one- or two-turn insulated link, and a suitable length of 75-ohm radio-frequency transmission link such as the currently-popular Twin-Lead type. In cases where the line is run close to high-powered buffer stages, it will be necessary to use a shielded coaxial line to prevent undesired pick-up. The use of a “haywire” line will greatly decrease the sensitivity of the meter. Fasten one side of the

A view under the modulation meter with the bottom cover removed. An additional mounting board for the ceramic condensers, the r.f. crystal diode and other small components is also shown. The audio crystal diode and C6 are mounted between the two toggle switches. Ground leads should be as short as possible, and the r.f. leads should be kept well separated from the meter and a.f. leads.
transmission line to terminal G on the rear of the case, and the other side to the other terminal. In addition, run a wire from terminal G to a good ground. Initially, place the pick-up link at the other end of the transmission line at least ten inches from the final tank coil. However, arrangements should be made to move this link closer if necessary.

It should be unnecessary to point out that to make full use of the meter over a long time, make the installation with the transmitter turned off!

Operation

With both toggle switches in the upward position at "R.F." and "+", respectively, turn the transmitter on. In most cases, the meter will indicate some value. (If no reading is obtained, use closer coupling.) Next, peak the input circuit by means of the trimmer adjustment on the left side of the case. This trimmer is at ground potential; hence an ordinary uninsulated screwdriver, or a Spinetite socket wrench, may be used for adjustment. With the input circuit peaked, the unit is in its most sensitive condition. Next the pick-up link should be varied until the meter reads exactly 1.0 ma. This establishes the correct reference point for voice modulation. In the event that sine-wave modulation is to be used, follow the procedure above, but set the meter at 0.71 ma., instead of 1.0.1 The transmitter should be turned off whenever the link is handled for adjustment purposes. Normally, only a slight readjustment is necessary. Do not rely on the trimmer for more than small correction adjustments. Operating the unit off resonance at higher frequencies is apt to give erroneous readings.

After setting the carrier level to the prescribed reference point, throw the left-hand toggle downward to the "A.F." position. In this position, the meter will read directly the modulation percentage of the carrier envelope. Throwing the right-hand switch downward will cause the meter to read negative modulation. It will be noted that at high levels, the positive indications will normally exceed the negative. The meter is customarily operated in the "+" position. It is recommended that the speech-amplifier gain be adjusted so that on normal speech the meter needle swings to read an average of approximately 70-80 per cent on the average voice peak. The mechanical inertia of the meter movement is such that it is possible to overmodulate on short bursts of voice energy without the meter so indicating. This is true of almost all types of modulation indicators utilizing direct-reading meters, which tend to integrate the high energy peaks of the complex human-voice waves. On sine-wave modulation, the above is not the case since the wave is uniform and symmetrical. The meter is so adjusted that it will follow the syllabic amplitude of the voice waveform. It is, of course, possible to connect the secondary leads of T1, incorrectly. This connection can be checked by throwing S1a-b to "A.F." and S2 to "+" and applying modulation with the carrier off, to simulate a badly-overmodulated signal. If the meter reads up, the connection to T1 is correct.

Throw the left-hand toggle (S1a-b) to the r.f. position so that the meter reads the average r.f. carrier level. Then observe if this level changes under modulation. If the meter dips appreciably below the initial reference setting, carrier shift is taking place. This is attributable primarily to the poor line-voltage regulation and should be disregarded. If a serious shift is noted, the meter will not read accurately in the "A.F." position; in addition, it is a definite indication of trouble in the transmitter. Numerous causes are possible. The latest edition of the ARRL Handbook will supply the operator with much valuable data concerning carrier shift and its correction.

The unit can be used as an audio monitor by throwing the left-hand toggle switch to "A.F." and connecting a pair of high-impedance head-phones to the jack on the right side of the case. It will be noted that the meter will not indicate modulation with the headphone plug inserted. Hence it is not possible to monitor by eye and ear simultaneously.

Explanation of Circuit

To fulfill its function, any type of modulation indicator must compare the voltage of the average r.f. carrier to the voltage deviations from the average caused by positive or negative audio modulation. This involves a comparison of two voltage measurements. The meter consists essentially of two linear a.c. voltmeters, the first responding only to the average r.f. carrier, and the second measuring its audio-frequency component. Physically, one meter is used on both circuits by switching arrangements, since a simultaneous measurement of both values is not necessary in most cases.

Referring to the diagram, a portion of the modulated output of the radio-frequency amplifier is fed via the link circuit to the input terminal strip, C1 acting as a d.c. blocking condenser. The trimmer condenser, C3, is utilized to balance out the reactive component in the transmission line, hence increasing the r.f. voltage applied across the first crystal diode. R1 and its shunting capacity, C5, are placed in series with the crystal to

1 The amplitude and frequency in speech varies tremendously over the period of a single syllable. The average energy is considerably less than that of a sine wave, but the ratio of peak to average amplitudes is greater. According to the ARRL Radio Amateur's Handbook, the average speech waveform contains only half as much power as a sine wave, both having the same peak amplitude. Expressed in voltage, this ratio is approximately 1.4 to 1. Hence this meter incorporates two "check points": one for sine-wave testing (0.7 ma.) and another for voice operation (1.0 ma.).

(Continued on page 144)
Dishing Out the Milliwatts on 10 KMc.

Equipment Used in the First 3-Cm. Amateur Work

BY JAMES A. McREGOR,* W2RJM, EX-WILZV/2

SINCE the lifting of security regulations on most radar systems and devices, many interesting and revealing articles have been published concerning this new art. The radio amateur has been given due credit for his part in the development of this great weapon, and in addition has received official recognition of potential future contributions by the assignment of several microwave bands for amateur work. Articles have already been published describing the accomplishments of amateurs in using the newly-allocated bands at 13, 5.5 and 1.4 centimeters.

The remaining microwave band, that at 3 centimeters, provides a band of frequencies from 10,000 to 10,500 megacycles, where components such as wave-guides and reflectors are moderately-sized, and where at least one tube is available which requires only a very modest power supply and associated equipment for communication use.

The author, in conjunction with C. K. Atwater, W2JN, set up and operated, on May 5, 1946, the equipment described herein, completing what is believed to be the first contact made by amateurs on 3 centimeters. The operating frequency was about 10,300 Mc., and the distance was 2 miles. The author operated WILZV/2 from his home location, and W2JN was operated portable from an opposite hill, with the aid of a gasoline-driven generator. Since a minimum of equipment is required for operation at these frequencies, others are encouraged to experiment with similar methods. Results of the May tests indicated that, with proper selection of sites, ranges may be extended easily. Experimenters can well afford to be optimistic about possible results, as signals over the two-mile path were very strong.

Equipment Details

The gear used for the initial contact is shown in the accompanying photographs. A thirty-inch paraboloid may be seen mounted on a tripod. This dish is fed by means of a section of wave-guide, terminating in a dipole and reflector, in the manner commonly used in 3-cm. radar equipment. Details of the antenna assembly are shown in Fig. 1. Immediately behind the dish is the preamplifier unit which feeds the

*67 Elmwood Road, Verona, N. J.
1 340 N. Fullerton Ave., Upper Montclair, N. J.

• We are prone to think of microwave work as a field for scientists working in laboratories equipped with vast quantities of costly apparatus. The equipment developed during the war was in this category, it is true, but here is proof that anyone who is willing to dig around in the surplus markets and exercise a bit of that well-known know-how can come up with workable gear for exploration of the amateur band at 3 centimeters.

QST for
Fig. 1 — Details of the wave-guide feed, antenna, and parasitic element. The antenna element is positioned at the focal point of the parabolic reflector. The correct position may be determined by field-strength indication, using a crystal rectifier and a low-range milliammeter for field-strength measurement.

Fig. 2 — Schematic diagram of the 30-Mc. preamplifier.

C1, C2, C3, C4, C5, C6, C10, C11 R4, Re - 220 ohms.
R1 - 180 ohms.
C1 - 47-µfd. mica. All resistors 1 watt.
C10 - 0.001-µfd. mica.
Li, L2, L4, No. 30 enamel, close-wound on 1/8-inch form, core-tuned.
J1 - Closed-circuit jack.
J2 - Coaxial output jack.
RFC - 30 t. No. 24 enamel close-wound on 100-ohm 1-watt resistor.

Fig. 3 — Detail drawing of the 723A/B s.h.f. oscillator tube. Tube potentials are as follows:
heater - 6.3 volts, a.c. or d.c.; cathode - 0;
resonator (shell) - 300 volts d.c., positive; repeller (cap) - 20 to 300 volts d.c., negative.

This is a s.h.f. oscillator, in which the resonant circuit and means of tuning are integral with the tube. It was designed to operate in a frequency range between 8500 and 9660 Mc. It is used with a modified wafer-type octal socket, the No. 4 pin being removed and a hole drilled to allow the coaxial line to pass through. This coaxial output line is designed for direct coupling with a suitable wave-guide, its inner conductor extending beyond the outer conductor to serve as an antenna when the line is projected through the wave-guide wall. The polystyrene insulator on this "antenna" should be kept clean, to avoid power loss in a conducting film. The tube may be mounted in either a vertical or horizontal position.

Referring to Fig. 3, it may be seen that two communication receiver. In this case, a Hallicrafter S-29 portable was used. The preamplifier unit is shown in detail in the smaller photograph, and its schematic is given in Fig. 2. The portable meter which appears in the larger photograph is used to monitor the crystal current, and the power supply at the right provides the voltages for the r.f. tube, which is used as a transmitting oscillator and as a local oscillator for reception. The power supply also handles the two tubes used in the preamplifier unit. The small unit resting on the power supply is the modulator, shown in schematic form in Fig. 5. A single-button hand microphone is used.

The transmitting tube used is a war-surplus type 723A/B, also known as a 2K25. This is an s.h.f. oscillator, in which the resonant circuit and means of tuning are integral with the tube.
vertical struts are provided for tuning, one of which is already variable by means of the stud, $A$, which spreads or contracts the flexible strut on the right side, moving part $B$ nearer to or farther from the tube base and compressing or stretching the bellows, $C$. When part $B$ is moved away from the tube base, the frequency of oscillation is raised, and conversely, when part $B$ is moved toward the base the frequency is lowered.

The upper limit of frequency range, reached by rotating the tuning stud $A$ to the limit of its travel, will seldom be within the amateur 10,000-Mc. band, hence it is necessary to perform the following operation to extend the tuning range. It may be seen that part $B$ is held in a fixed position on strut $D$ on the left side of the tube, by two small nuts which, after having been tightened, have been spot-welded to each other and to part $B$. The spot weld should be filed away until each nut can be moved freely on the threaded stud. Next, the position of these nuts should be adjusted very carefully, to raise part $B$ as was done on the other side. Extreme care should be used in this operation, as excessive stretching of the bellows may break some of the seals and render the tube inoperative. It is advisable to move the lower nut only until a firm resistance is felt. The operating frequency should then be checked, and if it is still below the limit of the band another tube should be tried, as any further attempt to raise the frequency will almost certainly ruin the tube.

The oscillator may be amplitude- or frequency-modulated, the former being used in our original tests, though frequency modulation is perhaps the more advantageous system. Amplitude modulation was used, as a receiving system was already available, and
The oscillator and preamplifier are built into one small unit which is mounted directly on the wave-guide at the rear of the parabolic reflector. The 723A/B, which serves as transmitting oscillator and as local oscillator for reception, is mounted horizontally, with its output probe projecting into the wave-guide. The device at the right is a 3-cm. wavemeter.

It was also desired to experiment with a converter feeding a communications receiver. Since the tube is inherently unstable when amplitude modulation is applied, some frequency modulation takes place also. For this reason the receiver should have a broad pass-band, except when A2 emission using a tone generator having a sharp square waveform is employed. When this type of modulation is applied to the reflector element of the 723A/B, frequency modulation is held to a minimum and the signal can be copied satisfactorily on a conventional communications receiver used for the i.f. system.

When voice modulation is used the i.f. pass-band must be of the order of 3 megacycles. Since this type of i.f. system was used extensively in radar systems, it is possible in some areas to obtain a receiver, or components for same, through surplus outlets.

Receiving Systems

The receiver used as an i.f. amplifier will depend upon the type of modulation employed, and can be either a broad-band a.m.-f.m. superheterodyne or a conventional communications receiver. The S-29 portable used with the converter in our initial tests was usable only with tone-modulated telegraphy, as previously explained, but it provided a simple and effective means of getting started on 3 centimeters. For voice reception the unit shown in schematic form in Fig. 4 has been used effectively.

Examination of the small photograph of the preamplifier unit will show a short length of wave-guide, mounted on the left side, terminating in a flange coupling. This length of wave-guide has a cartridge-type crystal, 1N21 or 1N23, mounted across the short dimension, to the rear. It is placed in such a position that the incoming signal is impressed across the crystal with maximum efficiency. It will be noted that the 723A/B, mounted horizontally at the left, has its socket directly on the wave-guide, permitting the "antenna" of the tube to project into the guide through a small hole directly below the socket. This constitutes the oscillator coupling to the crystal mixer. Since the local oscillator is tuned to a frequency which is 30 megacycles above or below the signal frequency the resultant i.f., which is impressed on the grid of the first 6AC7, is 30 Mc. This signal is then amplified by the two i.f. stages, which provide a gain of about 35 db. and are about 3 Mc. wide in pass-band. The output of this preamplifier is fed to the main receiver unit by means of a length of coaxial cable.

The i.f. unit shown in Fig. 4 consists of three additional i.f. stages, employing 6AC7s, and providing an additional gain of about 60 db. These i.f. stages may be stagger-tuned to permit a bandwidth of about 3 Mc. The detector, which is a 6J5, provides a small additional gain. A conventional audio stage using a 6V6 provides sufficient gain to operate a small permanent-magnet speaker. The interstage coupling units, indicated as T1, T2, T3 and T4 in the schematic diagram, are small permeability-tuned assemblies of unknown type, which were picked up at low cost on the surplus market. There are several types of these assemblies currently available which should be suitable for this purpose, or a simple core-tuned coil which will resonate at 30 Mc. should suffice. In the alignment of such a system it would be necessary merely to apply a 30-Mc. signal to each stage, starting with the last, and peaking each adjustment for maximum output.

(Continued on page 148)

---

Fig. 5 — Circuit of the unit used for modulating the 723A/B oscillator.

---

February 1947

61
How:

This is the month when the boys dive into the rig and clean out all the bugs, in preparation for the approaching DX Contest. Antenna insulators are washed and dried with alcohol, coil connections are polished to eliminate all resistance that might eat up valuable watts, and arrangements are completed for the rest of the family to spend the important weekends with the in-laws. DX Contests used to be a lot of fun before the war, but it is difficult to prognosticate about this one. The unpredictable factor is the operating technique that has cropped up among the DX hogs. If in the Contest they continue their stupid practice of breaking up contacts with continual calling, so that the necessary numbers can’t be exchanged, the DX stations will quit in disgust and there just won’t be any Contest! Have you noticed how many DX stations are quitting in the middle of an evening’s work these days? They will get on with a CQ and after finding that they can’t complete a single QSO, they quit cold. And who can blame them?

Several fellows have passed along one suggestion for the DX stations. They recommend that these fellows allow their oscillator stages to run all the time, thus making it impossible for them to receive on their own frequencies. If they do this, they are forced to listen off their own frequencies and it should tend to keep those frequencies clear, after the DX hogs wake up to the fact that no listening is being done there. This is a wasteful use of our frequencies — it would be much better to use the procedure outlined by W1EH some months back, where you swing on to the station’s frequency after you raise him — but no one seems to have enough initiative to try any other system.

There is a lot of agitation for the listing of violators of decent operating practices in a “Pig Pen,” and there is talk of disqualifying those operators from any of the DX awards. Personally, Jeeves’ boss would hate to see something like this come to pass, because he has always had a soft spot in his heart for DX men. But to like some of them the way they handle themselves these days, the soft spot would have to be in his head!

You know those take-them-yourself personality tests that appear in the magazines from time to time? Here’s one you can take to find out what your “DX Personality” is. Just check off “yes” or “no” after each one.

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Do you call a DX station on the frequency of the station he’s working before the DX station sends “SK”?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2) Do you give the DX station a long song-and-dance when there is a long line waiting for a shot at him and he has indicated in no way that he wants to click the crockery?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3) When you spot a weak DX station do you immediately tune up on him, in the hope that no one else will find him?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4) Do you insist on repeating your mail address three times, knowing full well that “QSL via ARRL” sent once is just as good?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5) Is your signal clean enough to give other Ws a chance to work DX near you, or do you take up 10 kc. with clicks and chirps?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6) When a DX station signs with “CL,” do you continue to call him for another five minutes?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Now turn to the end of this article to obtain your rating.

What:

The boys are having themselves a time on 80 c.w., this being the season for foreign DX on that band. W1HVF worked F3MS (3510), SMSJI (3510), and PA6NG (3550), while W2QHH got ON4AU (3510), GSTK (3515), G6RB (3520), and G6ZO (3520) with only 20 watts. Best DX heard of was W0TQD working G5LI. W4HHH, W9JD and W9NGS worked a VP6AE (3620 f) who claims to be in Suva and running 100 watts. Either we lose all faith in the W6 snooper, who should have latched on to him immediately, or he is a Grade A phoney. ON4AU has worked ZL4DQ, LU7AZ, LU1EP and KP4KD on 80.
Bert Brown sends in this shot of CR9AN, the 21-watt station of Adrian Roario in Macau. The transmitter is a 6L6 with a 14-Mc. crystal, and the receiver is an all-wave h.c. job with h.f.o. added and ganged midget condensers included for bandspread. The antenna is a single-section WSJK firing 25° east of north.

Some of the 75-meter 'phone gang are taking an interest in DX, with good results. W11HI worked K6CGK, while W11IM got PA8NG and G6AG, and heard OZ6AA, HB9FR, GM2IT and others. From W1DQ we learn that G6BY is using a large terminated rhombic and has been hearing 75 'phones from WI, W2, W3, W4, W5, W6, VE1, VE2, VE3 and VO. Many have been worked 80-40 crossband after 20 'phone folds. W1DQ has worked G6BY 280 times since July 1, on 20 and 80-40 crossband.

The DX is good on 7 Mc. for those willing to dig a little. VE5MW came up with PJ9:XX (7120 T6), XE2BC (7095), HH2JB (7140), F2HF (7170), GSKW/ZCl (7120) and ZD3AF (7120), and those last two ain't bad pickings. Another guy who has been doing a job on 40 is W6LHN, who knocked off ON4AU (28,020), G6ZO (28,005), G3SU (28,025), LA90 and G5LI, and heard F3NF and SM3IK. W3GNW snagged OK1FF (28,050) with only 30 watts to a crystal oscillator.

Some good stuff showed up on 28-Mc. c.w., what with some of the 14-Mc. regulars making a few passes at the higher frequency. W9KOK worked CR9AG (28,050), LX1AX (28,170), YR5X (28,000), CN8BK (28,165), F3JY (28,165) and G16YW (28,050) to bring his total to 84 on 10, and W8CVU got UA3KBC (28,175), HB1CE (28,090), W2CDJ/J2 (28,090), CN8HM (28,150) and ZD4AB. W5ACL added a few like CR7AD (28,020), ZEJFU (28,050) and OZ7G (28,040).

The 28-Mc. 'phone boys are well represented this month, and they managed to dig out some nice tidbits. WS9KP opens the parade with W4FHX/J9 (29,025) in the Marshalls, W4BOW/W2 (28,500), VU2CQ (28,300), VU2AQ (28,225), ZD4AB (28,250), ZEJ2A (28,400) and CR7AD (28,200). W2CYS concentrated on J9AAQ (28,300), W2CDJ/J2 (28,450), YL2CA (28,380) and CP5EA (28,800), while W7DJB latched onto to Q5AR (28,200), I1SR (28,250), OZ7PH (28,130), ZBIAB (28,365), VS1BJ (28,360), LXRBC (28,240), PZ1RM (28,120), HR1MB (28,400), YN1LB (28,130), LA8M (28,250) and W6MCF/C1 (28,110). DTB's best WAC time on 10 'phone is 7 hours. W7JHB raised XX2DN (28,180), XU1RP (28,230), PK1AW (28,450), UX6GRL (28,400) and CX5AP (28,485), and W9FNR snared OQSBH (28,370), OX1B (28,460), PZ1A (28,300), ZBIE (28,460), ZB2A (28,220) and a flock of other stuff. W4BPD took a crack at the band and grabbed off VQ3HJP (28,450) and HPIA (28,400) and heard YN3BG (28,130). W6ITH scared up VPSRS (28,420), VP9F (28,150) and YN1RA (28,300).

The cream was on 20 c.w. this past month, with the smart lads scaring up those new ones that are becoming tougher every day to find. For instance, new ones at W2CYS include ZD2G (14,030), VP8AD (14,040), CR9AG (14,050), V57ES (14,040) and V59AU (14,010), while W8BPW raised VP5RS (14,000), ST2AM (14,000), HA4EA (14,110), UNIAO (14,080), GSKW/Z1 (14,080), UA6KTU (14,120) and UBSKAE (14,100), and heard ZA2D (14,080). At W3KT it was EP1AL (14,040), XZ2KM (14,080), TP3A (14,025), VK4OS (14,100) in Papua and CX4CZ (14,050), and W2MEU found ZP2AC (14,060), KP6AB (14,140), ZEB2 (14,160), PT4AE (14,190) and J3AAD (14,190). W4BRB rebuilt in time to garner VP8AB (14,110), EK1AZ (14,110), KA1UZ (14,100), WS5ER/C7 (14,100), W2JCT/C7 (14,100),
VP8AI (14,125), UA@KAU (14,120), Ox1Z (14,120), VR4AA (14,130), RAEM (14,100) and IF4A/J6 (14,100 T6). ... W2PRN squeezed in among the mob and clamped on to FG3FP (14,195), UA9CF (14,080), FA3JY (14,025), LX1AS (14,000), U1A1AT (14,095), ZBIA (14,135), VP2AD (14,140), VP9K (14,060), VP4TR (14,360) and YR5M (14,025). ... W7YY is up to an all-time of 148 with ZKIAB (14,110), VO6K (14,120), XAEG (14,085) in Trieste, LZZX (14,090), VU2XL (14,070), OX3GE (14,095), HZIA (14,075) and W6VK/16 (14,115). ... W5ACL worked VP5AA (14,040), VS9AN (14,020) and TGSJ (14,000), and heard ZP6AB (14,050) and VS1AF (14,100). ... W4BPD has been busy, with W3CRA as second op, so naturally you’d expect to find stuff like PQ37T (14,035), PK2AA (14,095), EP3D (14,195), PE4KS (14,040), VP2GW (14,080), YULX (14,085), ZS4P (14,080) in Basutoland, UQ2AB (14,140), VS9AR (14,105) and J4AAC (14,080) already in the log, and FM5AC (14,080), XACP (14,100) in Sardinia, FO8ZW (14,105), VP6PM (14,065), LA4LA in Spitzbergen, and KV4AD (14,095) all spotted! ... W2TXB added VO5JTW (14,165 T8), Ox1BC (14,070), NY4CM (14,150), CN8BI (14,060) and ZE1JI (14,060). ... A few reports on 20 ‘phone indicate that there is plenty of the stuff there. Here’s W1GKK with KAI1C8 (14,165), XZZA2 (14,325), ZBI0D (14,345), F8FSP (14,350), J5AAA (14,190), CSYR (14,310), ZB2A (14,335), W6ONP/KW6 (14,230), CN8MA (14,325), EKIND (14,325) and VP5AL (14,200), while W2CHK got CT7A (14,370), VP2MY (14,390) and 7ZUVW (14,300). ... W2MPA has his usual list, this month’s including EL5B (14,330), EL4A (14,340), PZ1W (14,510), KAI1AW (14,180), VQ2PL (14,190), ZB1L (14,120), ZE1JX (14,160) and a flock of Zs.

Here are a few CMs you have probably worked. The two fellows in front, from left to right, are CM2BT and CO2BZ, and those standing are CM2SW, CO2JK, CO2DM and CM2CT.

Where:
If you have had any doubts about HZ1AB you can forget them. The station is in Saudi Arabia and is run by W4JMQ and (prewar) W3JEG. The lads run 300 watts to a pair of S13s and use a 40-foot vertical cage antenna. The receiver is a Super-Pro or SX-28. Cards, of which they have ordered a thousand, will be along shortly, via ARRL. You can get your QSL for prewar contacts with KF6JEG/KG6 or K6JEG/KF6 by writing to Henry K. Lee, KH6DE, 12 Kaulua Street, Honolulu 52, T. H. He regrets that circumstances made it impossible to QSL all his prewar contacts before this time, but it’s mighty nice of the guy to come through after all this, and you might tell him so when you write.

... You can QSL SU1US by sending your card to Saul Fingerman, W2PMX, 1165 Simpson Street, New York City. Yes, he’s the one who confused some with his “QTH-Fingers” routine. W2ITT hands out QSLs for D5FF via HB9AG, which indicates that he’s on a ship. ... W2GUR says send QSLs for D5FF via HB9AG, which indicates that the D is under cover. It may go rough on him when he gets caught. ... W6VFR drops the tip that VK4NV is in Port Moresby, Papua, and more active than VK4OS. ... W3YA clicked with a country we’ve all heard about but never worked. He raised S2DU on 3655 who, when asked what country he was in, replied “QRM” and signed! You’re new here, aren’t you? ... The op at VP2MM is requesting QSL via ARRL, but so far we haven’t heard a thing from him. He’s supposed to be a ship of Panama registry, you know. ... A few addresses sent in by the gentry — From OKI/WY: TINS (14,100), 6/o Signal Officer RAF, Castel Benito, MEF1, Tripoli, Libya. From W3EV: L41XX, via HB9CE. F8FSP, via W2LFI. From W3ALB: ST2AM, RAF Station, Kartoum, Egyptian Sudan. VQ6HOS, via G2HOS, 46 Salisbury Road, Birmingham, England. From W6QFW: VP8AI, Alan Betts, Pobble Island, Falkland Islands. HASX, Box 185, Budapest, Hungary. From W4XG: W3LGG/WP2 (14,020), Bruce Williams, 155th AACS Det., Antigua, APO 855, e/o P. M., Miami, Fla. ... The op at EP1AL may be “Kilroy” as he says he is, but he also claims to be a second cousin of Jeeves, and that’s open to question. [Obviously a falsehood. I don’t have a first cousin yet. — Jeeves]

When:
Now that QST told how to build a “Time Slide Rule” last month, we may be able to keep these times straight. But if you want to insure that nothing is lost in the translation to GCT, you had better do it yourself before you send it in to this department. We have already been accused of...
dragging scarlet herrings across the path by fouling up the times.

From W4KIT in South Carolina, on 20 c.w.: ST2AM (0545), VQ8AB (0245), PK2AA (2300), OQ5BT (2000), XAEG (1930), ZC6AA (14,126 at 1030), W6VKV/16 (2245), VQ2HC (0500) and FA1KF (1945) ....... From WJ4NG in Minnesota, on 20 c.w.: LA4LA (0945), UA3AM (0045), CKXIDZ (1300), ZS1AN (1745) and VPIHQ (0945) ...... From W7EYS in Washington, on 10 c.w.: VKs at 2330, South America at 0000, South Africa at 1630, Europe at 1730 ...... From W6LZWO in Texas, on 20 c.w.: VKs at 1500, VP8AD (0500), QNSMZ (1600), ZIz at 0500 and W6VKV/16 (1815) ...... At W6LDJ in Santa Ana, on 20 c.w.: ZK1AA (0130), EL3A (2230), ZB1AD (1615), ST2AM (1530) and ZD4AB (1830) ...... Up in Massachusetts, at W7EHT on 20 c.w.: VQ5HJP (0400), VK8AB (0400), V89AU (1730), VQ2HC (0500), KL7AD (2150), UQ2AB (1045), EK1AZ (0000), KV4AD (1330) and W8URU/C7 (0045).

Who:

W6SAI, who is probably not a bad guy at all but who rubs it in by sending along a photostat of his QSL from AC4YN, says W8KPB's November QST story about radio conditions near Los Angeles had only one thing wrong with it - it de-emphasized the situation. Bill says it is much worse than that! ...... That OY3IGO mentioned last month has been heard by several Ws, including W1JLT, but so far no reports of QSOs. It isn't surprising, since W1DYV got a letter from the Faeroes station saying that his receiver won't separate the signals. Wait until he hears them during the Contest! ...... The story from VR2AB is that VR2AA is on 10, 20 and 40 c.w. and that VR2B AB, AC, AD, AF, AG and UH are on 10 ...... W7QAP in Arizona got off 6 meters when he got the urge to pound brass on 10, and is a good contact for anyone trying to fill on a WAS. Latest DX there includes F8EO, GI5TK, ON4BCK, CR9AG, HB0AC, GM6UC and ZS6IH ...... GI6TK (14,050) is looking for Arizona, Nevada and Utah between 1700 and 1900 GCT, according to W7EHT ...... W4EWW proves that Southerners just take things as easy as possible. One day on 10 'phone he made seven calls and worked six stations - one in each continent! The stations were LX1AY, Z6S5, LU4AP, W6VRF/KG6 and J9AGT. (Yes, we counted only five there, too. He probably doesn't want to mention North America!) ...... Speaking of unique WACs, G5KW/Y1 worked it on 25 Mc, from a moving train! He installed a dipole atop a car and operated in motion, according to G6DH ...... Miles Weeks, who used to be W1WV and had worked more G stations than any other W, not to mention plenty of nice DX, is now matching wits with the W6s under the call W6ZZ. He threatens to repeat his G treatment on the Js and XUs ...... W6CLY, capping at W9ANA, was impressed when he had a solid contact with G4KY on 10 'phone, because the G runs 15 ma. at 200 volts to a 6J5 in the final! Shucks, that's overloading the tube ...... We misspelled the name of HR1MB - it should be Marion Brashear - and received a very nice letter for our trouble. Seems as how Marion is a guy who really gets around, having held nu7AHJ, W7IB, K5AA (1931-34), W6LBE, K5AN (1937-39), W9DEH and now W4JKE. The present rig ends up with an HF-100 running 150 watts, and a three-element beam is used, supported by a mast made from salvaged packing crates in which the household furniture had been shipped ...... KL7AD sends a list of stations worked that must be a mile long, at least. But Dick is unhappy about the 32 cards he received in return for 387 sent, and promises that in the future he will send cards only after receiving the other guy's, which seems like the right way to do it. KL7AD is one of our pet stations, because he occasionally takes time out to lace the DX hogs who break up his QSOs. And his laccings are no amateur jobs! There should be more DX stations like him.

DX Personality Scoring:

If you have honestly checked off the test at the start of this column, add the numbers for every square you checked "Yes." If your total is 1, you're an optimistic stupe. If your total is 3, you're a selfish lid. If your score is 4, you're an optimistic, stupid, selfish lid. If your score is 5 or over, brother, you're a DX hog! If your score is zero, you're one of the clean operators who rates 100% with the rest of the gang. — W1DX

Most consistent VS7 this past year has been YS7ES, Emil Savundranayagam, Have-lock Town, Colombo, Ceylon. He runs a kilowatt to a pair of 813s. The receiver is a National 120.
"I Just Put Up Another Antenna"

Or, "I'm Up a Tree as to Why You're Not Hearing Me"

BY BILL LIPPMAN,* W6SN

M y wife once paid me the dubious compliment of opining that I was the only ham she had ever met who appeared to be a reasonably normal human being. There was another ham, a friend of mine, who was to receive that accolade later, but he had been off the air for seven years and was really disqualified.

That situation is about to change . . . for the worse. In fact, my wife says it already has. I have a wild look in my eye, she declares, and I sit up suddenly in the middle of the night and converse at length with spindly little men who seem to be made mostly of No. 12 hard-drawn copper, and whose heads are egg insulators. Last evening when I came into the house I spoke loudly to our small black cat, who was sitting on the porch. "Lo, Tops," I said. But it wasn't Topsy . . . it was a pair of rubber boots. You see what I mean?

I was ever a "one-antenna" man. Back in the early twenties I had only one antenna. It worked fine for spark and for c.w. (all we had to do was find the nodal point). Sometimes, even after we found the node, it wasn't in just the right place, and then we would do things with the counterpoise. This was easy because the counterpoise was chin-high—in fact, where it sagged it caught you just under the armpits.

After I started supplying my own back yards, I got along nicely on fifty-foot lots. I remember that every time I read an article on antennas that started, "For those city dwellers who must get the most out of a restricted space . . . ." I immediately pulled the print closer to my already weak eyes and read on avidly. I was a suffering city dweller. People like W6GRL on the swamps of Ventura, W3EMM, who seems to own part of the south bank of the James, and HC1FG, who in my mind's eye occupies the top of a 12,000-foot peak with all of Columbia for his directions, were dwellers in another world. So all I ever had was one antenna at a time, and being naturally lazy, I seldom changed that. I got out well enough, too (I know now).

During the war I had a chance to buy what I had always yearned for—what had always seemed the unobtainable—a quiet suburban home, surrounded by an acre and a half of luscious space. This, I counseled myself, is it! Here I will live out my reclining (or maybe I said declining) years in peace and contentment, surrounded by my family and my QSL cards. I will become, easily, the first guy to work 371 countries, and they will rule me out of future DX Contests so that W6QD, W1SZ, W2UK and the others won't bleat into their beer crying "professional" in pitiful tones. I bought it.

To what I hoped would be our final resting place, I brought along the pair of thirty-five-foot poles (badly travel-worn from being dragged all over Southern California for ten years), creeping along the side streets at 4 A.M. with red lanterns hanging at what seemed sixty feet ahead and behind. Into the weeds they went, and in that plethora of space they looked like the lumber shortage had even affected toothpicks. They had always been high enough before. But not now. You see how your sense of proportion is affected? So I bought some 2X4s and stretched the masts out to sixty-five feet, which seemed more in keeping with the surroundings. After all, there were trees fifty feet high on one side of the grounds!

After searching five months for No. 12 galvanized, I found miles of it in a hardware store six blocks away (where it had been all the time), and strung my eggs. On a dark wind-free night, assisted by a battery of flashlights and extensions, my brave, uncomplaining wife and I hoisted the first mast into the wild black yonder. Next day we found one guy had been tied to the leg of a sleeping pullet, but the pole was up—and stayed up. In the full sunshine, and with confidence, we started operations on the other one. Knowing what we were doing was our downfall. Part way up a guy slipped, the prop pole broke, and the upper twenty-five feet of the mast snapped off and fell all over my wife. Three weeks later we resumed operations, compromising on putting up only the remaining forty feet.

Now I had two masts, but being of different

*525 South Westgate Ave., Brentwood Heights, Los Angeles, Calif.
height they upset all my carefully-planned arrays.
However, I was firmly resolved to go ahead in the
face of all difficulties. But let me go back a bit.
While the weeds were concealing the bare poles
(assuming guy wires), I had strung up among the
trees a half-wave wire so I could while away the
hours on 80 meters. This little gem was slightly
under twenty feet off the ground at the ends, and
fifteen at the middle. When the trees nodded to
each other in the wind, my little boy and his
friends played a sort of skip-ropes with it.

Did this fence-wire work, you ask? Brother,
ask W4FU of W9FS fame. All through June and
July, bad low-frequency months, Bert and I
worked nightly. When the California Kilowatts
were struggling with W5 and W7, I was working
the East Coast like crazy. According to The Book
this is all wrong. Besides, it was only a temporary
wire, so why should I keep it? Now the masts
were up, no more of this freak stuff. We're up,
UP and AWAY-Y-Y.

Not right away, though. No copper wire. I
searched around and found enough scraps (some
saw duty in 1921) to piece together a little half-
wave vertical for 14 Mc., just to keep the fila-
ments from getting brittle. While stumbling from
store to store in search of steel-core stuff, I found
the little half-wave doing yeoman duty. New
countries dotted my log sheets. Fellows said,
"My, my — you were never this loud before the
war — even with twice the power, too!" I thought,
boy — if a little temporary thing will do this well,
what is to be expected from all the directionals
I'm planning? Drooling, that's what I was
doing — drooling. But wait.

The Book says, solemnly, "The greatest gain to
be obtained from close-spaced elements is that to
be had from the W8JK, etc., etc." And here fol-
loows a rising curve of beautiful decibels. Well, I
am no hog, so I choose 6 decibels as a nice round
figure, and with some newly-acquired wire I
build me a two-section dandy. This is a week's
work, but when finished it is a heavenly thing to
behold, of shiny wire with pole-vault type
spreaders, taped between joints and the varnish
gleaming in the sun. Lifting it out of the weeds
dredged up a pair of wire cutters lost weeks be-
fore, and took the top off the brooder house, but
you could see it five blocks away. Beautiful.

Feeding this behemoth was something else; something akin to prescribing nutrient for the
finicky chinchilla. My dreams had involved
nonresonant lines running into the shack from
all over, from which I could select the desired
one by nonchalantly pushing a small button.
Ha! Little did I know — I, who had never pro-
gressed beyond the single-wire-feeder-clipped-to-
the-tank stage. I'll bet I ran that light bulb and
wire up and down the quarter-wave matching
section (it must have matched the power wires in
the next yard) two hundred times — the feeder
wires got so thin they were like a spider web. In

order to get it "shock-excited" I had to put
400 watts into a wire hung just off the ground.
My ankles still bear r.f. scars. Spot looked like a
zebra by the time I got him locked up.

Finally I decided the light was brighter —
maybe less dim — in one place than any other,
and proceeded to learn that that had been a
breeze compared to hooking on the feed line. After
half a day of moving the feeders up and down,
up and down, and "adjusting" the stub, there
were still standing waves. There were even a
number sitting, and a few actually lying down.
Tired, I supposed, from running up and down
that hot wire. I dunno — these editors make it
all sound so-o-o-o easy. You just do this, and
you do that, and it happens. Well, it never seems
to happen for me.

I hooked on the rig. Something is going on, all
right, as I can draw big arcs off the feeders and
the flat top, and the final is groaning with pent-
up power. I take off. Does Europe come back?
No! Does the ground wave ripple the harbor
at Sydney? No! I'm still under three layers of
QRM.

By getting up at an hour when even W6GAL
is in bed, I eke out a QSO with an SM, who is S9
at my place. We try the SJK against the vertical.
Both the same — weak. With shrewed cunning I
snag a VK who is trying to QSO his grandmother
in the old country. We go through the same
thing. He is also S9 with me. I am weak on both
antennas. The SJK is wonderful for receiving.
"But what good is a contraption that throws
shade all over the rose garden and is only good
for receiving?" my wife asks.

About this time, despondent, I think I shall
try a Lazy H. Everybody says they are the nuts,
and I notice some people have three of them.
W6CUH used to work WAG in 39 minutes with a
Lazy H no bigger than the palm of your hand.
But my masts aren't the same height. The Book
doesn't say anything about a semianergetic H2
only lazy ones. Mine would be up on one elbow,
leering insolently around the neighborhood. It is
not for me. My signals would not arrive round and
full-bodied. They would be square.
Frank Lucas, who is now W3CRA, blocks my receiver with his Sterba. I work up the subject of antennas carefully, plying his ego in the hope that I might find out how he managed to lead the International League for so many years.

"Long wires," says Frank with his Sterbas, "are my favorite. Put up a long wire and you will have no further trouble." He doesn't know what can happen to me. "You know how to tune 'em?" he asks. "Just prune the end until it stops affecting your tank tuning." Just prune the end, he says.

Being gullible, I fight my way through eucalyptus trees and brush, and hang up five half-waves of wire. The far end is across what we call a dry gulch in California. The wire was tied to a tree limb. You remember Jimmy Durante's story about the woman that got on the streetcar? Well, twenty-one times I walked out the door, down the steps, across the grass, through the rosebushes, between the oleanders, over the weeds, down into the gulch, up the other side, over the weeds, between the oleanders, through the rosebushes, across the grass, up the steps, in the door, press the key and look at the meter. Twenty-one times! "Just prune the end," he says.

And did the long wire work? You guessed it. It wasn't any better than the vertical.

"Ho," says W2CYS, "you should use a folded dipole." Why should I use a folded dipole? I've no reason to fold anything. Besides, folded dipoles always sounded to me like something from the infants department.

"Vertical half waves," sonorously intones my friend and former neighbor, W6ENV, "have only one outstanding advantage over other types. They are equally weak in all directions."

"But," buts Juan Lobo y Lobo, "I have always had much success with my vertical half wave." And who am I to argue with XE1A, the Pride of Pan-America, who carries off the honors in every contest?

By this time I am up to Chapter Ten, "V Antennas." I have also obtained several hundred yards of new wire by exchanging a second mortgage on my home. I start on the "V." The first leg is easy, but the second (or left) leg has to cross that danged gulch. This time I make the mistake of going up the tree 45 feet with the wire hooked to my belt and pulling my pants off every time I reach for a limb, without having a permanent helper on the ground. When I started up my seven-year-old was on tap, but when I reached the top, panting and bruised, he had departed to wherever it is that junior ops go when they are needed by their OM.

Trying to pull the wire tight, I hooked it into a branch across the gulch and it refused to let go. Spying an old man working some distance away, I hailed him. He must have thought me Death In a Tree, for he gingerly skirted the area for five minutes before deciding I was human and in distress. Would he throw a rope over the wire and pull it to one side for me? Yes, he would. He then proceeded to tie a tremendous rock to the rope, which somewhat hampered his efforts to get it over the wire. To further complicate matters, he stood on the rope during the first two tries, which resulted in the rock stopping short about 3 feet above his head and coming back down as fast as it went up. This brought forth some of the nimblest footwork I ever saw, Nijinsky and Astaire notwithstanding. Soon, however, he looped the wire and we got it straightened out. While sitting this performance out I carved my initials in the trunk at the fifty-foot level, but I was an old, old man when I reached the ground, and I'll never see those initials again in this life.

When I finished "matching" the stub it was 9 P.M. and no dinner. But what of it? I had a "V" beam! What is food and drink beside that? I sat down and listened, and lo, there was W5KGI/O7 in Peiping, China — right smack in the middle of my largest decibels. Back he came with an S7. "Wait," I said, "want to make an adjustment." I slipped off the "V" feeders and clipped the trusty old vertical onto the tank. "Do you notice any difference?" I asked him. "Oh, not much," comes back Glen, "maybe a point louder now. What did you do — raise the power?"
NEGATIVE result is often important, and for this reason we should not feel that our inability to get across the Atlantic on 50 Mc. during the month of December makes the time spent in that endeavor wasted. There were quite a few in there trying; those who were caught napping on November 24th, when the first trans-Atlantic v.h.f. communication was carried on, were on the job for the recurrence of high m.u.f. on the 27-day cycle in the days just before Christmas, but no F2 DX was found in anyone's stocking. The m.u.f. rose on schedule, but not quite high enough to permit 50-Mc. DX work to Europe.

There was cooperation at the other end of the path, too. By special permission from his government, PAO1UN, Eindhoven, Holland, was ready with 100 watts on the band's edge, a 4-element beam, and a converter which tuned the range from 30 to 60 Mc. In Capetown, South Africa, ZS1T was conducting regular 50-Mc. listening tests with W6PFJ. Down in Mexico City, XEIKE was running 125 watts to an 829 on 50.024 kc., feeding a 4-element array. CE3FV on 56.4 Mc. temporarily, was keeping skeds with W7QAP. As they have for months, G6DH and G5BY were monitoring the 50-Mc. band regularly, and G6DH and your conductor continued daily skeds on 28 Mc., exchanging information as to the m.u.f. on the North Atlantic path, as observed by noting the strength and time of appearance of various signals in the range between 40 and 50 Mc. at each end.

These daily checks, which have gone on uninterrupted since early November, showed that the m.u.f. came close to 50 Mc. for two days following the 50-Mc. break-through on November 24th, but then dropped off steadily, falling to about 38 Mc. in early December. By the 10th, however, WGTR (f.m. station at Paxton, Mass., on 44.3 Mc.) was being heard again at G6DH, and the English television station (sound channel on 41.5 Mc., video on 45.0 Mc.) was putting in an appearance at W1HDQ. These two signals were heard daily until Dec. 25th, often with a strength which gave the waiting 6-meter enthusiasts some optimism that this would be the day, despite the information from the Bureau of Standards that the m.u.f. for the path would be about 40 Mc. for December. The CRPL predic-

---

**February 1947**

---

**RECORDS**

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Station A</th>
<th>Station B</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 Mc.</td>
<td>W6NAW</td>
<td>W8CIR/1</td>
</tr>
<tr>
<td>2590 Miles</td>
<td>July 5, 1946</td>
<td></td>
</tr>
<tr>
<td>144 Mc.</td>
<td>W3HWN</td>
<td>W1MNF</td>
</tr>
<tr>
<td>390 Miles</td>
<td>September 29, 1946</td>
<td></td>
</tr>
<tr>
<td>235 Mc.</td>
<td>W9OAQ/6</td>
<td>W6WNQ/6</td>
</tr>
<tr>
<td>110 Miles</td>
<td>December 15, 1946</td>
<td></td>
</tr>
<tr>
<td>420 Mc.</td>
<td>W6FZP/6</td>
<td>W6UID/6</td>
</tr>
<tr>
<td>170 Miles</td>
<td>September 29, 1946</td>
<td></td>
</tr>
<tr>
<td>2300 Mc.</td>
<td>W1JSJ/1</td>
<td>W11LS/1</td>
</tr>
<tr>
<td>1.6 Miles</td>
<td>June 23, 1946</td>
<td></td>
</tr>
<tr>
<td>5250 Mc.</td>
<td>W2LGF/2</td>
<td>W7FOF/2</td>
</tr>
<tr>
<td>31 Miles</td>
<td>December 2, 1945</td>
<td></td>
</tr>
<tr>
<td>10,000 Mc.</td>
<td>W4HPJ/3</td>
<td>W6IFE/3</td>
</tr>
<tr>
<td>7.65 Miles</td>
<td>July 11, 1946</td>
<td></td>
</tr>
<tr>
<td>21,000 Mc.</td>
<td>W1NYL/2</td>
<td>W9SAD/2</td>
</tr>
<tr>
<td>800 Feet</td>
<td>May 18, 1946</td>
<td></td>
</tr>
</tbody>
</table>

---

*V.H.F. Editor, QST.
his mobile rig, when he was listening for another local on the evening of Nov. 31st. VE3PK later reported hearing 4ZU at the same time, and the following evening he was heard by 3MJ and 3LS, all of whom could hardly believe their ears at first, the distance being about 1000 miles from Melbourne (VK3s) to Brisbane (VK4ZU). On the same two evenings, VK2NO heard the fourth harmonic of a VK3 in the old 5-meter band, and VK2OC and VK2WJ heard VK3HK. The VK2s, in the vicinity of Melbourne and Brisbane, so these reports represent a skip of only about 450 miles or so.

The first two-way interstate work was done on December 5th, when VK2NO worked VK3MJ, Melbourne, 450 miles, and VK4AW, Brisbane, 500 miles, was worked on the 7th, these being the first contacts with the third and fourth call areas made from VK2 on 50 Mc. Other Sydney-area stations in on the fun were 2WJ, 2AZ, and 2AHF, and they contacted 3MJ, 3HI, 3NW, 3GG, and 3YS, all in the vicinity of Melbourne. This activity took place between 6 and 9 P.M., and, reminiscent of many similar sessions in this country, the period was marked by a violent thunderstorm. On the 7th the band began to show signs of life at about 4:15 P.M., when the VK3s worked 4A W, 4ZU and 4FB, all of Brisbane, and the VK2s worked 100 Mc.

This burst of sporadic-E skip, having caused greater interest in the possibilities of the 50-Mc. band, should do much to further the cause of VK-W attempts. There will be many more stations watching the band down there now, and they have more incentive to go to work on receivers and antennas. The coming year should see increased activity on the band, should do much to further the cause of VHF mania, who happened to visit the VK2s. There will be many more stations watching the band down there now, and they have more incentive to go to work on receivers and antennas.

As usual, the VK2s worked 500 miles, was worked on the 7th, these being the first contacts with the third and fourth call areas made from VK2 on 50 Mc. Other Sydney-area stations in on the fun were 2WJ, 2AZ, and 2AHF, and they contacted 3MJ, 3HI, 3NW, 3GG, and 3YS, all in the vicinity of Melbourne. This activity took place between 6 and 9 P.M., and, reminiscent of many similar sessions in this country, the period was marked by a violent thunderstorm. On the 7th the band began to show signs of life at about 4:15 P.M., when the VK3s worked 4A W, 4ZU and 4FB, all of Brisbane, and the VK2s worked 100 Mc.

This burst of sporadic-E skip, having caused greater interest in the possibilities of the 50-Mc. band, should do much to further the cause of VK-W attempts. There will be many more stations watching the band down there now, and they have more incentive to go to work on receivers and antennas.

The coming year should see increased activity on the band, should do much to further the cause of VK-W attempts. There will be many more stations watching the band down there now, and they have more incentive to go to work on receivers and antennas.

This burst of sporadic-E skip, having caused greater interest in the possibilities of the 50-Mc. band, should do much to further the cause of VK-W attempts. There will be many more stations watching the band down there now, and they have more incentive to go to work on receivers and antennas. The coming year should see increased activity on the band, should do much to further the cause of VK-W attempts. There will be many more stations watching the band down there now, and they have more incentive to go to work on receivers and antennas.

We should continue our efforts to contact Australia and New Zealand stations on the hour, at 2100, 2200, 2300 and 0000 GCT. VK2NO has an automatic transmitter in operation during this opening. All VK-W attempts. There will be many more stations watching the band down there now, and they have more incentive to go to work on receivers and antennas.

The coming year should see increased activity on the band, should do much to further the cause of VK-W attempts. There will be many more stations watching the band down there now, and they have more incentive to go to work on receivers and antennas. The coming year should see increased activity on the band, should do much to further the cause of VK-W attempts. There will be many more stations watching the band down there now, and they have more incentive to go to work on receivers and antennas.

As usual, the VK2s worked 500 miles, was worked on the 7th, these being the first contacts with the third and fourth call areas made from VK2 on 50 Mc. Other Sydney-area stations in on the fun were 2WJ, 2AZ, and 2AHF, and they contacted 3MJ, 3HI, 3NW, 3GG, and 3YS, all in the vicinity of Melbourne. This activity took place between 6 and 9 P.M., and, reminiscent of many similar sessions in this country, the period was marked by a violent thunderstorm. On the 7th the band began to show signs of life at about 4:15 P.M., when the VK3s worked 4A W, 4ZU and 4FB, all of Brisbane, and the VK2s worked 100 Mc.

This burst of sporadic-E skip, having caused greater interest in the possibilities of the 50-Mc. band, should do much to further the cause of VK-W attempts. There will be many more stations watching the band down there now, and they have more incentive to go to work on receivers and antennas.

The coming year should see increased activity on the band, should do much to further the cause of VK-W attempts. There will be many more stations watching the band down there now, and they have more incentive to go to work on receivers and antennas. The coming year should see increased activity on the band, should do much to further the cause of VK-W attempts. There will be many more stations watching the band down there now, and they have more incentive to go to work on receivers and antennas.

We should continue our efforts to contact Australia and New Zealand stations on the hour, at 2100, 2200, 2300 and 0000 GCT. VK2NO has an automatic transmitter in operation during this opening. All VK-W attempts. There will be many more stations watching the band down there now, and they have more incentive to go to work on receivers and antennas.

The coming year should see increased activity on the band, should do much to further the cause of VK-W attempts. There will be many more stations watching the band down there now, and they have more incentive to go to work on receivers and antennas. The coming year should see increased activity on the band, should do much to further the cause of VK-W attempts. There will be many more stations watching the band down there now, and they have more incentive to go to work on receivers and antennas.

As usual, the VK2s worked 500 miles, was worked on the 7th, these being the first contacts with the third and fourth call areas made from VK2 on 50 Mc. Other Sydney-area stations in on the fun were 2WJ, 2AZ, and 2AHF, and they contacted 3MJ, 3HI, 3NW, 3GG, and 3YS, all in the vicinity of Melbourne. This activity took place between 6 and 9 P.M., and, reminiscent of many similar sessions in this country, the period was marked by a violent thunderstorm. On the 7th the band began to show signs of life at about 4:15 P.M., when the VK3s worked 4A W, 4ZU and 4FB, all of Brisbane, and the VK2s worked 100 Mc.

This burst of sporadic-E skip, having caused greater interest in the possibilities of the 50-Mc. band, should do much to further the cause of VK-W attempts. There will be many more stations watching the band down there now, and they have more incentive to go to work on receivers and antennas. The coming year should see increased activity on the band, should do much to further the cause of VK-W attempts. There will be many more stations watching the band down there now, and they have more incentive to go to work on receivers and antennas.

As usual, the VK2s worked 500 miles, was worked on the 7th, these being the first contacts with the third and fourth call areas made from VK2 on 50 Mc. Other Sydney-area stations in on the fun were 2WJ, 2AZ, and 2AHF, and they contacted 3MJ, 3HI, 3NW, 3GG, and 3YS, all in the vicinity of Melbourne. This activity took place between 6 and 9 P.M., and, reminiscent of many similar sessions in this country, the period was marked by a violent thunderstorm. On the 7th the band began to show signs of life at about 4:15 P.M., when the VK3s worked 4A W, 4ZU and 4FB, all of Brisbane, and the VK2s worked 100 Mc.

This burst of sporadic-E skip, having caused greater interest in the possibilities of the 50-Mc. band, should do much to further the cause of VK-W attempts. There will be many more stations watching the band down there now, and they have more incentive to go to work on receivers and antennas. The coming year should see increased activity on the band, should do much to further the cause of VK-W attempts. There will be many more stations watching the band down there now, and they have more incentive to go to work on receivers and antennas.

The coming year should see increased activity on the band, should do much to further the cause of VK-W attempts. There will be many more stations watching the band down there now, and they have more incentive to go to work on receivers and antennas. The coming year should see increased activity on the band, should do much to further the cause of VK-W attempts. There will be many more stations watching the band down there now, and they have more incentive to go to work on receivers and antennas.

As usual, the VK2s worked 500 miles, was worked on the 7th, these being the first contacts with the third and fourth call areas made from VK2 on 50 Mc. Other Sydney-area stations in on the fun were 2WJ, 2AZ, and 2AHF, and they contacted 3MJ, 3HI, 3NW, 3GG, and 3YS, all in the vicinity of Melbourne. This activity took place between 6 and 9 P.M., and, reminiscent of many similar sessions in this country, the period was marked by a violent thunderstorm. On the 7th the band began to show signs of life at about 4:15 P.M., when the VK3s worked 4A W, 4ZU and 4FB, all of Brisbane, and the VK2s worked 100 Mc.

This burst of sporadic-E skip, having caused greater interest in the possibilities of the 50-Mc. band, should do much to further the cause of VK-W attempts. There will be many more stations watching the band down there now, and they have more incentive to go to work on receivers and antennas. The coming year should see increased activity on the band, should do much to further the cause of VK-W attempts. There will be many more stations watching the band down there now, and they have more incentive to go to work on receivers and antennas.

As usual, the VK2s worked 500 miles, was worked on the 7th, these being the first contacts with the third and fourth call areas made from VK2 on 50 Mc. Other Sydney-area stations in on the fun were 2WJ, 2AZ, and 2AHF, and they contacted 3MJ, 3HI, 3NW, 3GG, and 3YS, all in the vicinity of Melbourne. This activity took place between 6 and 9 P.M., and, reminiscent of many similar sessions in this country, the period was marked by a violent thunderstorm. On the 7th the band began to show signs of life at about 4:15 P.M., when the VK3s worked 4A W, 4ZU and 4FB, all of Brisbane, and the VK2s worked 100 Mc.
were made by W11LL, who heard a three-way local QSO going on in Cincinnati, Ohio. Brownie broke it up, and had made contacts with W8s NDN, ODF, and BFB before the rest of us got started. He also worked W8CYE, Miamisburg. Other Wls in this affair included W1PFD, W5CIR/1, and your conductor.

**Here and There on Six**

The term "DX" has always had a special meaning for v.h.f. men, who apply it to anything not worked during the normal course of events. Thus, DX can mean W8, W9, or W4 to a W1 or W2, and it is enough to get worked up over too, under certain circumstances peculiar to v.h.f. operation. Now, however, DX is about to mean the same thing to 50-Mc. workers that it does to low-frequency men — remote countries, seldom-heard prefixes, and even WAC. More and more, we're hearing of some really choice DX now (or soon to be) available on 50 Mc. Some of it we can't give you all the details of, because the printing of everything we know might cause some fellows a bit of trouble, but here are a few legitimate samples: Y12CA, heard in this country daily on 28 Mc., is rigging up an automatic transmitter, and will arrange tests with interested operators who can transmit to him on 28 Mc. He will try to make it two-way as soon as he can get receiving facilities, but should have the transmitter, and a beam antenna to go with it, ready to work on 50 Mc. by the time this appears in print. VQ3TOM, Tanganyika, is angling for a receiver to cover both 50 and 58 Mc., and will be glad to talk v.h.f. with interested parties on 10. We have already mentioned PA6UN, who is the best prospect yet for trans-Atlantic work, being all set as to rig, receiver, and antenna system for work on 50 Mc. His authorization is a temporary one, but with the cooperation of the licensing authority who very kindly issued this special license, he hopes to carry on tests through the spring peak period.

The period between Dec. 19th and 22nd looked good to W6OVK, Redwood City, Cal., who had a chance to check the band these days between 8 a.m. and 12 noon. Several weak fading signals were heard near the low edge of the 50-Mc. band, but none long enough to be identified. Jim says that more stations are showing up on 6 in the Bay area. W6NJJ has started a movement by which everyone gets on the band each Wednesday evening at 7:30.

Good news from Arizona — W7QLZ, first in the long line of Arizona DXperts, is back on the scene. Clyde has a portable rig with an 832 in the final, which is installed in his car, along with a 5-10 receiver. This rig can be used on 10, 6, or 2 meters, and will be available for fixed station use at Castle Hot Springs. Clyde is also scouting a site. Signals were heard almost to 50 Mc. at peak periods in October and November.

**More 50-Mc. Frequencies**

<table>
<thead>
<tr>
<th>Callsign</th>
<th>Frequency (Mc)</th>
</tr>
</thead>
<tbody>
<tr>
<td>W1BDN</td>
<td>50.48</td>
</tr>
<tr>
<td>W1MZ</td>
<td>50.6</td>
</tr>
<tr>
<td>W1OFY</td>
<td>50.6</td>
</tr>
<tr>
<td>W1PET</td>
<td>50.18</td>
</tr>
<tr>
<td>W2OMM</td>
<td>50.1</td>
</tr>
<tr>
<td>W7ACD</td>
<td>50.03</td>
</tr>
<tr>
<td>W8ODF</td>
<td>50.6</td>
</tr>
<tr>
<td>W9AKF</td>
<td>50.44</td>
</tr>
<tr>
<td>W9GTH</td>
<td>50.48</td>
</tr>
<tr>
<td>PA6UN</td>
<td>50.00</td>
</tr>
<tr>
<td>XE1KE</td>
<td>50.02</td>
</tr>
</tbody>
</table>

There is a prospect of activity in Utah, never before represented on 50 or 56 Mc., and in Idaho, if the plans of W7DTB, Lewiston, Utah, and W7ACD, Shelley, Idaho, materialize. Both have receivers for 50 Mc., and are working on rigs and antenna systems. They have W7EHP, Rigby, Idaho, W7DMZ, American Falls, Idaho, W7MAV, Logan, Utah, and W7JHH, Ogden, Utah, lined up, and are looking for converts in Salt Lake City and Provo. Since this area is just about the right distance for skip contacts to the Pacific Northwest, the California Coast, and the entire Middle West, these boys should not lack contacts when the major sporadic-E season rolls around next spring.

There is an active group centered around Pittsburgh, according to W3RUE, who writes that W3OMY, Pittsburgh (250 watts, 3-element beam), W3SSF, Colver (750 watts, 4-element array), W3KKI, Farrell (100 watts), W3KSP, Westview (50 watts), W3RUE, Pittsburgh (100 watts, 3-element beam), W3SSG, Hubbard, Ohio (100 watts, 3-element beam) and W3TJD, Morgantown, W. Va. (100 watts, 4-element beam), are active regularly and will be glad to arrange schedules with interested parties in Western New York, Pennsylvania, Eastern Ohio, West Virginia, and Maryland, to increase their sphere of influence. Drop a card to W3RUE, 8036 Churchview Ave., to get things started.

What is probably the world's longest grapevine was responsible for spreading word of the trans-Atlantic work on November 24th, according to W9PK. At 10:35 CST, only 10 minutes after the G6DH-W1HDQ contact had gotten underway, Jack got word of it from ZS6DW, who had gotten it from another ZS that G7BY was also hearing your conductor. Later, in contact with VK5SR, he learned the rest of the details! Jack says that a few more Illinois stations are showing up on 6, recent arrivals being W9AKF, Aurora (p.p. 3STGs, 4-element array), W9GTH, Washington (60 watts, 3-element beam), and W9DXZ, Oak Park (30 watts, vertical coax). The number of the Chicago-area 2-meter gang are giving 6 a whirl, according to W9NFK's *Midwest VHF News*, which lists W9s YQ1, E8M, VEZ, LWE, and ELV as prospects.

In the opposite direction from W9PK, the...
Society for the Promotion of Activity on 6 holds forth, with some results and considerable promise, according to W9AB, Mishawaka, Indiana. Near Kalamazoo, W0SCQ, W8AKR, and W8HDMM keep things going, with W8VTB at Three Rivers, Mich., W8JLQ at Toledo, Ohio, W9AB and W8ECH at Mishawaka, and W9QCY at Ft. Wayne comprising a network which functions each Monday night. Tying in with the stations around New Castle it should be possible to ring in the active group in the vicinity of Terre Haute. This whole great area was the scene of much fine long-haul work on 56 Mc. just before the outbreak of war; it should be possible to do even better on 50 Mc., if everyone will do his part in maintaining activity in his own locality and keep on the lookout for the signals from beyond the horizon. W9UIA is on down in Evansville, and is working W9CZD in Sullivan, W9IKF and W9ZHL in Terre Haute, and W9UNS in Marshall at frequent intervals. In New Castle, W9MBL and W9FHY have frequent contact with Dayton and Cincinnati, and the stations in this group listen for Mishawaka and Ft. Wayne stations at 7, 8 and 9 P.M. each Monday, and call in that direction five minutes later. This is the sort of thing that keeps the band active, and in shape to make the most of any unusual conditions which might otherwise go unnoticed, such as the opening to W1 on the evening of December 22nd.

An odd condition is showing up in the course of the regular evening contacts of the Eager Beavers of Missouri and Kansas. WØYUQ reports that WØZIB, formerly S5- to S9-plus in the summer and early fall, is now running at a barely-audible level much of the time, while WØJCQ, who is farther from WØZIB, is hearing him better than he formerly did. W9PKD, still farther along, could not hear ZIB at first, but is now receiving him with an improved signal. Must be that new 3-element quarter-wave spaced array at Goshland!

Hunting harmonics and other commercial signals in and near the 50-Mc. band is getting to be quite a sport these days. Here are a few reported recently: By G6BY — WMZG calling WCC, S5 on m.c.w., 49.8 Mc.; NYQD on about the same frequency, also calling WCC, heard on Nov. 30th, at 1436 GCT. By Z9IT, Capetown, S. A. — unidentified weak signals just inside the low end of the band at 1628 GCT, Dec. 15th. By W1HDQ — CEC56, c.w. harmonic near 42 Mc., heard around 8 A.M. EST during late December; French commercial harmonics (reported by G6DH to be from around Dakar), near the signal of CBC, and at similar times; television video, 46 Mc., presumably Eiffel Tower, 9-11 A.M. EST. By many Eastern stations — television video channel on 45 Mc., London, heard daily for several days around 27-day peaks of sunspot activity. By W9ALU, Metamora, Ill. — c.w. on 50.9, sending “543 543 QSV QSV K,” heard at 1820 CST on Dec. 17th.

144-Mc. News

With the passing of frequent openings of the 2-meter band, much of the activity of the summer and fall period has fallen off, or at least so it seems when one listens on the band. It is still possible to dig up contacts in most areas, however, and the use of improved gear in the form of crystal-controlled transmitters and superhet receivers has gone a long way toward holding the range of operation well above that achieved when we first made the changeover from 112 Mc. a little over a year ago. Organized operating activity is helping, and there is still quite a bit of activity on the appointed nights wherever such a program has been instigated. The boys want to use the band, and a surprising number will do so when the word gets around that activity can be found on certain nights. W1CTW, Arlington Heights, Mass., reports a spot-frequency net operating each Thursday evening at 9 p.m. on 147.96, the list including W1s AKD, I1D, IKW, EU, P13 and PKA, with more coming. Cal worked 16 different crystal-controlled stations during November.

Ever try straight a.w. on 144 Mc.? The few who have used a b.f.o. know that it is invaluable in locating weak signals. When one is using a highly-directive beam the b.f.o. is particularly handy, as it will help to spot activity which is going on in a direction away from the line of the array, when such signals would otherwise go unnoticed. W9LKH, Providence, R. I., reports that the stable signal from W1HDF, Elmwood, Conn. (a difficult hop under normal conditions) is often heard by the b.f.o. method, when Paul would never have known Cal was on. The weak b.f.o. beat serves admirably in centering the beam, after which the voice modulation can usually be copied.

Message handling can be carried on very nicely via 144 Mc. Originated by W2STZ, Tanwood, N. J., a message came to W1HDQ all the way on 144 Mc., the route being W2STZ, W2IRM, W2KU, W2NI, W2PCV, W10GS, W1ISF, W1EH. It related the story of W1KSF, who was flying from Baltimore to Washington at a height of 13,000 feet, working 2 meters en route. He was heard and called by numerous W2s, but the best DX known to have been worked was W2VX, Westville, N. J., who made contact with W1KSF over Baltimore, Washington, and Fredericksburg, Va., the distance to the last point being about 200 miles.

Here's a chance for Vermont contacts on 144 Mc. W1MEP, Bennington, Vt., who used to hold forth from Glastenbury Mountain in prewar days, is now operating on 2 from his home. He has a 6-element array, and will be glad to keep (Continued on page 180)
HE'S HAPPY

1114 Wellington Court, Ann Arbor, Mich.
Editor, QST:
Now that I am back home again, with the same old rig on the air and getting my QST every month, I see the situation hasn't changed much with respect to the usual gripes and groans over what the ARRL is doing, has done, or is trying to do. I think you fellows ought to have a pat on the back once in a while for the way things are run.

I like the way things are run.

About all this fuss over Class D licenses — well, being a steadfast w.w. man I was against it, too, when I first heard about it, but now that I think it over perhaps you fellows were right and the thing should have gone through. Perhaps we will all be sorry yet, only time will tell. Anyway whatever the Board decides in the future, I am going along with boot, stock, and barrel.

And another thing, I like QST as it is. I don't see anything too technical about it. Isn't the purpose of QST to keep us informed of the latest? Heaven forbid the day when QST becomes a "build it" or "story" magazine.

ANSWERING CQs

114 Acacia Ave., San Bruno, Calif.
Editor, QST:
... It appears that a considerable amount of time and frequency spectrum are wasted in making the general call, "CQ." In order to arrive at a QSO, My plan, no doubt advanced many times in the past, is for the operator calling CQ to send the break sign "BK" after the third CQ and pause for a short interval to listen on his own frequency for other station or stations trying to "BK" in. If any BKs are heard the CQer will immediately send his call and give the "K" signal. In this way the length as well as the number of CQs made should be considerably lessened. This plan gives the first operator who hears the CQ a chance to make the contact, whereas his chances are lessened the longer the CQ is continued. This method should work equally well on the 24/28-volt dynamotor. Its output is 200 amp., 28 per.

POWER FOR THE BC-373-E

Hardin, Montana
Editor, QST:
Regarding the article on the BC-373-E in December QST, it might be of interest to others that one can get a generator from war surplus which will give the necessary voltage for the 24/28-volt dynamotor. Its output is 200 amp., 28 volts, 5700 watts, d.c. It is made by Delco-Remy. Other specifications: 6 poles, slant-wound, 2500-4500 r.p.m., shipping weight 33 lbs. The generator can be bought from Generator Sales, 1037-9 N. Damen Ave., Chicago 47, Ill. Price is $895, F.O.B. Of course the driving power for this generator would be around 3 h.p. per 100 amp., but if one is to go portable-mobile it can be run from the fan belt of an auto, or on Field Day workings one could use a gas motor to drive it. I have one of the generators but as yet haven't been able to get the rig set up... — Charles B. Rider, W7JSQ

THE DECEMBER ISSUE

Box 175 North St. Sta., Naugatuck, Texas
Editor, QST:
Congratulations on having achieved an all-time high of 192 pages in the December issue. Leznee, now: 192 divided by 2 is 96, so the wire goes between pages 96 and 97. It's thinner and doppler than those which came with prewar binders. Hey! Instead of one of those outs of the SX-42, why didn't you run instructions on how to clip this issue into the 1946 binder? Well, maybe if I move July over into the first half, I can... nope, that won't work either. If the prewar tin-rods were thicker, maybe the binders were too... nope, guess not; anyway the cover wouldn't match its neighbors. OK, Ed, you win. I give up. How do you cram in?

Until I find out, I'm not ordering any '47 binder, I wouldn't suggest omitting any advertising, even though QST is beginning to resemble that lousy rag (Censored — Ed), because I know that you (we) can use the next little hororatum that Halligan coughed up. But if during 1947 we're gonna have a 192-page issue each time an SX-42 or HQ-173.25 is announced, please run all 102 cuts of whatever it is on the last 41 pages, so we can rip it out without spoiling any text. (After finishing page 15, we all know what the SX-42 looks like, so the other 100 purty pitchers have no reference value.)

Very 73 for bigger (on second thought, I'll retract that word) and better QSTs.

— Basil C. Barbee, W1OCE/5

PLUG FOR V.H.F.

3330 Lake Shore Dr., Chicago 13, Ill.
Editor, QST:
... The amateur society as a whole is passing up a wonderful opportunity by not occupying six meters. When I tune across a dead 6-meter band, night after night, it makes me very sad. Where is the old amateur experimental genius going? Let's get the lead out and start giving the ultrahigh frequencies hell. We all know what the 80-40-20-10-meter bands will do. We know very little the possibilities of the v.h.f. bands simply because we hams are too damned lazy to warm up the soldering iron and think a little bit... Once upon a time they said 80-40-20-10 was no good, either, remember? Come on, you guys — devote some more time to operating the ultrahighs so we can prove the book wrong again. There is nothing complicated or mysterious about the subject at all. Just streamline your thinking to 1947 instead of 1937 and you are well on the way... — Louis J. Frankel, Jr., W6GUP

THOSE EXTRA DITS

WB1MS, Friendship, Maine
Editor, QST:
Listened on 80 the other night and heard a couple of the boys gasin'. Thought I'd copy their stuff on the mill for a little practice and here's what I got:
"W1 — DE W1 — GE O.M. UR HIGS 570X 5B 4Y FB. QTH 5R BOHTON MAHS. SANDLE IS 6ILL. USING 150 WATT TO AN 813. ANT 5ALFWAE4E CTR FED. WELL OM WSATS 5B SANDLE TRY K."
Juliet 66a XYL called me to cew ho I had to quit. I think this mill either needed overhauling or 6e handle on that guyw 6ag wah looie, 73.

— 6ill 5all, W167

February 1947 73
A TRANSITRON UTILITY OSCILLATOR

The wide-range transitron oscillator circuit shown in Fig. 1 serves a multitude of purposes around the ham shack, providing a simple means of measuring small capacitances, determining the resonant frequency of any coil with a known capacitance across it, and even measuring the stray capacitances present in an oscillator circuit.

The circuit will oscillate whenever a coil, or a resonant circuit, is connected across the terminals marked L in Fig. 1. The calibrated condenser provides a method of measuring small capacities by the substitution method, and of determining the resonant frequency of any coil with a given amount of C across it. The circuit will oscillate with almost any value of inductance, for example anything ranging from a filter choke to an i.f. transformer. The oscillator can be made to operate over a frequency range of about 20 c.p.s. to 10 Mc.

Fig. 1 — A wide-range transitron utility oscillator for the ham shack. The sliders on Re, R1 and Rs should be adjusted to give the voltages shown in the diagram.

The 6S7J tube forms a conventional transitron oscillator, while the 6E5 magic-eye tube serves to indicate oscillation. Since the screen current for the 6S7J must flow between the L terminals, a d.c. path between these terminals must always be provided.

In use, the magic-eye angle is set to some convenient position by adjustment of the grid-bias control, R4. Then a coil, or a coil-and-condenser combination, is connected between the L terminals. Oscillation will produce fuzzy edges on the eye shadow, and may change the shadow angle. The frequency of oscillation may then be determined by any convenient method, such as an absorption wavemeter, heterodyne frequency meter, or a calibrated receiver. If a resonant circuit, such as an i.f. transformer, is to be checked for frequency, the jumper to the calibrated condenser should be removed. Allowance should be made for the distributed capacity across the L terminals, including internal tube capacities and stray wiring capacities.

The circuit may be used as a simple oscillator at any frequency within its range by winding a coil of suitable inductance for the frequency range desired, and connecting it across the L terminals. It is then tuned to the exact desired frequency with C1. If the L/C ratio is kept within reasonable limits, the harmonic content will be very low. For example, with the set oscillating at 1 Mc. only the first six harmonics were audible on a nearby communications receiver. An old filter choke was found to be self-resonant at about 1300 cycles. Adding a little extra capacity caused it to be resonant at about 160 cycles.

The capacity of a small condenser may be found by noting the change of the calibrated condenser capacity required to keep the oscillator signal in tune (b.f.o. on) on a receiver when the unknown condenser is connected across a coil at the L terminals. Larger capacities may be determined by measuring the frequencies with and without the unknown capacity shunted across the coil, and then calculating the unknown capacity from the bandspread-condenser formulas. Similarly, the stray capacity of the oscillator circuit may be computed using the calibrated condenser to give a known capacity change.

— Henry L. Cox, Jr., W8UPS/3

CENTER JOINT FOR 300-OHM FOLDED DOUBLET

From several sources we have received information on the use of 300-ohm Twin-Lead in folded doublets. All point out that because of the thermoplastic properties of the polyethylene dielectric used, excellent joints can be made between the flat-top portion of the antenna and the feed line by the application of heat. The process is illustrated in Figs. 2 and 3.

74

QST for
The wires of the feed line are soldered to the flat top as close to the right angle formed by the joint as possible. The soldering iron is then applied to the overlapping pieces — A and B — of the polyethylene in the center of the joint. The "poly" melts, bonding the flat top to the feed line in a rigid joint that adds no weight to the center of the antenna.

At W2IJC, W0SRP and W2LMH tabs A and B in Fig. 2 are not used, separate scraps of the poly being used as the source of the bonding material. The scraps are heated and are worked around the joint with a hot knife blade. W2LMH suggests that splices may also be made in the Twin-Lead, "staggering" the points where the two wires are joined and bonding the adjacent portions of poly as shown in Fig. 3. W0SRP has also spliced RG-11U coaxial cable by similar means.

The soldering iron should be cleaned before starting the operation and should not be allowed to become too hot. If the iron is not clean, some of the solder clinging to its point as tinning will come off and become embedded in the poly, forming a near-short-circuit right across the joint.

Once the joint has hardened, it may be trimmed with a penknife to make it neater looking.

— Lavene T. Heaps, W0SRP; Bill Karsten, W2LMH; Rev. Victor W. Schoenberger, W2IJC; Harry H. Nooke.

THREE-WAY CRYSTAL SOCKET

In many ways adapters for fitting the new small-size crystal holders into standard UY 5-prong sockets are not the ultimate solution to the problem of how to use three styles of crystal holders in the same rig without using three sockets. The homemade socket shown in Fig. 4 handles all three of the currently-popular holders without requiring adapters, and does it without any forcing, pinching, or binding. Its construction is simple, and the parts required can usually be found in the junk box.

In this gadget, a portion of a 5-prong socket and a matching portion of an octal socket are cemented together to form a composite affair. The resulting pin spacings and contact diameters permit the use of the prewar "standard" crystal holders (0.125-inch diameter pins spaced \( \frac{3}{4} \) inch), the FT-243 holder (0.089-inch pins spaced \( \frac{1}{8} \) inch), and the CR-1A/AR holder (0.125-inch pins spaced \( \frac{1}{2} \) inch). The old-type holder plugs into Pins 2 and 4 of the 5-prong socket, the FT-243 goes into Pins 4 and 6 of the octal portion, and the CR-1A/AR into Pins 2 and 3 of the 5-prong portion.

To make the socket, remove the locking ring and mounting plate from the sockets. Needless to say, the sockets should both be of the same diameter and general type. Amphenol Types S-5 and S-8 fill this requirement nicely. Saw the two as shown in the sketch, being careful to keep the cut square. If you want to be extra cautious about it, leave a little extra portion on each one and finish it smooth with a file. This will assure a good fit, and will permit the surfaces to be squared up in the event that the hacksaw cut wasn't quite true. Cement the portions together as shown in

(Continued on page 158)
ARRL's Thirteenth International DX Competition is scheduled to start this month, the first c.w. period Feb. 14th to 17th and the first 'phone period Feb. 21st to 24th. Full details of this major postwar activity appeared last month. See page 16, January QST. Study the rules carefully for answers to any questions. These are week-ends of QSO opportunity. All set?

Congratulations. "Operating News" takes this opportunity to extend heartiest congrats:

. . . to the SSers who worked all 71 ARRL Sections in the November contest . . . to all who took part and made it the "best ever" in League history. The 71-section men were W6XKQ/7 (c.w.) and W6ITH (phone).

. . . to W1HDQ for putting the first 50-Mc. signal across the Atlantic, Nov. 24, 1946. He was copied by both G6DH and G5BY — almost exactly 25 years after the successful 1921 ARRL Second Transatlantics, during which Godley copied 200-meter amateur signals from this side. This was an experimenter's job par excellence. W1HDQ's six-meter success required daily observation and plots of m.u.f. All credit to him as holder of OES appointment number one.

Clubs and ECs: ARRL Emergency Coordinators should strive to enlist the support of all active local amateurs in their AEC groups. The club is an excellent place to enlist assistance in planning amateur radio service emergency organization. Has your club had a meeting devoted to emergency organizing? When there is more than one club in a town or city, attempt should be made to invite a representative of each club or association to become an Assistant Coordinator or member of an amateur-service planning group. Is your club identified with the ARRL Emergency Corps? Is there a plan for disposition of portable or mobile amateur stations in event of local emergency? Which agencies would your group serve? Does every amateur know how he would serve best? How many hold AEC cards now?

Emergency Coordinators, RM's, PAMs, Net­ters — Are You Ready? Come crippling blizzard . . . wires down . . . spring flood . . . unexpected disruption or overload of communications anywhere for any reason and we have a com­ munications emergency. Large or small emergency, are we really ready? We're kidding ourselves if we haven't made ourselves, as individual amateurs or groups, part of a plan. All net and drill (radio) operation is of course enjoyable and fraternal, be it for emergency preparation or otherwise. But let's make it count for Amateur Radio!

Do we have existing nets not already dedicating at least part of their efforts to public-service objectives? Why not? (NCS please note) consult with the nearest ARRL Emergency Coordinator (or SCM or SEC) and see if your net membership cannot be made AEC members? How best can some drills be devoted to advance planning for use of the net in any emergency? Work this out and send us a message as you progress, please.

All Emergency Coordinators have a January bulletin covering the necessary planning. Their problem is to translate from a generalized diagram of all types of organizations served, and with which we have liaison to create a local community plan. Over-all policy provides for use of every amateur-band group from 3.5-3.9 Mc. to and including 144 Mc. This plan as implemented should be put in diagram form and should name the stations in each band, include all clubs and networks, and the agencies served, specifically. Please help, everyone.

Multiclub Communities. In large cities there are sometimes two or more radio clubs to take care of amateur groups in metropolitan and suburban territory or because of special club-member objectives, number limitations, parking and working-time problems. When we have more than one club in a city, the groups should be joined in some of their major purposes and objectives, we believe. Annual or semiannual joint meetings, outings or hamfest plans will promote fraternalism and mutual understanding between different ages and groups of members. Friendly ARRL Field Day and other competitive activity may often be planned. Emergency planning, particularly, requires the fullest support of every active amateur and every group. Club program arrangements can assist by promoting a meeting — or allotting time at several successive meetings — to discussion of local plans, explanation of AEC and local organizing program by the appropriate ARRL Emergency Coordinator.

More on Spacing. Poor sending was men­tioned in this column last month, with emphasis on the desirability of correct spacing. There are two types of spacing trouble: (1) no spacing, or too little spacing between words or letters, and (2) extra spacing between the parts of a character.
Your sending may make sense to you even if words are run together. However, when calls or words are run together the result is difficult to copy, and the calls become gibberish. Get some experienced operators to listen critically to your sending and ask them to be analytical and frank. Rhythm, and clean word spacing—not speed—should be the aim of both new and old-time operators. Actual smoothness and speed depend on the spacing and rhythm. The absence of need for repeat means speed. The flashy fast operator so often spends any time saved making repeats, except when in QSO with pals familiar with his idiomsyncrasies. K1AW may become A1AWKA1AWK with a chance of ending signals throwing in some added confusion, not to mention QRM effects! Other examples: (1) TEST becomes NST; W1TSU and W1MEX become W1BU and W1GX; (2) CQ becomes NNQ. Readjustment of the dash contact on a bug or closer key spacing may assist in overcoming the latter defect. Good sending requires rhythm all the way through, and control exercised over the spacing as well as the actual lengths of dits and dahs. One way to get good rhythm is to listen regularly to good tape (automatic) transmissions.

**BCI Circulators Needed?** Any amateur having local interference complaints is invited to indicate the frequency and mode of his transmission and the type of receiver used by the complainant in asking the ARRL Communications Department to send its suggestions and mimeographed information on this subject. It should be regarded as an individual responsibility to so conduct amateur operations, and provide information and advice to listeners, that public complaints to the FCC of any amateur interference will be completely avoided. Radio clubs should maintain alert interference committees to assist members, solicit local complaints, and insure good public relations for the whole amateur service insofar as their communities are concerned. ARRL will gladly provide its available helps on this subject to individuals or clubs.

**Did You Return the Operating Survey Card?**

Tabulation of thousands of returns from the Operating Interest Registration Card which appeared in the January issue is just getting under way as you read these lines. If you missed this card or for any reason failed to return it, please complete the form now and mail it back. The survey is an opportunity to register the characteristics of every active operative amateur station. The cards indicate to us whether you are a high-power or low-power user of amateur frequencies, show how much you actually operated in the first 15 days of December, 1946, in which bands and by which methods, and indicate your expected operation in 1947 in the different c.w. and 'phone subbands. How's to send it in if you haven't?

---

**FREQUENCY-MEASURING TEST**

**February 4th**

- Starting 11:00 P.M. EST (8:00 P.M. PST), W1AW — 3710, 7055, 14,025 and 28,070 kc. (approx.).
- Last chance to get your entry in for the first-period 1947 Frequency-Measuring Test. See page 65, January QST, for details. Will you win the electric-clock prize?

**IDAHO-WASHINGTON EMERGENCY**

In mid-November, 1946, the worst snow and ice storm in 44 years seriously disrupted communication facilities in Northern Idaho and sections of Washington. Radio amateurs provided communications for the Northern Pacific Railroad in dispatching trains in and out of Sandpoint, Idaho.

Carl Partlow, W7EEN, president of the Spokane (Wash.) Amateur Radio Operators Club, and James McGoldrick, W7ELN, drove to Sandpoint with portable gear and set up a station at the N. P. depot November 19th. Schedules were maintained with Chester Brown, W7NV, Spokane. Contact was maintained throughout the emergency period, until the storm had abated and train schedules returned to normal. Fred Arndt, W7IDA, Sandpoint, took over that end of the circuit at noon on November 20th, and Joe Davis, W7ICM, relieved W7NV at Spokane.

Frank Burford, W7ELH, Moscow, Idaho, assisted in relaying some of the traffic.

HK3AB is a familiar call on 28-Mc. 'phone. Here is the man behind the mike, Hector McCormick, Bogota, Colombia. The receiver is an RCA-99 with Howard pre-selector. "Mac" runs 250 watts to his transmitter. W2NHB, in Colombia on business, tells of some pleasant visits with HK3AB. An experience to be long remembered was a contact between W2AYR and HK3AB, through which W2NHB talked with his wife and child in Brooklyn. These are but two examples of similar incidents by which HK3AB maintains a reputation for "international friendships and hospitality."

---

February 1947
A.U. MARATHON

On Thanksgiving Day, 1946, the Twenty-Seventh Annual A.A.U. Marathon was held at Berwick, Penna., with the outstanding runners of the United States and Canada entered. The course is a 9-mile cross-country run with mountains and hills being the main obstacles. The event was covered by amateur radio for the first time in the history of the race. Communication was maintained on 144 Mc. with Abbott TR4s being used exclusively. Three amateurs covered the race with W3KGA, Roland “Ed” Parson, operating portable-mobile in front of the runners. He transmitted a running commentary of the race indicating lead positions regularly. W3KQM, Forrest E. Campbell, located at the finish line, relayed W3KGA’s commentary over the p. a. system. George H. Smith, jr., W3LGO, was in the press box and handled the contacting and monitoring of W3KQM and W3KGA in case of break-downs. Contact was continuous from start to finish. Race officials were very pleased with the set-up and plans are being made to cover next year’s race.

CODE PRACTICE

January QST (page 65) lists the schedules of stations transmitting code practice on 25 Mc. This month there are two additions.

W5LDH, Phil Slipakoff, 3312 Louisiana Ave. Parkway, New Orleans 15, la., 28,668 kc., Monday and Wednesday, 7:30 to 8:15 P.M. CST. (27-Mc. to cover next year’s race.

Seventh Annual AAU Marathon was held at Berwick, Penna., with the Hq. Staff, Directors, Alt. and Asst. input!”

A.R.R.L. ACTIVITIES CALENDAR

Feb. 4th: Frequency-Measuring Test
Feb. 13th: Frequency-Measuring Test
Feb. 14th-17th: DX Competition (c.w.)
Feb. 21st-24th: DX Competition (phone)
Mar. 5th: Frequency-Measuring Test
Mar. 7th: Frequency-Measuring Test
Mar. 14th-17th: DX Competition (c.w.)
Mar. 17th: CP Qualifying Run
Mar. 21st-24th: DX Competition (phone)
Apr. 11th-13th: Frequency-Measuring Test
Apr. 18th: CP Qualifying Run
Apr. 26th-27th: CD QSO Party

Jan. 16th-Dec. 15th: 1947 V.H.F. Marathon
Jan. 1st-Dec. 31st: Most-States V.H.F. Contest
First Saturday Night Each Month:
A.R.R.L. OFFICIALS NITE (Get-together for SCM's, RM's, SEC's, EC's, PAM's, Hq. Staff, Directors, Alt. and Asst. Dirs.)

HAVE YOU RECEIVED YOUR CODE-PROFICIENCY CERTIFICATE?

The next opportunity to qualify for a certificate or endorsement sticker in the A.R.R.L. Code-Proficiency Program is on February 18th. At 10:00 p.m. EST that date W1AW transmits the monthly qualifying run at speeds of 15, 20, 25, 30, and 35 w.p.m. Frequencies: 3555, 7145, 14,150, 28,060, and 52,000 kc., simultaneously.

The text copied, received successfully by ear at the highest speed you can copy, should be sent to A.R.R.L. for checking. To avoid errors in recopying, send your original copy. Attach a statement certifying over your signature that the copy submitted is direct copy, made from reception of W1AW by ear, without any kind of assistance, personal or mechanical. If you qualify, you will receive your certificate, or appropriate endorsement sticker for certificate you already hold. Those who qualified in the past should submit copy only if speed is higher than indicated on certificate or endorsement sticker.

QST lists in advance the text to be used on several of the 10:00 p.m. EST (Monday through Friday) CP schedules. This makes it possible to check your own copy. It also provides a means of obtaining sending practice since it permits direct comparison of one’s flat and tape sending. To get sending help hook up your own key and buzzer and attempt to send right in step with the tape transmissions. Adjust your spacing in the manner indicated as necessary for self-improvement.

Subject of Practice Text from Dec 1st or QST

Date
Feb. 4th: Single Control ... Bandswitching Transmitter
Feb. 7th: A Unique Five-Band Antenna System
Feb. 10th: Five Are Better Than Three
Feb. 12th: The Hottest Inexpensive Transmitter
Feb. 13th: Qualifying Run, 10:00 P.M. EST
Feb. 16th: What About the BC-575-E?.
Feb. 20th: Design of Cathode-Ray Tube Circuits
Feb. 24th: Those Excellent C.W. Signals
Feb. 26th: Standing Waves — Good or Bad

BRIEFS

In the fall of 1946, Alaska’s Bering Sea coast was swept by two of the worst storms in Alaska’s history. Great damage was done to property and wintertime stores of supplies. At Moses Point, all Civil Aeronautics Authority facilities were washed out for four days. KL7BD reports that KL7CC came to the rescue and did a bang-up job on 7252 kc., maintaining communications with CAA stations at Galena, Fairbanks, Unalakleet, and Anchorage, using the call KMZZ/KL7CC. KTCC’S 0-L0 worked at 100 watts input!

W1COI took a message from KA1SS, delivered by telephone, and sent an answer back to KA1SS, all in thirty minutes.

QST for
YLs—AND WHERE TO FIND THEM

W1KIU Ellen 3.5, 7 Mc., c.w. 7-11 P.M. EST, Sun.
W1MCW Lou 28,256 kc., phone 4-6 P.M. EST, Mon.-Fri.
W2QZK Jarelle 14,14 Mc., c.w./phone 7-11 P.M. EST, Mon.-Fri.
W2NFR Helen 3.5, 7, 14 Mc., c.w./phone After 11:15 EST nightly
W2OWL Ruth 28,702 kc., phone 3-5 P.M., 9-11 P.M. EST
W2PMA Lillian 28,723/28,200 kc., phone 8:15 A.M.-12:30 P.M.
W2QCC Pauline 3558 kc., c.w. 5:00-6:30 P.M. EST
W3ABE Frances 3.5, 7, 14 Mc., c.w. 3-5 P.M., 9-11 P.M. EST
W3CDQ Elizabeth 7220 kc. 8 P.M. EST and later
W3HJR Dorothy 2.5 Mc., c.w. 8-11 P.M. EST
W3KWA Bethel 25,702 kc., phone All day, Sat. & Sun.
W3YD Tuza 3831 kc., c.w. Noon-6 P.M. EST
W3WKO Jackie 14,266 kc., phone 4-10 P.M. EST, weekdays
W4KMM Ginny 28,500 kc., phone All day, Sat. & Sun.
W4HSW Jerrie 3918, 7177, 14,350, 28,704 kc., c.w./phone Evenings
W5JFW Judy 7216 kc. After 5 P.M. EST
W5WHW/4 Jessie 29,600 kc., phone 8:30 P.M.-Midnight
W5JJP Rosemary 3646 kc., c.w. 8-9:30 P.M., EST
W6UXF Enid 3.5 Mc., c.w. Evenings
W7HDS Lissette 3.45, 14, 27, 28 Mc., phone; 3.5, 14 Mc., c.w.
W7JWC Manila 28,746 kc., phone Evenings
W8WUT Avia 28.5 Mc., phone
W8YKU Laura 3705 kc., c.w. 10-11 A.M., 2-4 P.M.
W9HXM Emily 28,520 kc., phone 6 P.M.-Midnight
W9JTX Louise 3.5 Mc., c.w.
W9EMP Maude All phone bands

The above tabulation was compiled with the cooperation of the Young Ladies Radio League. These “gals” may be found on the bands and frequencies indicated. Although complete information is not available, the following additional calls also belong to YLs. If the call of an OM appears here in error, please forgive it, YLs!

W1BDN PTJ QGT KQK MIV MIM MMP MUV
WNN NWA OAR ZR
W2FKX HXG IXY KUG MEG MJS MWY NAZ NGO
W3CQ NBD OLB QVQ QYQ PBI POU PTD PVS PJA
W4TQ QFQ GBB GQK QIC QA QP QVM QWL RQ RBU
W5EQV RUP RZW TBU TUT
W3FXZ LVW LVB UQG UUY
W4GQZ HXG XRG XQR JRV
W5SDEW HEE KIC IZU JAD JQ9/6 LVT UUY ZA
W6GMO NQD TCH TON TDL TMD UHA
W7HRW VGR WOL WRT WSG W8G
W8EIJ/KY QGQ HHR KYQ KXQ KXQ/I XJW JTWG
W9GQX KNO VYU WZT/I YUL YGD YNO
W9HXX EFW JPT JXI/1 RSA RNO/4 QVQ
W9DDB JWJ OUD OWQ UA VQK
W3A3MC 4V0
G7YX QLY KORJ KHEFD

2910 and 7200 kc. are the special frequencies used by YLRL members, and are good spots to watch when looking for the fair sex. YLRL officers are Lou Lacy, W5IKC, president; Louise Baker, W9JTX, vice-president; Helen Cook, W9MWO, secretary; Lou Littlefield, W1MCW, publicity chairman; and Clara Reger, W2RUP, editor YL Harmonics. The YLRL slogan is “QRV— I am ready.”

February 1947
The Youngest OM

Donald Joe Choate, W5LVZ, El Reno, Oklahoma is eleven years old. His Class B license was issued September 13, 1946, a few weeks before his eleventh birthday. W5LVZ is active on 28.5-Mc. phone with a kilowatt rig built by his father, W5LTB.

---

BRIEF

During late July, 1946, the Mike and Key Club of Santa Monica, Calif., furnished radio contact for the races held by the Aquaplane Association off Hermosa and Manhattan Beaches. The club assisted in laying out the course, and reported swimming, paddleboard, dory, and other races. For laying out the course, rigs were set up on the piers and in a boat, which was directed by radio to the correct position for dropping buoys. For night races, held on three evenings, one station was established on shore, and one in a boat at the seaward end of the course, for reports on the races. The shore rig was fed into the p.a. system. Three mobile-marine stations and two land stations handled the main events, held on a Sunday. On boats were W6ESR, W6NSC, and W6AQJ. On shore: W6CFI and W6PTR at finish line at end of pier, and W6RIU at judges stand and p.a. on beach. All operation was on 51.84 Mc. Others participating were W6VED and W6TVK.

---

BRASS FOUNDERS’ LEAGUE
(November Traffic)

<table>
<thead>
<tr>
<th>Call</th>
<th>Orig.</th>
<th>Del.</th>
<th>Rel.</th>
<th>Extra Del.</th>
<th>Total Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>W7BST</td>
<td>151</td>
<td>109</td>
<td>703</td>
<td>—</td>
<td>963</td>
</tr>
<tr>
<td>W4PL</td>
<td>12</td>
<td>64</td>
<td>524</td>
<td></td>
<td>654</td>
</tr>
<tr>
<td>W6IOX</td>
<td>5</td>
<td>17</td>
<td>488</td>
<td>16</td>
<td>536</td>
</tr>
<tr>
<td>W8SAY</td>
<td>33</td>
<td>46</td>
<td>887</td>
<td>33</td>
<td>504</td>
</tr>
<tr>
<td>W2LT</td>
<td>—</td>
<td>360</td>
<td>145</td>
<td>—</td>
<td>501</td>
</tr>
</tbody>
</table>

The following make the BFL with over 100 “deliveries plus extra delivery credits”:

W1UE 219 W3MJK 123 W8KB 102 W8SCW 102

A message total of 500 or more, or 100 “deliveries plus extra delivery credits” will put you in line for a place in the BFL. The Brass Founders’ League listing is open to all operators who qualify for this monthly “honor roll.”

---

The Youngest YL

Georgette Ottney, VE3AMC, Almonte, Ontario is thirteen years old. Her transmitter is the old familiar 89-807Cititer. The 56-56 receiver and preselector have been replaced by an HQ-129X, if Santa Claus made the expected delivery. Antenna is a 3.5-Mc. center-fed Zepp. VE3AMC will be found on c.w.

---

BYRD ANTARCTIC EXPEDITION

At least two radio amateurs, W5AYE and W8DBD, are among the personnel of the Navy’s 1947 Antarctic Expedition, headed by Rear Admiral Richard E. Byrd. Latest advices at this writing indicate that no amateur radio operation is contemplated. However, W8DBD writes that he will have a long list of calls heard. Should expedition plans for amateur radio be changed, the news will be carried in WIAW bulletins.

---

BRIEFS

The services to mankind we radio amateurs occasionally are able to perform constitute much of the “something” that makes ham radio the grandest hobby of them all! Back in October, 1946, W4JEF, Aiken, S. C., and G6WY were parties in just such a service. Gipsy Smith, jr., son of the famous evangelist, was on tour in the Southern States. He remarked to W4JEF that he was concerned over the health of his father, who was understood to be dangerously ill in London. Turning at once to amateur radio, W4JEF made contact with G6WY, who telephoned the home of Gipsy Smith, sr., and received the comforting news that the 80-year-old evangelist was home from the hospital and out of danger. This information was relayed back to W4JEF within thirty minutes of the initial contact.

---

November 23, 1946 was W5AZO’s thirteenth wedding anniversary. Commenting to the XYL that, “We were in Keokuk, Iowa thirteen years ago, getting hitched,” he turned on the 7-Mc. rig and called CQ. It couldn’t have worked better had it been planned, for who answered but W9DUP with the opening remark, “Greetings from Keokuk!”

---

80 QST for
If there now breathes a balm in the 71 ARRL Sections who doesn't know how to send a message preamble, it certainly isn’t the fault of the Sweepstakes Contest! The bands were alive with those familiar exchanges during the November 16th-18th and 23rd-25th weekends. Records were broken . . . greater participation, higher scores, improved operating skill, more fun!

Each “SS” seems to reach the ultimate in operating capabilities, but each succeeding affair crashes through with new records, unbelievable records, yet very realistic! If you will look back on the results of the last prewar Sweepstakes (1941) you will find c.w. scores topping 100,000, and a high ‘phone score of 53,680. In the 1946 fray we find nineteen (count ‘em) claimed c.w. scores over 100,000! And a high ‘phone total of 50,800! There you have a summation of the magnitude of the affair. More words would be wasted.

Leading the c.w. list is Vic Clark, W4KFC (ex-W6KFC) of earlier Sweepstakes. Vic set a new high in contacts of 869. W4FU (ex-W9FS) with 883 contacts just topped his 1941 record (831). WSJIN claims an even 800 QSOs.

In the ‘phone ranks, Reg Tibbets, W6ITH, established a new high in SS scores—56,800! Reg also worked all 71 Sections, being the only ‘phone participant claiming this accomplishment although W9DPA lists 69.

The only c.w. contestant claiming all 71 Sections worked is W0KKG/7. Several claim 70 Sections, but the Philippines eluded most of them: W1ME, WITS, W1UE, W2HIF, W2IFP, W4BDP, W5KC, W6HTZ, W6NLI, WSJIN, W8WZ, and W9GRV.

The following listings show score, stations worked, and Sections worked. All figures are claimed by the contestants and subject to further checking. The final scoring must wait until official results are available.

### CW

<table>
<thead>
<tr>
<th>Callsign</th>
<th>Score 1946</th>
<th>Score 1941</th>
</tr>
</thead>
<tbody>
<tr>
<td>W4KFC</td>
<td>147500-859-68</td>
<td>W8PFXH</td>
</tr>
<tr>
<td>WAFU</td>
<td>149262-833-69</td>
<td>W8PFXC</td>
</tr>
<tr>
<td>W8NJA</td>
<td>123475-500-70</td>
<td>W7TWC</td>
</tr>
<tr>
<td>W6QRM</td>
<td>132135-760-76</td>
<td>W8PRU</td>
</tr>
<tr>
<td>W5P5B</td>
<td>129412-747-70</td>
<td>W8DUR</td>
</tr>
<tr>
<td>W5H5T</td>
<td>112475-715-90</td>
<td>W8GUV</td>
</tr>
<tr>
<td>W5H5T</td>
<td>112475-715-90</td>
<td>W8KME</td>
</tr>
<tr>
<td>W8BTF</td>
<td>118548-675-90</td>
<td>W9TBT</td>
</tr>
<tr>
<td>W8FPA</td>
<td>116181-694-67</td>
<td>W8RI</td>
</tr>
<tr>
<td>W8P8C</td>
<td>112307-565-77</td>
<td>W8RSS</td>
</tr>
<tr>
<td>W8FT7</td>
<td>111505-595-20</td>
<td>W8X85</td>
</tr>
<tr>
<td>W8F8P</td>
<td>110205-670-68</td>
<td>W8A1Z</td>
</tr>
<tr>
<td>W8IKY</td>
<td>109312-666-66</td>
<td>W8DOR</td>
</tr>
<tr>
<td>W8Z8R</td>
<td>108715-605-85</td>
<td>W8FPA</td>
</tr>
<tr>
<td>W8P5C</td>
<td>105905-605-67</td>
<td>W8TBU</td>
</tr>
<tr>
<td>W8L8R</td>
<td>101395-606-60</td>
<td>W8KGE/7</td>
</tr>
<tr>
<td>W8G8U</td>
<td>103293-616-67</td>
<td>W8ROX</td>
</tr>
<tr>
<td>W8HST</td>
<td>100150-574-70</td>
<td>W8WFS</td>
</tr>
<tr>
<td>W8B8X</td>
<td>100595-565-95</td>
<td>W8T7P</td>
</tr>
<tr>
<td>W8O8X</td>
<td>99456-556-68</td>
<td>W83HID</td>
</tr>
<tr>
<td>W8D8F</td>
<td>99025-609-68</td>
<td>W8GNC</td>
</tr>
<tr>
<td>W8N8C</td>
<td>95779-505-69</td>
<td>W8X8B</td>
</tr>
</tbody>
</table>

### PHONE

<table>
<thead>
<tr>
<th>Callsign</th>
<th>Score 1947</th>
<th>Score 1946</th>
</tr>
</thead>
<tbody>
<tr>
<td>W8DIR</td>
<td>83614-638-64</td>
<td>W9AG</td>
</tr>
<tr>
<td>W8MPF</td>
<td>83156-602-65</td>
<td>W8P8D</td>
</tr>
<tr>
<td>W8XML</td>
<td>84870-406-69</td>
<td>W8GYS</td>
</tr>
<tr>
<td>W8UIT</td>
<td>84426-621-65</td>
<td>W8Q8J</td>
</tr>
<tr>
<td>W8IKY</td>
<td>84330-446-59</td>
<td>W8E8M</td>
</tr>
<tr>
<td>W8K7T</td>
<td>83050-451-58</td>
<td>W8G8B</td>
</tr>
<tr>
<td>W8R8D</td>
<td>83901-517-65</td>
<td>W8F8B</td>
</tr>
<tr>
<td>W8Q8C</td>
<td>82360-540-52</td>
<td>W8F8J</td>
</tr>
<tr>
<td>W888</td>
<td>81413-501-55</td>
<td>W8FFH</td>
</tr>
<tr>
<td>W898MP</td>
<td>82530-535-51</td>
<td>W878F</td>
</tr>
<tr>
<td>W8BP8Z/5</td>
<td>82090-505-65</td>
<td>W8KP8V</td>
</tr>
</tbody>
</table>

### BRIEF

W8WDQ and W3RQC are forming a c.w. net on 7 Mc. for all present and former Coast Guard radiomen. They are especially interested in rounding up those who attended Groton, Curtis Bay, and Atlantic City radio schools. USCG hams should communicate with W3RQC, Bob Brown, 623 Delaware Ave., Wilson, Pa., or W8WDQ, Bob Brewster, 2815 Euclid Hts. Blvd., Cleveland Heights, Ohio 18.
### DIRECTORY OF ACTIVE NETS

<table>
<thead>
<tr>
<th>State/Network</th>
<th>Time Zone</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Alaska</strong></td>
<td>3:00 P.M.</td>
<td>Alaska Time, daily</td>
</tr>
<tr>
<td><strong>Alberta</strong></td>
<td>3:00 P.M.</td>
<td>MST, Mon.-Fri.</td>
</tr>
<tr>
<td><strong>Arizona State Net</strong></td>
<td>3:00 P.M.</td>
<td>MST, Mon.-Fri.</td>
</tr>
<tr>
<td><strong>Ark. Valley Emerg. Net</strong></td>
<td>3:00 P.M.</td>
<td>MST, Mon.-Fri.</td>
</tr>
<tr>
<td><strong>Atlantic-Pacific Trunk</strong></td>
<td>3:00 P.M.</td>
<td>EST, Mon.-Fri.</td>
</tr>
<tr>
<td><strong>Buckeye Net (Ohio)</strong></td>
<td>3:00 P.M.</td>
<td>EST, Mon.-Fri.</td>
</tr>
<tr>
<td><strong>Cracker Emergency Net</strong></td>
<td>3:00 P.M.</td>
<td>EST, Mon.-Fri.</td>
</tr>
<tr>
<td><strong>Dog House Net (Ohio, Ind.)</strong></td>
<td>3:00 P.M.</td>
<td>EST, Tue., Fri.</td>
</tr>
<tr>
<td><strong>Eastern Massachusetts</strong></td>
<td>3:00 P.M.</td>
<td>EST, Mon.-Fri.</td>
</tr>
<tr>
<td><strong>Florida Emerg. Phone Net</strong></td>
<td>3:00 P.M.</td>
<td>EST, Tue., Thu.</td>
</tr>
<tr>
<td><strong>Gem Net (Idaho)</strong></td>
<td>3:00 P.M.</td>
<td>EST, Mon.-Fri.</td>
</tr>
<tr>
<td><strong>Golden State Net (Cal.)</strong></td>
<td>3:00 P.M.</td>
<td>PST, Mon.-Fri.</td>
</tr>
<tr>
<td><strong>Great Lakes Ear! Net•</strong></td>
<td>3:00 P.M.</td>
<td>EST, Mon.-Fri.</td>
</tr>
<tr>
<td><strong>Iowa 75 Net</strong></td>
<td>3:00 P.M.</td>
<td>CST, Mon.-Sat.</td>
</tr>
<tr>
<td><strong>Kentucky Traffic Net</strong></td>
<td>3:00 P.M.</td>
<td>CST, Mon.-Fri.</td>
</tr>
<tr>
<td><strong>Maryland Emergency Net</strong></td>
<td>3:00 P.M.</td>
<td>EST, Sun.</td>
</tr>
<tr>
<td><strong>Michigan QMN Net</strong></td>
<td>3:00 P.M.</td>
<td>EST, Mon.-Fri.</td>
</tr>
<tr>
<td><strong>Minnesota State Net</strong></td>
<td>3:00 P.M.</td>
<td>CST, Mon.-Fri.</td>
</tr>
<tr>
<td><strong>Missouri</strong></td>
<td>3:00 P.M.</td>
<td>CST, Mon.-Fri.</td>
</tr>
<tr>
<td><strong>Missouri Mission Trunk Net (Cal.)</strong></td>
<td>3:00 P.M.</td>
<td>CST, Mon.-Fri.</td>
</tr>
<tr>
<td><strong>Mississippi</strong></td>
<td>3:00 P.M.</td>
<td>CST, Mon.-Fri.</td>
</tr>
<tr>
<td><strong>Missouri rebound Net°</strong></td>
<td>3:00 P.M.</td>
<td>CST, Mon.-Fri.</td>
</tr>
<tr>
<td><strong>Ohio Emergency Net</strong></td>
<td>3:00 P.M.</td>
<td>EST, Mon.-Fri.</td>
</tr>
<tr>
<td><strong>North Dakota</strong></td>
<td>3:00 P.M.</td>
<td>CST, Mon.-Sat.</td>
</tr>
<tr>
<td><strong>Northern New Jersey</strong></td>
<td>3:00 P.M.</td>
<td>EST, Mon.-Sat.</td>
</tr>
<tr>
<td><strong>North Central Texas</strong></td>
<td>3:00 P.M.</td>
<td>CST, Mon.-Sat.</td>
</tr>
<tr>
<td><strong>Northern Texas</strong></td>
<td>3:00 P.M.</td>
<td>CST, Mon.-Fri.</td>
</tr>
<tr>
<td><strong>Nutmeg Net (Connecticut)</strong></td>
<td>3:00 P.M.</td>
<td>EST, Mon.-Fri.</td>
</tr>
<tr>
<td><strong>New England Net</strong></td>
<td>3:00 P.M.</td>
<td>EST, Mon.-Fri.</td>
</tr>
<tr>
<td><strong>N. H. Emergency Net</strong></td>
<td>3:00 P.M.</td>
<td>EST, Mon.-Fri.</td>
</tr>
<tr>
<td><strong>North Dakota</strong></td>
<td>3:00 P.M.</td>
<td>CST, Mon.-Sat.</td>
</tr>
<tr>
<td><strong>North Central Texas</strong></td>
<td>3:00 P.M.</td>
<td>CST, Mon.-Sat.</td>
</tr>
<tr>
<td><strong>Ohio</strong></td>
<td>3:00 P.M.</td>
<td>EST, Mon.-Fri.</td>
</tr>
<tr>
<td><strong>Ohio Emergency Corps</strong></td>
<td>3:00 P.M.</td>
<td>EST, Mon.-Fri.</td>
</tr>
<tr>
<td><strong>Pelican Net (Louisiana)</strong></td>
<td>3:00 P.M.</td>
<td>CST, Mon.-Fri.</td>
</tr>
<tr>
<td><strong>Pioneer Net (California)</strong></td>
<td>3:00 P.M.</td>
<td>PST, Mon.-Fri.</td>
</tr>
<tr>
<td><strong>Pine Tree Net (Maine)</strong></td>
<td>3:00 P.M.</td>
<td>EST, Mon.-Fri.</td>
</tr>
<tr>
<td><strong>Rebel Net®</strong></td>
<td>3:00 P.M.</td>
<td>CST, Mon.-Fri.</td>
</tr>
<tr>
<td><strong>Rhode Island</strong></td>
<td>3:00 P.M.</td>
<td>EST, Mon.-Fri.</td>
</tr>
<tr>
<td><strong>South Carolina</strong></td>
<td>3:00 P.M.</td>
<td>EST, Mon.-Fri.</td>
</tr>
<tr>
<td><strong>Southern New Jersey</strong></td>
<td>3:00 P.M.</td>
<td>EST, Mon.-Sat.</td>
</tr>
<tr>
<td><strong>Siskiyou Net (Oregon)</strong></td>
<td>3:00 P.M.</td>
<td>PST, Mon.-Fri.</td>
</tr>
<tr>
<td><strong>South Carolina</strong></td>
<td>3:00 P.M.</td>
<td>EST, Mon.-Fri.</td>
</tr>
<tr>
<td><strong>Tennessee Gulf Coast Emerg. Net</strong></td>
<td>3:00 P.M.</td>
<td>CST, Mon.-Fri.</td>
</tr>
<tr>
<td><strong>Traffic Outlet</strong></td>
<td>3:00 P.M.</td>
<td>EST, Mon.-Fri.</td>
</tr>
<tr>
<td>**Trunk Line <strong>A</strong>”</td>
<td>3:00 P.M.</td>
<td>PST, Mon.-Fri.</td>
</tr>
<tr>
<td>**Trunk Line **’0’”</td>
<td>3:00 P.M.</td>
<td>EST, Mon.-Fri.</td>
</tr>
<tr>
<td>**Trunk Line <strong>’1’</strong></td>
<td>3:00 P.M.</td>
<td>EST, Mon.-Fri.</td>
</tr>
<tr>
<td><strong>Two Letter Call Net</strong></td>
<td>3:00 P.M.</td>
<td>EST, Mon.-Fri.</td>
</tr>
<tr>
<td><strong>Vermont-Green Mountain Net</strong></td>
<td>3:00 P.M.</td>
<td>EST, Mon.-Fri.</td>
</tr>
<tr>
<td><strong>Western Massachusetts</strong></td>
<td>3:00 P.M.</td>
<td>EST, Mon.-Fri.</td>
</tr>
<tr>
<td><strong>Western New York</strong></td>
<td>3:00 P.M.</td>
<td>EST, Mon.-Fri.</td>
</tr>
<tr>
<td><strong>Western Pennsylvania</strong></td>
<td>3:00 P.M.</td>
<td>EST, Mon.-Fri.</td>
</tr>
<tr>
<td><strong>West Virginia</strong></td>
<td>3:00 P.M.</td>
<td>EST, Mon.-Fri.</td>
</tr>
<tr>
<td><strong>Wisconsin</strong></td>
<td>3:00 P.M.</td>
<td>CST, Mon.-Fri.</td>
</tr>
<tr>
<td><strong>YALL</strong></td>
<td>3:00 P.M.</td>
<td>CST, Mon.-Fri.</td>
</tr>
</tbody>
</table>

---

**ELECTION RESULTS**

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

- **Nebraska**: Roy E. Olmstead, W9JOF, Oct. 15, 1946
- **Eastern New York**: Ernest B. George, W3ZEL, Oct. 15, 1946
- **Mississippi**: Harold Day, W5IGW, Oct. 15, 1946
- **Saskatchewan**: N. E. Thompson, VESCO, Oct. 15, 1946
- **Oklahoma**: Bert Weidner, W5HXI, Oct. 15, 1946
- **Kansas**: Alvin B. Ursch, WHAWP, Oct. 15, 1946
- **Oregon**: Raleigh A. Munkres, W7AZ, Nov. 22, 1946

In the South Carolina Section of the Roanoke Division, Mr. Ted Ferguson, W4BQS/ANG, and Mr. J. C. Whittington, W4FNC, were nominated. Mr. Ferguson received 35 votes and Mr. Whittington received 34 votes. Mr. Ferguson's term of office began December 2, 1946.

---

**ARRL-NET “QN” SIGNALS**

<table>
<thead>
<tr>
<th>Signal</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>QNA</td>
<td>Answer in alphabetical order of calls.</td>
</tr>
<tr>
<td>QNB</td>
<td>Act as relay between ... and ...</td>
</tr>
<tr>
<td>QNC</td>
<td>All Net stations copy.</td>
</tr>
<tr>
<td>QND</td>
<td>Net is directed.</td>
</tr>
<tr>
<td>QNE</td>
<td>Entire Net please stand by.</td>
</tr>
<tr>
<td>QNF</td>
<td>Net is free.</td>
</tr>
<tr>
<td>QNG</td>
<td>Leaving Net until ...; please guard.</td>
</tr>
<tr>
<td>QNH</td>
<td>Your Net frequency is high.</td>
</tr>
<tr>
<td>QNI</td>
<td>Reporting into Net or I report into Net.</td>
</tr>
<tr>
<td>QNJ</td>
<td>Can you copy ...?</td>
</tr>
<tr>
<td>QNK</td>
<td>Transmit message (a) to ... to ...</td>
</tr>
<tr>
<td>QNL</td>
<td>Your Net frequency is low.</td>
</tr>
<tr>
<td>QNM</td>
<td>You are QRMing ...; please stand by.</td>
</tr>
<tr>
<td>QNN</td>
<td>Net Control Station is ... (on ... ka)</td>
</tr>
<tr>
<td>QNO</td>
<td>Going out of Net.</td>
</tr>
<tr>
<td>QNP</td>
<td>Unable to copy you due to poor conditions; will call you later (or at ...).</td>
</tr>
<tr>
<td>QNQ</td>
<td>Send you information “QNC” or May I transmit message “QNF”</td>
</tr>
<tr>
<td>QNR</td>
<td>Answer ... and relay (or receive) traffic.</td>
</tr>
<tr>
<td>QNS</td>
<td>Following stations in Net.</td>
</tr>
<tr>
<td>QNT</td>
<td>Leaving Net temporarily (or for ... minutes) or I request to leave Net temporarily, etc.</td>
</tr>
<tr>
<td>QNU</td>
<td>... has traffic for you; await instructions (or QNU QNR).</td>
</tr>
<tr>
<td>QNY</td>
<td>Please request to QSY.</td>
</tr>
<tr>
<td>QNW</td>
<td>Through whom shall I relay message for ...?</td>
</tr>
<tr>
<td>QNX</td>
<td>You are excused from Net or I request to be excused.</td>
</tr>
<tr>
<td>QNY</td>
<td>Please shift to another frequency (or to ... ka) to prevent QRMing other Net stations (or to clear traffic with ...).</td>
</tr>
<tr>
<td>QNQ</td>
<td>Following new member(s) now in Net.</td>
</tr>
</tbody>
</table>

The above list of special “QN” signals has been devised to facilitate net operation. It is used in all ARRL Traffic Nets, and most of the signals are applicable to other types of networks as well. Use of this list aids speedy and orderly net sessions. Every net operator should post a copy at his operating position. Mimeographed copies are available upon request to the Communications Department. Where possible, it is suggested that net managers or net control stations obtain sufficient copies for all stations and distribute them locally.
MEET THE SCM

Clayton C. Gordon, W1HRC, Providence, Rhode Island, is one of our real old-time SCMs, having held this post continuously for “Little Rhody” since April 15, 1935.

Born in Bethlehem, New Hampshire, September 10, 1901, he now is engaged as transmission manager for the American Telephone and Telegraph Company.

Although he first became interested in amateur radio in 1915, it was not until September 30, 1933, that he received his first license, at which time he received the call he has held ever since, W1HRC. In 1940 he was issued a Code Proficiency certificate for copying on a typewriter at 25 w.p.m. HRC has been very active in field-organization affairs, having held office as president, vice-president, and treasurer of the Providence Radio Association, in addition to appointment as RM. At present he holds appointment as ORS and has just finished a term as alternate director of the New England Division. He took part in prewar Sweepstakes, Field Days, and other contests, and is active in AEC organization and participation.

The shack, which is located in the basement, contains a 6AK5 VFO, 6L6 doubler, 807 buffer-doubler and HF-100 p.p. final with a Class B modulator for 3.5, 7, 14, and 28 Mc. Maximum c.w. power is 450 watts. Receiver is an HRO. Antenna regularly used is a 7-Mc. center-fed all-band installation with tuned feeders. Portable equipment consists of a vibrator-110 a.c. combination pack to power a Pierce oscillator-6L6 final and a three-tube superhet.

Outside of amateur radio W1HRC's pet hobby is taking Kodachrome 35 mm. stills. He is very enthusiastic about mountain climbing, a sport in which he engages with his two daughters, and in which he usually beats the book time on trails.

Clayt makes a serious effort to keep amateur radio a hobby and tries to follow the “Amateur’s Code.” Therefore, he attempts to maintain an interest in many things. In QSOs it is quite common for him to draw out the other fellow and get him to talk about his interests, thus contributing to Clayt’s knowledge of his fellow amateurs.

BRIEF

W3VQX, Franklin, Pa., had a three-way QSO on 3.85-Mc. phone with WSAW, Franklin, Mich., and W9UGH, Franklin, Indiana. WSAW says there are about 31 Franklins in the 48 states so . . . you guessed it, he’s going to try to WAF (Work All Franklins).

NEW A.R.R.L. SECTION

Welcome is extended to the Yukon Section of the Vanalta Division. The new Section was created by joint action of the CGM and CM, in recognition of the activity consistently reported from the Yukon. Reports of Yukon activity should be sent to the Acting SCM until an election has been completed. His address appears on this month on page 6.

The Yukon Section becomes effective with publication of this notice in QST. Nominations for SCM in conformance with the ELECTION NOTICE should be submitted at once. With Minnesota a single Section (Dec. QST, page 79) we had one less Section. With the new Yukon Section we are back at 71 ARRl Sections.

ELECTION NOTICE

(To all ARRl Members residing in the Sections listed below)

You are hereby notified that an election for Section Communications Manager is about to be held in your respective Sections. This notice supersedes previous notices.

Nominating petitions are solicited. The signatures of five or more ARRl full members of the Section concerned, in good standing, are required on each petition. No member shall sign more than one petition.

Each candidate for Section Communications Manager must have been a licensed amateur for at least two years and similarly a member of the League for at least one continuous year immediately prior to his nomination.

Petitions must be in West Hartford, Conn., on or before noon on the closing dates specified. In cases where no valid nominating petitions were received in response to previous notices, the closing dates are set ahead of the dates given herewith. The complete name, address, and station call of the candidate should be included with the petition.

The following nomination form is suggested:

Communications Manager, ARRL (Place and date) 38 La Salle Road, West Hartford, Conn.

We, the undersigned full members of the

ARRl Section of the

Division hereby nominate .................................. as candidate for Section Communications Manager for this Section for the next two-year term of office.

Elections will take place immediately after the closing dates specified for receipt of nominating petitions. The Ballot mailed from headquarters to full members will list in alphabetical order the names of all eligible candidates. You are urged to take the initiative and file nominating petitions immediately. This is your opportunity to put the man of your choice in office.

— F. S. Handy, Communications Manager

* In Canadian sections nominating petitions for section managers must be addressed to Canadian General Manager Alex Reid, 102 Logan Ave., St. Lambert, Quebec. To be valid such petitions must be filed with him on or before the closing dates named.

February 1947

83
**ATLANTIC DIVISION**

**EASTERN PENNSYLVANIA** — SCM, Jerry Mathis, W2BEE, Ex-3BYTS now is 4EWA and hopes the fellows in this section will keep an ear peeled for him. Ex-3DUI now is 3LQV, 3DUI now has been issued to 8DUI. 84FM has engaged in round-table chew after midnight on the cover of the November issue, except 8L and 6 and handled two messages with 10 watts in one end for traffic schedules, especially with Penn Yan, N. Y.

Busted a couple of vest buttons when he saw his QSL card at 10 P.M. 3QLW is using an HT-6 and an SX-28 on 3.9, 3.5, 28 Mo. He schedules 3YA Tuesdays at 9:30 and lets the rest of the gang know what you are doing.

There is plenty of activity in the Rochester area on 144 Mo. RTB is rebuilding; RSL has a six-element beam; OVE has a three-element beam; TXB works with a vertical; PXN has a couple of 3.5- to 14-Mc. rigs on one-tenth of a watt. TEK spoke on plumber’s delights for 28 Mo. at the RARA meeting. TXB has a new “harmonica.” 1PKL, formerly 5MBT of Rochester, now is at East Norwalk, Conn., working on 14,143 kc with 30 watts to an 828B. Bill says the DX in that locality is unbelievable.

He wants to get in touch with the Rochester gang. Attendance at the RAWNY hamfest at Buffalo was near 400. ROL won first prize, an HQ-120X. UPI and Alternate Director 8SNB attended. Speakers were R. Rowe, 2FMF, W. C. Louden, Lt. Comdr. C. Cummings. UXL now is JR; QDN is 01, LUV and RUI are mobile on 28 Mc. While on vacation PXN kept schedules with ROL from various places. BAG, SOK, 1RJ, and QAG have crystal-controlled rigs on 144 Mc. as well as superhet. At the last meeting of the KBT Club, Ernie Graf gave a very interesting talk on DX, and put together with sound films. RUI and LE have new “harmonics.” PXN, PUB, UVE, VEX, CUL, and PUT are on 28 Mc. PMA is on 40 Mc. on all bands. FXQ now is 0Y. QSN is on 3.5-Mc. c.w. FOH, VTH, UHI, and PFX are on 7-Mc. c.w. An urgent message from Niagara Falls was delivered in two hours to an Army captain in Manila. OVP contacted K6FSE at Hawaii, who in turn contacted an amateur at the captain’s Army base in the Philippines.

The next morning Manila called OVP but because of OVP’s low power he was unable for the OVP message was received by OVP via 6TIK but because of OVP’s low power he was unable for the OVP message was received by OVP via 6TIK but because of OVP’s low power he was unable for the OVP message was received by OVP via 6TIK but because of OVP’s low power he was unable for the OVP message was received by OVP via 6TIK but because of OVP’s low power he was unable for the OVP message was received by OVP via 6TIK but because of OVP’s low power he was unable for the OVP message was received by OVP via 6TIK but because of OVP’s low power he was unable for the OVP message was received by OVP via 6TIK but because of OVP’s low power he was unable for the OVP message was received by OVP via 6TIK but because of OVP’s low power he was unable for the OVP message was received by OVP via 6TIK but because of OVP’s low power he was unable for the OVP message was received by OVP via 6TIK but because of OVP’s low power he was unable for the OVP message was received by OVP via 6TIK but because of OVP’s low power he was unable for the OVP message was received by OVP via 6TIK but because of OVP’s low power he was unable for the OVP message was received by OVP via 6TIK but because of OVP’s low power he was unable for the OVP message was received by OVP via 6TIK but because of OVP’s low power he was unable for the OVP message was received by OVP via 6TIK but because of OVP’s low power he was unable for the OVP message was received by OVP via 6TIK but because of OVP’s low pow
In this series of articles about phonograph reproduction, we have said very little about speakers. They are, of course, one of the most important (and most expensive) elements in the entire reproducing system, and we can hardly finish off this series without saying anything about them.

If you are a perfectionist in phonograph reproduction who spends all his spare time tinkering with turntables and amplifiers, who guards each record from even a fingerprint lest it increase surface noise, who won't allow furniture to be moved because it will change acoustics and who reads the Journal of the Acoustical Society for relaxation, then we will not tell you what speaker to use, for you will disagree with us. We have the greatest respect for you, for we admire your technical skill and enjoy listening to your instruments, but this page is not for you.

This page is for the men who like to listen to records but with whom phonographs are neither a hobby nor a profession. If you fall in this class, there is some advice we can give you.

Whatever speaker you use, do not drive it to the limit. Speakers overload, and they will give objectionable distortion long before they rattle. For instance, even at volume levels you might use in your own living-room, half a dozen 12-inch speakers will give purer tone than one 12-inch speaker. You probably will not care to go this far, but for the best tone you will want generous speaker capacity, no matter what type of speaker you use.

You should expect to do a bit of tinkering with the balance between highs and lows. You will have to make adjustments to suit the speaker you use, the acoustics of your room and the make of records you prefer. This sort of tinkering is rather good fun, if there is not too much of it. You will find that your difficulties increase with the frequency range you mean to reproduce. If you aim for a range up to fourteen thousand cycles, you will find that you have a real job on your hands, while if you cut off at about five thousand cycles it is easy. Between these two extremes there is a lot of ground and you can suit your own preference. However, remember that most of the records you buy over the counter have little useful range above eight thousand cycles and many of the poorer records sound best with an even narrower range.

Having given a lot of reasons why it is sensible not to aim for too fancy a job in record reproduction, we confess that we are going to shoot the works ourselves. We may report to you on our results some day, but only after we have carried out a lot of experiments. We try to keep our advice on this page accurate and this is a field where it is easy for a man to fool himself. In the meantime, we shall study up on the Journal of the Acoustical Society.

William A. Ready
during November. 17, Messages handled totalled 117, with the following stations participating: KLW (Alt. NCS), LAC, DBC, KQG, OMA, 87WA, 3KJO, FWJ, TDY, 36K, TWJ/4, and TOJ (NCS). The newly-elected officers of The Amateur Transmitters Assem. of W. Penna. include: NUG, KSP, MPO, KWA, UST, UHN, LAH, UL, OB, LEM, SGH, and BWP. Meetings are held on the first Friday of each month in the Buhl Planetarium, Pittsburgh. RUE reports the members of the Pittsburgh area "50-Mc. Gang" include: SEFG, OMY, SPF, KSP, KXI, RUE, and SJM. QSLing inputs range from 40 to 70 watts, with all stations using vertical horizontal antennas. Anyone interested in arranging schedules on 50 Mc. is requested to contact RUE.

KWA worked G2CvY on 3.5 Mc. TDJ now is 7KIY, and operates on 3.5 Mc. from Glenrock, Wyo. QSM is continuing o.c. transatlantic, AFR operating practice, etc., on the air. Let's all cooperate for better conditions. MUX sends in following: Official Observer work but traffic problems. Appointments are open for PAMS as well as OBS, OBS, OFS, EC, and OES. Let's get active, fellows. WFS worked eighteen stations during one morning on 28 Mc. 73. "Wes." has his new Gonset 28-Mc. converter working. M-a&e totalled 117, with Calls to Kansas, Wisconsin, Illinois, Michigan, and general bull aeeslon. 73. "Wes."

Illinois — SCM, Wesley E. Marriner, W8AND — Northern Section RM: Lloyd Hopkins, EVJ, 27 Lynch St., Elgin. Southern Section RM: Louise Baker, JTX, 635 North. Director of Instruction, WAB, 257 West. Louise, WAB has been trying to remove parasitic oscillations from a pair of 807 tubes in 28-Mc. 'phone transmitter, and is installing noise limiter in HRO receiver. First postwar DX contact for WA was with ON4AX on 7 Mc. QSL worked twenty-five countries in one week. BWP is doing fine job as OO on 14-Mc. 'phone. KWL is member of T/LAP. UVM is heard working 8-Mc. 'phone. CB worked "EBF" station on 7 Mc. with his new exciter. LOD has been getting good noise limits in 28-Mc. 'phone transmitter, and is attracting o.c., 144-Mc. transmitter with 832A final. LYC is putting out his notifications via QIN. QLW is our high traffic man

Traffic: W3KWL 1114, MJK 138, KWA 123, TOJ 102, KQD, MIE, YA, 13, WBEZ/7, 38, BWP 7, AVY 47, 73.

Central Division

Traffic problems. Anyone interested in traffic. The YL Club meeting held Dec. 17th, in the Buhl Planetarium, Pittsburgh. RUE will be in 10th place.

Traffic: W3KWL 1114, MJK 138, KW A 123, TOJ 102, KQD, MIE, YA, 13, WBEZ/7, 38, BWP 7, AVY 47, 73.

Central Division

Traffic: W3KWL 1114, MJK 138, KW A 123, TOJ 102, KQD, MIE, YA, 13, WBEZ/7, 38, BWP 7, AVY 47, 73.

Traffic: W3KWL 1114, MJK 138, KW A 123, TOJ 102, KQD, MIE, YA, 13, WBEZ/7, 38, BWP 7, AVY 47, 73.
Hams are pretty shrewd individuals when it comes to selecting the gear they use. Many thousands knew what they wanted — they're using HQ-129-X receivers on the air every day. That, we believe, is one of the finest endorsements any product can achieve. Materials are still hard to get but hundreds of HQ-129-X's are being shipped every month.

36 YEARS OF KNOW HOW

HAMMARLUND
THE HAMMARLUND MFG. CO., INC., 460 W. 34TH ST., NEW YORK 1, N.Y.
MANUFACTURERS OF PRECISION COMMUNICATIONS EQUIPMENT
and reports two new hams will be on soon. MUM teaches code at Eau Claire Vocational. ARJ is getting ready to blossom forth with a kilowatt. The Racine gang held a QSO party on the air recently which was a great success. Your SCM spoke at Racine on Nov. 28th, along with GFI. Your SCM also enjoyed appearing at the South Bend Club's meeting on Nov. 25th. OVL has visited many clubs in the Wisconsin area. YPP sends in a nice report on the Madison gang. They are located at West Point, and is operating as 9SYA/2 or 2KGY and wants Wisconsin contacts on week-ends on 14-Mc. 'phone. The MRAC held an annual bowling party Dec. 7th with a big turnout. By the time you fellows read this, I will have given up the job of SCM of Wisconsin and will be working as the new Connecticut Division Director. I ask you at this time to please cooperate with your new SCM and give him the same assistance as that tendered me during the past several months. Traffic: W8FK 104, DJF 14, EID 22, NWW 15, ARB 12, QRM 8, IQW 2. 73. Rich.

**DAKOTA DIVISION**

**NORTH DAKOTA** - SCM, Raymond V. Barnett, W8EVP - The North Dakota Net has been reactivated with schedules at 6:00 p.m. Mondays, Wednesdays, and Fridays on 20-Mc. with later contacts with Minnesota and Montana. We need more ORS. Let's hear from you on our net schedules or send an application by mail. YIZ reports a newly-formed club at Jamestown with E9Q, GWU, W2JJ, and W5VF - President - E9Q, W2JJ, and W5VF. The Central Club received log books, message blanks, *Handbooks, etc.*, ordered from ARRL, and they sold like hotcakes. DAR is attending the university in Minneapolis. RJF moved to Minnesota. GCM is active as W5CQV on 3.5-Mc. AFK is active as 7-Mc. ZLP moved to Dayton, Ohio. BSF lacks only Nevada and South Carolina for WAS with 15 watts input. HBR has a new home at Watford City and has 40 watts on the air. We need more reports by the fifth of each month. There are new hams in Rapid City. NGM is on 28-Mc. 'phone. KoJ has 40 watts on the air. We need more reports by the fifth of each month. A card will do. How about it, fellows? Traffic: W8PDSN 21, SSW 15, EVP 6. 73. Roy.

**SOUTHWEST DAKOTA** - SCM, P. H. Schultz, W5QYQ - ZAL, ZBU, and DJM are taking care of the emergency net in the county. DJM is experimenting with 28-Mc. antenna. WUU put up 256-ft. center-fed antenna. IWE is now in Rapid City. NGM is running 275 watts to a 813 on all bands and has a 25-watt emergency rig using a gas-engine generator. YQG has an SX-26 waiting for R.E.A. line to come near him. INT, LBT, YTN, and ZTR are Huron Club members. The Sioux Falls Club now has thirty-five members. Permanent meeting place is in the recording room of the Municipal Church. The theory station, under IPB, is building a 100-watt station for the club. CRY has worked ten countries on 28-Mc. ZRA is on with 14-Mc. 'phone contacts with South America. 73.

**MINNESOTA** - SCM, Vernon G. Pribyl, W5QI - Acting SCM is Donald G. Przbyle, WM3MC - SJZ finished a new final using push-pull 813s. He checked with the several contacts on low bands. He will build another for harmonics. Incidentally, it would not be a bad idea for the rest of us to do that. Several stations have been logged for harmonics. DNY got in on the several contacts and is rebuilding his receiver pending more activity. The JCN is operating every Sunday on 3550 kc. GBZ has fun with his harmonica. DNY got in on the BS Contest and now reports that local rag-chews are held every night on 28-Mc. with the Minneapolis gang. GQZ has an IXB-final with 50 watts on 28-Mc. c.w. He's looking for a new receiver. BOL is on 3.5-Mc. c.w. with a BC-376 transmitter and a BC-348 receiver. He is working on a 60-ft. rainpipe mast antenna for 3.5 Mc. EMC finally got the bugs out of his antenna system and is active on 3.5 and 7 Mc, with 125 watts to push-pull T220E. Both Minnesota nets are going along now, with a near-perfect attendance at all sessions. Your activities reports are to be sent to W8EVP at Mound, Minnesota, who will act as your SCM until an election has been held. Traffic: W8OMC 28, E5P 28, QRJ 6, JNC 2, RJF 2. 73. Vern.

**DELTA DIVISION**

**ARKANSAS** - SCM, Marshall Riggs, W5JIC - LUX is on all bands with 50 watts to an 807. LQG is on also. LQG has an IXQ-19X and is threatening to give up. W5L is on 14-Mc. for 14 Mc. LLO has cathode-modulated rig on 28 Mc. HAT has new receiver. LV8 has new frequency meter, so watch your step, boys. He also worked a VQ4 the other day on 28,580 kc. AYH ruined his modulator working ZKIAA. He has 15 watts in the SS Contest, making 10,000 points. LID is on the air with 50 watts on 7 Mc. LQZ has mobile rig. Better watch that battery. DFY is rebuilding his beam. DVI is constructing rhombic on 14-Mc. ENG is on all bands. JAT has extended double Zepp for 7 and 14 Mc. and is re-attaching to an extended double Zepp for 7 and 14 Mc. OLF has a new 28-Mc. beam. YKJ is working 28- and 14-Mc. 'phone. 73.

**TENNESSEE** - SCM, James W. Watkins, W5VT - KTE, RM and chief of LSN, 3550 kc., is looking for schedules leading to Panama and South America. GAD has new Millen unit. GUKC is on 7 Mc. ARK has 7 Mc. W51GW 307, SSW 15, EVP 6. 73.

**(Continued on page 60)**
EMPTY SOCKETS
with a purpose

These spaces are reserved for three more Eimac 75T triodes.

Putting a transmitter together by the following steps cuts several financial corners. Starting from 250 watts input and going to 1000, there is no need to discard any parts as you go along:

1. As illustrated above, space is left in the original layout for four Eimac 75T triodes but only one is used—input: 250 watts.

2. A second Eimac 75T is added to operate in push-pull with the first—input power: 500 watts.

3. Finally, another 75T is put in parallel with each of the original pair and the ultimate kilowatt of input is attained.

Whether a transmitter is built by this system or with full power right from the start, Eimac 75T’s offer a number of remarkable advantages. These include:

- Exclusive emission-controlled grids for stability and efficiency.
- High power gain.
- Low interelectrode capacitances.
- Low plate-voltage operation.
- Optimum grid, plate, and cathode geometries from aspects of transit time, electron migration, and thermionic efficiency.
- Ability to withstand momentary overloads without damage.
- Moderate cost — $10.50.

Write for full details on the Eimac 75T triode and the add-a-tube transmitter.

EITEL-McCULLOUGH, INC.
1294M San Mateo Ave., San Bruno, Calif.
Export Agents: Frazar and Hansen, 301 Clay St., San Francisco 11, Calif., U.S.A.

Follow the leaders to
Eimac TUBES
very informative discussion was held after his interesting talk. ODG is now active on 14 Mc. and has received a new YLJ-20. KGY is very active on 7 Mc. PFI is moving to Fort Wayne, Ind. Best of luck, Wayne. KFF is new call at Crab Orchard and he is active on 7 Mc. using a single 6L6. He now has thirty-three stations, a few VEs, and enjoys to big a crystal ball, we are unable to know what is happening and where. Unless reports are sent to your SCM it is impossible to fill our allotted space. If the present trend is any indication of the future, the name 200 meters has been abandoned and most activity is coming on the 30 meter band.

GREAT LAKES DIVISION

KENTUCKY — SCM, Joseph P. Colvin, W5IEZ/4 — It is now 4DA. 4FYW/4 is on 3.9 Mc., 'phone at Central Office. KA9S is WOB and KA9O is 3.7 Mc. KA8Q is 3.73 Mc. with 40 watts to 507, and would like to QSO 9SA 70.5 Mc. ex-9VBN, has HZ-9 on 28, 14, and 3.5 Mc. 'phone and c.w. 4PU, ex-9FS, has given Kentucky a place in the Brass Racket net. The net is being maintained from the Hotel Ontario, 571-573 Main. XKIS is on 30 Mc., with a 34-element beam. The net also meets at Delaware, anyone interested is requested to put your 'phone traffic. Information is requested on any 2.5-3.0 Mc. c.w. or 3.6-3.5 Mc. c.w. nets, or stations operating into traffic nets. Recent ORS appointments include BUM, 4QJU, and 4KMM. ORS certificates have been issued to BUM, 4KMM, and WBC. How about more of you applying for ORS or OSS? It now is 4QI with Rayboyn at Bedford, Mass. and is on QSO 400 Mc. 28 Mc. and 7-Mc. c.w. ZOB/4 is operating at 4QI with 40 watts to 807, and would like to QSO 9JON/8. 4MO, ex-9BUE, is on 28 Mc. and schedules are maintained on 28 Mc. 9HOE/4 is operating at 28 Mc. but has no coils for other bands yet. SSCW is assistant SCM and would appreciate any contacts. 4AXY has a new band-painting transmitter on the air. 4YAL says hill beam quit working, but we think someone else just got a new 7-Mc. beam. 73.

OHIO — SCM, William D. Montgomery, W6PNQ — The Buckeyes Net (c.w.) on 3730 kc. meets every weekday night at 7:30 P.M. More outlets are needed throughout Ohio, especially in the southern area. We announced the formation of the Buckeyes Net (c.w.) to put your 'phone traffic. Information is requested on any 2.5-3.0 Mc. c.w. or 3.6-3.5 Mc. c.w. nets, or stations operating into traffic nets. Recent ORS appointments include BUM, 4QJU, and 4KMM. ORS certificates have been issued to BUM, 4KMM, and WBC. How about more of you applying for ORS or OSS? It now is 4QI with Rayboyn at Bedford, Mass. and is on QSO 400 Mc. 28 Mc. and 7-Mc. c.w. ZOB/4 is operating at 4QI with 40 watts to 807, and would like to QSO 9JON/8. 4MO, ex-9BUE, is on 28 Mc. and schedules are maintained on 28 Mc. 9HOE/4 is operating at 28 Mc. but has no coils for other bands yet. SSCW is assistant SCM and would appreciate any contacts. 4AXY has a new band-painting transmitter on the air. 4YAL says hill beam quit working, but we think someone else just got a new 7-Mc. beam. 73.

MICHIGAN — SCM, Harold C. Bird, WSDP—8URN sends congratulations and thanks for ORS. 8TBH reports that Mr. Weston and Jerry Beesley visited the Michigan Amateur Radio Club recently. SWUF is handling traffic in QMN. SXF is working on a pi-network four-ft. rod antenna for receiving the traffic man. SUUG worked 43 sections during SS Contest on 14, 7, and 3.5 Mc. 'phone and c.w. 4PU, ex-9FS, has given Michigan a place in the Brass Racket net. The net is being maintained from the Hotel Ontario, 571-573 Main. XKIS is on 30 Mc., with a 34-element beam. The net also meets at Delaware, anyone interested is requested to put your 'phone traffic. Information is requested on any 2.5-3.0 Mc. c.w. or 3.6-3.5 Mc. c.w. nets, or stations operating into traffic nets. Recent ORS appointments include BUM, 4QJU, and 4KMM. ORS certificates have been issued to BUM, 4KMM, and WBC. How about more of you applying for ORS or OSS? It now is 4QI with Rayboyn at Bedford, Mass. and is on QSO 400 Mc. 28 Mc. and 7-Mc. c.w. ZOB/4 is operating at 4QI with 40 watts to 807, and would like to QSO 9JON/8. 4MO, ex-9BUE, is on 28 Mc. and schedules are maintained on 28 Mc. 9HOE/4 is operating at 28 Mc. but has no coils for other bands yet. SSCW is assistant SCM and would appreciate any contacts. 4AXY has a new band-painting transmitter on the air. 4YAL says hill beam quit working, but we think someone else just got a new 7-Mc. beam. 73.

HUDSON DIVISION

EASTERN NEW YORK — SCM, Ernest E. George, W2HHL — 1XX reports from the Poughkeepsie area that NOF is hosting a sixteen-element beam. The Middletown gang is going great guns on 144 Mc. and challenges the Mid-Hudson area to hit around 144 Mc. alone. The Poughkeepsie guys are working 144 Mc. crystal from 8211 with an 832. GYU, on 144 Mc., with 300 watts, is burning all up receivers in town. SSY, CRE, and MXR are making the most of the Jeffcato bunch. DM is hammed on 144 Mc. and is working 28 Mc. He has a new antenna pole which turned out to be no stiffer than a good piece of new 2" rope. He still can't figure how the Army used those poles. The BNT traffic net is now operating on a small scale under the direction of R. H. McPeek. R. H. McPeek has some activity low this month in the lower part of the division.
Be Right with... OHMITE

AMATEUR ITEMS

Accurate—Dependable—Long Lived

Vitreous Enamed Rheostats

Available in 10 sizes, from 25 to 1000 watts. Winding is permanently locked in vitreous enamel. The metal-graphite brush provides unmatched smoothness of action. Engineered for long, trouble-free life.

Non-inductive Resistors

Used as dummy antennas, load resistors, and terminating resisters. Available in vitreous-enamel type wound on a tubular ceramic core, and in hermetically sealed-in-glass type. Sizes from 50 to 250 watts.

Transmitter Band Change Switch

For the rapid, convenient changing of transmitter frequency by front-of-panel knob control. Designed for circuits up to 1 kw rating. Low loss porcelain and metal construction. Units can be mounted in tandem on a single frame.

Parasitic Suppressor

Designed for the suppression of unwanted ultra-high frequency parasitic oscillations. Consists of a 50-ohm vitreous enameled non-inductive resistor supporting a choke of 0.5 microhenries and .003 ohms d-c resistance.

Radio Frequency Plate Chokes

These chokes have a single layer winding on a steatite core, protected by a moisture-proof coating. Five sizes available to cover 2½, 5, 10-20, 20-40, 20-40-80-160 meter bands. All chokes have a 1000 ma rating.

Dependable Resistors

A complete line of wire wound vitreous enameled resistors, from 10 to 200 watts. Available in the fixed type and adjustable "Dividohm" type. "Little Devil" ½, 1, 2-watt composition resistors also available.

OHMITE MANUFACTURING CO., 4864 Flournoy Street, Chicago 44, U. S. A.

Write for Catalog No. 18

Provides useful data on the selection and application of rheostats, resistors, tap switches, chokes, attenuators, and other components.
MISSOURI - SCM, Mrs. Letha A. Dangerfield, W1UAW - PAH, the new Section EC, announces he intends to keep essentially the same set-up in the organization of the section as was used previously. He urges all Former Corps members and ECs to write him for reactivation of appointments. And of course he wants to hear from new ones, also. Down Coffeyville way, LQS and his YF announce the addition of a Jr. operator to the staff. A YLI YLY is working; some choice QSOs with 5LVT, BPV and his nephew, ODS, are conspicuous by their absence on 144 Mo. LTK's 144-Mc. rig is one of the nearest in these parts. The MARS, a new radio club, held its first meeting recently. For DXers any non-MARS 144-Mc. station in Brooklyn, or OHE. (How about sending the QTH to the poor SCM?) NWA and BGI, assisted by KU, put out a strong signal on 144 Mo. How about joining the group? (See 3FL, W1UAW's 145-Mc. rig.) How has call J7UP in Topeka like mushrooms. DJL had a little harmonic trouble. OWQ urges CP-30 for 28 Mo. FLZ has T40. final modulated with T40X on 3.9-Mc. 'phone, and is on the air, thanks to the editor of Bandapread.

NORTHERN NEW JERSEY - SCM, Charles Ham, jr., W2KDC - From Suffolk, DOG report. in a number of fine letters were received from the IRU. KANSAS-SCM, Alvin B. Unruh, W1LAW - PAH, the new Section EC, announces he intends to keep essentially the same set-up in the organization of the section as was used previously. He urges all Former Corps members and ECs to write him for reactivation of appointments. And of course he wants to hear from new ones, also. Down Coffeyville way, LQS and his YF announce the addition of a Jr. operator to the staff. A YLI YLY is working; some choice QSOs with 5LVT, BPV and his nephew, ODS, are conspicuous by their absence on 144 Mo. LTK's 144-Mc. rig is one of the nearest in these parts. The MARS, a new radio club, held its first meeting recently. For DXers any non-MARS 144-Mc. station in Brooklyn, or OHE. (How about sending the QTH to the poor SCM?) NWA and BGI, assisted by KU, put out a strong signal on 144 Mo. How about joining the group? (See 3FL, W1UAW's 145-Mc. rig.) How has call J7UP in Topeka like mushrooms. DJL had a little harmonic trouble. OWQ urges CP-30 for 28 Mo. FLZ has T40. final modulated with T40X on 3.9-Mc. 'phone, and is on the air, thanks to the editor of Bandapread.
The Tri-tet crystal oscillator can be a source of pride and joy—or it might be a first-class rock crusher. This has been discussed in many articles over the past years. Completely satisfactory performance, without casualties, can be obtained if you:

1. Use reduced plate and screen voltages when you tune up and whenever you change the cathode tank tuning.

2. Always tune from the low C side until maximum output is obtained. See curve shown on this page and avoid cross-hatched danger zone.

3. Unless you have a well screened tube such as an 802, never use a Tri-tet for straight through operation without shorting out the cathode tank. Use a switch, not a bent plate on the cathode condenser. Tuning through full capacity to short out the cathode circuit by means of a bent condenser plate takes the tuning through the danger zone.
WHEN YOU NEED A
PAPER TUBULAR FOR YOUR
RIG, SPECIFY MALLORY
FOR DEPENDABILITY

For communication work you need the best. Failure takes you off the air, and it may result in damage to other valuable components. That’s why experienced communication engineers specify Mallory T P Condensers. They give an added margin of safety, but they cost no more.

And here are the reasons why Mallory T P Condensers last longer:

1. Better impregnation eliminates moisture absorption
2. Better sealing produces longer life
3. Better quality control during manufacture produces longer life

You can find the size and value you want in the Mallory Approved Precision Products Catalog. No other manufacturer’s line is more complete. Order from your Mallory distributor.

P. R. MALLORY & CO., Inc.
INDIANAPOLIS 6 INDIANA

(Continued from page 28)

drive an 807. CU is building an a.e.o. for his all-band kilowatt rig. QXO again made highest traffic score. KJK ran into trouble trying to rebuild power supply for SS Contest and made only nine contacts. DBA applied for ORS and OBS renewals; he relayed three messages on 7 Mc. OPB worked twenty stations the first week end of SS Contest, using 807, but missed the second week end. EYM had antenna trouble from high winds. QJF says a number of the fellows in the Joplin area have a round table on 26-Mc. ‘phone almost every night. OUD still is working on the Missouri traffic net on 3775 kc. at 7 p.m. nightly. The net needs more operators and more traffic. Traffic: WFQQXO 90, KJK 30, CRM 14, OUD 8, DEA 3, EYM 3, 73 and HNY to all.

NEBRASKA — SCM, Roy E. Olmstead, W8FOB — Was certainly surprised to learn that I had been nominated (and elected) as your SCM. My first thought is to express the thanks and appreciation of all Nebraska amateurs to Art Gaeth, W8FOB, for the superb management and service he has given us during the past term. BQP is working on 3.5 and 14 Mc. and wants traffic. TRB is active on 7 Mc. ESM has new NC-2400 and an 807 on 7 Mc. MLB, SEC, wants used receiver. EWO says DDT is not good for bugs in his rig. JTJ is on 29-Mc. f.m. ‘phone. GTC owns a new SX-42. VKT transferred to Cleveland. FQB’s 28-Mc. beam was K9ed by his friend and was replaced with a 7-Mc. doublet. The Ark-Sar-Ben Radio Club elected FQB, QXR, EKK, and VHS as officers for ’47; KBS, after service in the merchant marine, is planning ham activity with AR-88 and ART-13; DMW is active with pair of 24Gs. GPX has new HRO rig. EXP is erecting novel 14-Mc. beam. COU has WAA rig. BW’s 28-Mc. rotary still is grounded. SAI is active on 7 Mc. TMK put DB-20 ahead of his Howard receiver. OHU swapped his multi-crystal exciter for an a.e.o. FBN is erecting a 28-Mc. building. RQK is doing SB Job reporting from North Platte sector. DLX and LWV are about to push switch on rigs. YLC is home from war work in Washington. GBR is active on 7 Mc. at Hastings. Several section appointments have expired and will be cancelled if not returned for endorsement. For the present the State Net is 3745 kc. at 8:00 CST. TQD will act as net control and handle your traffic. Traffic: W8TQD 366. "Pop!"

NEW ENGLAND DIVISION

CONNECTICUT — SCM, Edmund R. Fraser, WIKQY — RM VB has the Nutmeg Net operating smoothly. Stations are needed in Stamford, New Britain, Waterbury, Wallingford, New London, Bristol, and Norwich. Club News: SARC: PLI is on 7 and 144 Mc. Corfis has an HRO and a TR-4. OGG, EC, has FSY, QXR, AKP, EPN, ERK, BRL, and NWQ assisting him in Red Cross weekly drills. BARA: ACV, now FC, runs a kw. into 4-125As. OPG completed buffer and 354 final. NHARA: 1PHX and 2PHX activated KAT. MM’s new antenna is working fine. ARK is starting new code and theory classes. FMV operated GB during the SB. NARL: DXT reports the club now is an ARRL affiliate. AVN, EC, requests cooperation of Newington fellows in the Joplin area. General news: CTI is building a 10 x 14 shack in the basement. FSH has new Melander transmitter. ING and EQY worked UX6GRL, ex-W6GRl, in Nanking. KKS reports: KV4AD and H9B9G visited AW. MHF has a new shack, SX-25, and Millen exciter. EKY has an S12 on 3.5 Mc. P122 is using p. S12 final and two-element beam on 28 Mc. DJC is using cathode modulation with p. S16 on 14 and 28 Mc. IJO is building a kw. EJT has 350TH on 14 Mc. DAV and LMK are having private DX contest. FVP has new HRO STA. BAX is on 7 Mc. KE8 has 37 countries on 28 Mc. with 30 watts. JTD has 210 Hartley on 3.5 Mc. OND has two-element beam on 38 Mc. BEQ Waced in four hours on 28 Mc. ‘phone with his XYL, NJJ, at the mike. 2AM1/1, EPO, EMF, and ATE are on 14 Mc. ‘phone. KAK, BPY, KLM, and FHE are on 28-Mc. ‘phone. The Screwball Net (NNQ NCS) is active from 10 to 11 nightly on 28 Mc. ABU has two-element beam building p.p. S16s for 28-Mc. ‘phone. HVF has over sixty countries deadwaxing kv. on 14 Mc. The Manchester Radio Club meets at the YMCA every other Monday night. EDL and ITI have new Super-Pro receivers. SCS has three-element beam on 28 Mc. JPB has kw. on 14 Mc. LXX is on 28 Mc. with 15 watts. JTPX is working DX on 14 Mc. JFR is v.f.o. FVQ has HRO STA and multivibrator. Former Navy

(Continued on page 98)
TEMCO TRANSMITTERS are top notch DX performers and here are the important reasons why. Every amateur knows that power input does not govern the DX capabilities of a transmitter ... power output is the determining factor. That's why Temco stresses engineering for higher circuit efficiency — to assure maximum power output for every power input rating — and every Temco is conservatively rated.

Frequency flexibility is another reason, for, every Temco features a VFO with crystal-like stability always enabling you to find a spot for a QSO no matter how congested the bands may be. And the distinctive, clear-cut, clickless keying of a Temco assures a fine signal for the CW operators.

Add to this, strength and stability of the carrier ... freedom from hum and spurious radiations ... complete absence of splashing and you have additional reasons why Temco Transmitters pull in the DX everytime you tune over the band.

Let these reasons be your reasons for selecting a Temco and then settle down to a lifetime of "fine business" and R-9 pluses.

A. 1000-J6 For point-to-point commercial service featuring Temomatic Instantaneous Frequency Selection. You turn the switch ... the Temco does the rest, 1 KW output.

B. 75-GA. Amateurs have already reported WAC on phone with this mighty little powerhouse of the air waves.

C. 500 GA Originally underrated at 750 watts input. Actually performs at a conservative 1 KW input ... a bonus of 250 watts at no extra cost.
radio men, interested in maintaining their rates and advancement, are invited to join the organized Naval Reserve unit of Hartford. Members are paid for each weekly drill attended aboard the USS LST 722. Navy communication equipment is available and a Navy network is planned. There are two week-end cruises per year with full pay and allowances. If you are a Veteran of World War II and interested in your Navy whether a licensed amateur or not, communicate with John M. Murray, W2AMD, 11 Keeney Ave., West Hartford, stating your experience and rate. Traffic: W1UE 413, VB 295, BFW 197, KQG 148, JMY 104, CTY 65, DAY 64, ORP 52, AW 48, NJS 47, LOP 35, APB 28, AMQ 27, OB 17, TD 9, IC 8, BHM 8, BIR 6, CIA 6, TTT 5, GB 5, 72, ED.

MAINE — SCM, G. C. Brown, W1AQL — The U. of M. Radio Society has been revived with a fine membership of twenty-five, ten of which are licensed operators. MBL has been elected president of the club. EZR reports that AWC and OGS are engineers at WAGM, Presque Isle; COM is engaged in radio sales and service, assisted by COV; the Lewiston-Auburn Club has joined the League; KTT is on 3.5- and 28-Mc. phone. HST works DX on 7 Mc. with 6L6. A nice letter was received from LIP, now located with the Magnavox Company in Fort Wayne, Ind. Bob says he is planning a 28-Mc. mobile job. LKP still is interested in making schedules during the afternoons. AI is busy during these days servicing oil burners. BQU recently visited the XYL's folks in Canada. FQ is back with the New England Tel. & Tel. Co. and has a position on the staff of the Eastern Division. ERO was a visitor in Brewer recently. BLF is on 14-Mc. phone. We are pleased to report that MAW has returned from the sanatorium and is much improved in health. EZR visited OHT recently. If present plans materialize you will have a new SCM in the near future. GEG, Old Orchard, has consented to be a candidate for the job. Your present SCM wishes to thank all of the gang who were so cooperative in making it possible to have a worthwhile Maine Section. Best of everything to all of you. Traffic: W1IMXT 9, LKP 6, "G.O."

EASTERN MASSACHUSETTS — SCM, Frank L. Baker, jr., W1ALP — New ORS: LML and CCF. AAR, WI, and HA renewed ORS appointments. KTG and KYX are carrying on as ECs. The following have been issued new Section Net certificates in the Eastern Mass. Net: KZT, BPF, EPE, FGT, EMG, OUD, JYJ, KYU, JCX, and BDU. Ex-2CLM has new call, 1CLM. Ex-5PFK new call is FMJ, SFGR is on 28 Mc. FJX and GRY are on 3.9-Mc. phone. IBIBGI was a visitor at the Eastern Massachusetts Club meeting. PMD and JIR are on 144 Mc. DFS/2 is on 3.9-Mc. phone. FPQ and HYK are on 28 Mc. Louis Giovanini now is PJE, Ex-3LWU, and IPEX, is on 3.5 and 7 Mc. New ORS appointment. Ex-SHIWI, now IPIXH, gave a talk before the EMC on crystals. ONZ is on 14-Mc. cw. and 28-Mc. phone. He has a new four-element beam on 28 Mc. JXU has a Workshops beam on 28 Mc. OUM made 344 contacts the first week of the SS Contest. New officers of Yankee Radio Club: NLU, pres.; NVB, vice-pres.; AMT, treasurer; LQW, secy. CTW gave a talk before the Brockton Amateur Radio Club. OEK is on 144 and 3.5 Mc. Ex-9JSU now is FPK on 144 Mc. NXJ is working on 144-Mc. crystal job. KYX is on 7-Mc. cw. and 144 Mc. AAR and MON want to get a net going on 28 Mc. in New England. KTG is working DX. The T-9 Radio Club had a Christmas Party at IBF.

PREFERRED BY ENGINEERS

BURGESS BATTERIES

RECOGNIZED BY THEIR

STRIPES • REMEMBERED

BY THEIR SERVICE

(Continued from page 94)
Send the good wife a valentine . . . show her that romance still lives . . . and make this February memorable! Then, if you'd like to do something a little more practical to make the XYL happy, modernize the family phonograph with a new Astatic Pickup Arm.

Hams, as a rule, like things to operate smoothly, and if the phonograph is "off color or acting up," Astatic's new Model Nylon-508 Pickup, equipped with the very latest Nylon 1-J Cartridge may not alone enhance the appearance of your set but improve, appreciably, the fidelity of reproduction. See your Radio Paris Jobber or write for literature.

**Astatic**

97
Be in a position to command a "key" job in the growing TELEVISION Industry by preparing now with the type of thorough, practical TELEVISION Engineering training that the industry requires. The new CREI TELEVISION Engineering course is (1) A complete well-coordinated course of study that covers the entire field of practical TELEVISION Engineering, (2) Presented in CREI'S professional and proven home study form, based on actual experience in our own TELEVISION Studios and Laboratories, plus years of TELEVISION Engineering, (3) Prepared by CREI'S experienced staff, based on actual experience in our own TELEVISION Studios and Laboratories, plus years of TELEVISION Engineering, (4) Presented in CREI'S professional and proven home study form, based on actual experience in our Television Engineering, (2) Presented in CREI'S professional and proven home study form, based on actual experience in our own TELEVISION Studios and Laboratories, plus years of TELEVISION Engineering.

Now—Plan for a Good-Paying Career Job in TELEVISION

New CREI Home-Study Course in Practical TELEVISION ENGINEERING

Be in a position to command a "key" job in the growing TELEVISION Industry by preparing now with the type of thorough, practical TELEVISION Engineering training that the industry requires. The new CREI TELEVISION Engineering course is (1) A complete well-coordinated course of study that covers the entire field of practical TELEVISION Engineering, (2) Presented in CREI'S professional and proven home study form, (3) Prepared by CREI'S experienced staff, based on actual experience in our own TELEVISION Studios and Laboratories, plus years of close contact with leaders in television development. Here's your opportunity to be prepared for competition well ahead of competition, if you start NOW!

JUST OFF THE PRESS! MAIL COUPON FOR COMPLETE FREE DETAILS AND OUTLINE OF COURSE

CAPITOL RADIO ENGINEERING INSTITUTE
—Where Professional Radio/Man Study

98
Lighthouse Larry Comments:

Here's an interesting slant for users of metal tubes: . . . Judging from mail received, the average ham is exceedingly anxious to get the most out of his present receiver. This can be done by feverishly plugging tube after tube into the set until satisfactory results are secured—but why go about things the hard way? . . . For example, is the 6AC7/1852 metal tube better than the 6SK7? Let's take a close look. The r-f stage in your receiver undoubtedly uses a remote-cut-off pentode. This means, in most cases, a 6SK7 or 6K7. A lot of us have replaced these tubes with a 6AC7/1852 and been overjoyed to find we hear more signals. Fine business—but what actually has been changed? For one thing, a 6AC7/1852 is a sharp-cut-off pentode, definitely not what we want in the r-f stage. Probably the apparent increase in signals was due to cross-modulation, not to more sensitivity. Signals which formerly were separated, now arrive on the same frequency. A-v-c action also probably is out of kilter, again due to the sharp-cut-off tube.

Reference to the diagram will explain this better. Let's assume you are receiving a moderately weak signal. Tube operation then would be at point "A" for most tubes. The few microvolts' input from the signal causes this point to remain relatively fixed. Suddenly, on comes that new ham next door with his kw-rig, and only 100 kc away from where you are tuned! This local signal now is impressing volts on your defenseless r-f tube. Modulation of this local signal causes your r-f tube to operate back and forth on its respective operating line.

With a 6SK7, if operation is from "A" to "B," tube action is linear, as may be seen from the straight line on the graph. In the case of the 6AC7/1852, a much different effect takes place. As soon as grid voltage tries to swing from "A" toward "B" the tube becomes completely cut off, distortion takes place, and cross-modulation has become a new annoyance in your receiver.

Well, then—how about using a 6AB7/1853? This looks like a better choice, and one I'll discuss later. . . . Meanwhile, remember I'm at your service to help you with any special data you may wish about Ken-Rad's value-giving line of metal tubes for amateurs!
Snap on the filaments, settle yourself at the controls, and enjoy a most satisfying world tour—by radio. Listen to the musical CQ from Latin America, the cheerful hello from Canada. Hear the eagerness in the voice of the American operating portable from Casablanca or Tinian. Maybe you're searching the DX bands for the G4—or was it an HB9—that you used to work every Saturday. Or perhaps your next door neighbor wants to send a message to his aunt in Phoenix.

Sharpen up the incoming signal you've selected on the Collins 75A receiver. You have a crystal filter that you can adjust with ease. The r-f gain control does not affect the pitch of a cw note. And the receiver is so stable that line voltage fluctuations—or the slam of a door—will not require frantic retuning to find the signal again.

Even under adverse conditions your reception will be better with the 75A. Then switch the Collins 30K transmitter to the Operate position and you're on the air. Use either tone or cw. You can change frequency quickly if you desire. The permeability tuned oscillator (PTO) controlled exciter—the Collins 310A—sits right on the operating desk. Both transmitter and exciter are bandswitching. The 30K transmitter has a speech clipper in the audio circuit to keep the modulation at a high level. Notice how it helps your signal, particularly in QRM or QRN.

The world is truly at your fingertips when you're using Collins equipment. Write for illustrated bulletins describing Collins ham gear.

FOR BEST RESULTS IN AMATEUR RADIO, IT'S

COLLINS RADIO COMPANY, CEDAR RAPIDS, IOWA
11 West 42nd Street, New York 18, N. Y. 458 South Spring Street, Los Angeles 13, California
Order Your Collins Ham Gear From These Dealers
(Additional dealers will be announced as they are appointed)

**CALIFORNIA**
- Electrical Supply Co., 149 12th Street, Oakland
- Sacramento Electric Supply Co., 711 Capitol Avenue, Sacramento
- Henry Radio Co., 2331 Westwood Blvd., Los Angeles
- Kierulf Co., 828 W. Olympic Blvd., Los Angeles
- Radio Television Supply Co., 1509 S. Figueroa Street, Los Angeles
- San Joaquin Radio Supply Co., 4266 Market Street, San Francisco

**COLORADO**
- Radio Products Sales Co., 1367 16th Street, Denver

**CONNECTICUT**
- Hatry & Young, 203 Ann Street, Hartford
- 1172 Chapel Street, New Haven
- 542 E. Main Street, Bridgeport
- 89 Cherry Street, Waterbury
- 525 Main Street, Stamford

**DELAWARE**
- Radio Electric Service Co. of Penn., 219 W. Eighth Street, Wilmington

**GEORGIA**
- Henry L. Reid Co., 1103 Peachtree St., N. E., Atlanta
- Jee's Appliance Service Co., Colquitt
- Damascus
- Edison

**ILLINOIS**
- Allied Radio Corporation, 853 W. Jackson Blvd., Chicago
- Newark Electric Company, 323 W. Madison Street, Chicago
- Tri City Radio Supply, 1919 4th Avenue, Rock Island

**INDIANA**
- Van Sickle Radio Supply Co., 34 W. Ohio Street, Indianapolis

**IOWA**
- Iowa Radio Corporation, 1212 Grand Avenue, Des Moines
- World Radio Laboratories, 744 W. Broadway, Council Bluffs

**KENTUCKY**
- Universal Radio Supply, 715 So. 7th Street, Louisville

**LOUISIANA**
- Radio Parts, Inc., 807 Howard Avenue, New Orleans
- Interstate Electric Co., 411-11 Main Street, Shreveport
- Wholesale Radio Parts Co., Inc., 311 W. Baltimore Street, Baltimore

**MARYLAND**
- Radio Shack, 167 Washington Street, Boston
- Hatry & Young, 42-44 Cornhill, Boston
- 639 Essex Street, Lawrence

**MASSACHUSETTS**
- M. N. Duffy & Co., 2040 Grand River, Detroit

**MICHIGAN**
- Lew Bunn Company, 1211 La Salle Ave., Chicago
- Cabell Electric Company, 422 So. Farish Street, Jackson

**MISSISSIPPI**
- Henry Radio Shop, 211 No. Main Street, Butler
- Walter Ave Radio Co., 1125 Pine Street, St. Louis

**MINNESOTA**
- Leuck Radio Supply, 243 So. 11th Street, Lincoln

**MISSOURI**
- Evans Radio Company, 8 No. Main Street, Concord
- Aaron Lippman & Co., 246 Central Avenue, Newark
- Radio Electric Service Co. of Penn., 513-15 Cooper Street, Camden

**NEW HAMPSHIRE**
- Harvey Radio Co., Inc., 103 W. 43rd Street, New York
- Newark Electric Company, 115 W. 45th Street, New York
- Masline Radio & Electronic Equipment Co., 192-196 Clinton Avenue No. Rochester
- E. E. Taylor Company, 465 Central Avenue, Albany

**NEW YORK**
- North Carolina Electric Co., Inc., 312-14 No. Eugene Street, Greensboro
- Southeastern Radio Supply Co., 41-15 Hildiboro Street, Raleigh

**OHIO**
- Progress Radio Supply Co., 413-15 Huron Road, Cleveland
- Hughes Peters, Inc., 101 E. Long Street, Columbus
- 725 So. Main Street, Dayton
- The Myronic Company, 121 W. Central Pkwy., Cincinnati

**OKLAHOMA**
- Radio Electronics, 1032 E. Broadway, P. O. Box 708, Enid
- Radio Supply, Inc., 724 No. Hudson Street, Oklahoma City

**OREGON**
- United Radio Supply Co., 22 N. W. 9th Ave., Portland

**PENNSYLVANIA**
- Radio Electric Service Co. of Penn., 701 Arch Street, Philadelphia
- 1042 Hamilton Street, Allentown
- Cameradio Company, 953 Liberty Avenue, Pittsburgh

**RHODE ISLAND**
- Chemstry Radio & Electric Company, 12 Emory Parkway, Knoxville
- Bluff City Distributing Co., 905 Union Avenue, Memphis

**TENNESSEE**
- Wilkinson Bros., 2406 Ross Ave., P. O. Box 1169, Dallas
- Electronic Equipment & Engineering Co., 1310 So. Staples Street, Corpus Christi
- R. C. & L. F. Hall, 1015-17 Carolina St. Houston
- 2143 Cedar Springs Ave., Dallas
- 1803 Fremont St., Galveston
- 961 Pearl St., Beaumont

**UTAH**
- Radio Supply Company, 45 E. 4th South Street, Salt Lake City

**VIRGINIA**
- Radio Supply Company, 711 Granby Street, Norfolk
- 3002 W. Broad Street, Richmond

**WASHINGTON**
- Northwest Electronics Co., 104 Monroe Street, Spokane
- Western Electronic Supply Co., 2609 First Avenue, Seattle

**WEST VIRGINIA**
- King & Irwin, 316 11th Street, Huntington
OVER 35 YEARS OF RADIO ENGINEERING ACHIEVEMENT
Murdie-Silver Co., Inc.
1240 MAIN ST., HARTFORD 3, CONNECTICUT

MODEL 800
U. H. F. RECEIVER

MODEL 700
U. H. F. XMITTER
Only 5" x 10" x 5½", new "ATOM-X" construction. Xtal controlled output at 144-148 and 235-240 mc. Built-in 14-watt modulator, four plate current indicators. Long line push-pull 832 final. Matches Model 800 to make ideal home-station or mobile rig.

HI-Q AIR CAPACITORS
Good to 500 mc. Compact, efficient, light. Ideal for trimming or tuning in high quality circuits. 3-30 ufd. in 1080 rotation. With phenolic mounting plate only 3.30 net.

Send postcard for catalog of new measuring equipment, communication receivers, transmitters, kits, parts. See them at your favorite jobber.

OVER 35 YEARS OF RADIO ENGINEERING ACHIEVEMENT
Murdie-Silver Co., Inc.
1240 MAIN ST., HARTFORD 3, CONNECTICUT

NORTHEASTERN DIVISION
ALASKA -- SCM, August G. Hiebert, K7CBF -- The Anchorage Amateur Radio Club now has its own room in the News Building, 3rd and F Streets. CX donated an NC-100A. Ralph Walker and CA have the rig ready to go as soon as the station license is issued. In the last. EU was named to the program committee, replacing BH. Movies from the Kuskokwim were shown by EU. AJ, secretary, has married GV. BD reports a new 815 in the final at Moose Point. Statewide DXers should watch 28 and 14 Mc. for 144-Mc. Moving Adak amateurs DX, DX0, 28LW, 3FQ, 3KOY, 3KTS, 6UXL, and 7ELJ. Ex-SCM PQ is operating 2JAA in Japan. ENA has a 4,000-ft. mountain in his Juneau back yard shielding against Mc. 'phone. LS has NC-200. 73. NWW at Moses Point. Stateside DXers should watch 28 and 14 Mc. at present, was active in SS. He also visited FM. He is on 28-Mc. 'phone, JMH schedules VE6AO for 28-Mc. 'phone. JMH, 28-Mc. 'phone and 3.5-Mc. c.w. nets. Thanks for your interest. 73.

IDAHO -- SCM, Alan K. Ross, W7ITU -- 1YG is new OBS. More OBS and OQ are needed. JPF sends in nice report of 28-Mc. activity mentioning a three-way with ZL1HT and VR2AB and daily round table with 5KOU and 5KMP in Chicago. 28-Mc. activity in Southern Idaho promises to be good soon. ACD plans on 300 watts, ditto for EHP, FOF, JPF, GPM, and IWU are planning on 50 Mc. shortly. Let's be heard from Northern Idaho. JY/7, home station on 7 Mc. at present, was active in SS. He also visited FM. He is on 28-Mc. 'phone. JMH schedules VE6AO as well as NCS in Gem Net. Each local ARC area should have an Emergency Coordinator. You fellows with portables who like to get out for Field Days are the logical choice for ECOs. Drop me a line. What are you doing and what are your interests? ENT, former Idaho SCM, paid me a visit. Gem Net 3743 kc. Mon., Wed., and Fri. 9 P.M. MST. Traffic: W7JMH 44, IVU 25, 1Y/7 1. 73.

MONTANA -- SCM, Albert Beck, W7EQM -- Section EC: BWH. Thumps, the club paper of SMARA, is PB for news from Billings. How about Who's Who? Bumps, or what have you from other Montana clubs? GBI is back in Montana. CRD is studying hard and on the air rigged up in trailer house on MSC Campus. HEM is on 144-Mc. 'phone. New hams in Great Falls are: KAZ and JVN. BXL, JVN, GBI, and DSS are working on 144 Mc. JJG has parasitic troubles. JHR is on 3.9-Mc. 'phone. Lewistown reports JRM is new operator. CAL is on 3.9 and 28 Mc. FTO has new plumber's delight beam on 28 Mc. and goes 9A+ from England, KKB, new call sign. One ham in Butte, works 144 Mc. and howl EMF, KKB, FTO, JFR, and CJN, Butte's EC Net, call CQ on 144 Mc. in Butte. QSO guaranteed! The Butte Club held an installation party Jan. 4th. FLB needs Delaware for WAS. First QSO was with BC-610, now strike-bound in Seattle. Traffic: KL7CF, 3FQS, 3KTS, 5JWN, 6UXL, and 7ELJ. movie from the Kuskoqwim were shown by EU. Acclamation party Jan. 4th. FLB needs Delaware for WAS. First QSO was with BC-610, now strike-bound in Seattle. Traffic: KL7CF 3FQS, 3KTS, 5JWN, 6UXL, and 7ELJ. What are you doing and what are your interests? EMT, Butte's EC, runs EHP. EHP, 28-Mc. 'phone and 3.5-Mc. c.w. nets. Thanks for your interest. 73.

OREGON -- Acting SCM, Cliff Tice, W7BEE -- AYV reports on Astoria activities. He is on 7 Mc. mostly, occasionally on 14 Mc., c.w. exclusively. BOO is on all bands. COU is on 7 and 3.5 Mc. EBD has 400 watts on 14 Mc. COZ is on 28-Mc. 'phone. Zf 3.9 and 28 Mc. HBN is on 28-Mc. 'phone and 3.5-Mc. c.w. with an HT-6. BBQ is working on a frequency standard. FNZ is very active on 28 and 14 Mc. 'phone. HQL and 1RV are heard. GCO called CQ the other night and while listening for a call he heard AEF. AEF was in a car cruising along the highway toward Astoria. COZ gave him a buzz and guided him right into the shack where a minor hamfest was being held. Forest Grove's hams now are boosted to nine with the arrival of 7BOF on 7 Mc. with a half kilowatt. FBX is on 7 Mc. with an 807. Klamath Falls now boasts a ham club with the following officers: GML, pres.; GLF, vice-pres.; HDU, secretary. The membership includes FWG, GLF, GML, HDU, HMG, IDJ, IQM, JBF, JEB, JRU, JWM, IRT, ECL, HVD, QP, 6VKS/7, and 6OTQ/7. At the invitation of Bill Sanders, the Salem Club spent an evening on a tour through the State Forestry Department Laboratory. Some of the new calls are KBS, KGU, and JSW. They are on 3.5- and 7-Mc. c.w., and KGU is on 28-Mc. 'phone, also. ASG is...
TRIGGER TUBE
SYLVANIA’S NEWEST
—made specifically for electronic relay applications...

PHOTOCELL TRIPPING CIRCUIT FOR ELECTRONIC FLASH TUBE

HERE'S A NEW 5-element, inert-gas filled, internally triggered cold cathode relay tube designed for operation up to 1000 volts on the anode, with a positive pulse on the control or trigger grid—a tube made specifically for triggering.

Its cathode structure is similar to that utilized in the well-known T21, SN4 type strobotron tubes which are mostly used for stroboscopic applications. This cathode design is characterized by its ability to furnish extremely high instantaneous peak currents—hundreds of amperes.

However, the design of the new Trigger-tube varies in that the delay time—time required to initiate the arc—as well as the deionization time, is greatly reduced as compared with previous triggering tubes. In addition, since this tube has been especially designed for trigger applications—applications which do not utilize the light flashes produced by the arc—it can be ideally utilized wherever stable characteristics and low switch current are important.

For example: electronic flash equipment in which externally triggered flash tubes can be readily controlled by a hand trip switch, built-in shutter synchronizing switches, or by a photocell.

Write address below for full specifications.

The OA5 is licensed under the tube patents of Edgerton, Gernsback and Grier, but no license is implied under their circuit patents.
ATTENTION AMATEURS

Just as rapidly as world conditions permit PR will establish jobber stocks in principal cities of all countries where amateur radio is permitted. Jobbers are already operating in some countries. Meanwhile, for best service, Send Your Inquiries and Orders Direct to Our Export Representatives in New York:

ROYAL NATIONAL COMPANY, Inc.
75 West Street, New York, N. Y.
U.S.A.

Outside of the U.S.A.

working Africa consistently on 14-Mc. cw. BVV has worked all continents on 28 Mc. since return from down the Coast, and is working on a field strength meter to improve that record. FRT finds 28 Mc. ideal for that schedule. JAA has purchased an SCR-662. The Pendleton Club is quite active. Keep the reports coming. gang. Cliff.

WASHINGTON—Acting SCM, Lloyd Norborg. W7EHQ—New appointments: CKZ as OO, OBS, and OPS; HAD as OO; BL as OPS; FWD as OBS and OBS; ACF as OBS. RP4KD writes he will be on 14- and 28-Mc. phone in the DX Contest looking for Washington stations for WAS. C2Y reports Cascade Radio Club going strong with 35 paid members. Congratulations. HGC is on 3.5, 7, and 14 Mc. with 90 watts. IOO, on 7 Mc. with 15 watts, holds weekly schedules with W1NKN, also chief operator at KREM. IDZ reports reports HX6 and ROX are on 28 Mc. EGU is on 3.9 Mc. The Los Angeles gang is interested in 50 Mc. YARC officers are: KFM, pres.; CAM, vice-pres.; JPA, secy-treas. FCZ is on 28-Mc. phone. GMC is on 14, 28 and 144 Mc. CAM, JVB, FYV, JBY, AVR, ARF, ALH, AWX. KFM, JYB, ITR, JFD, ECR, and JCC are on various bands and especially on TWO! The Yakima gang is hot! DGN reports nice SS Con-

EMB, pres.; DTK, vice-pres.; KBA, secy-treas. DTK is on 7 Mc. with 75 watts. PDN is on 7 and 14 Mc. with 400 watts. KHM works his OM, GW, on 28 Mc. 6V6 puts out a heap of DX with BC-610. ERH reports 28 and 14 Mc. very good for rag-chews. FDD is on 3.9 Mc. exclusively. Orchids to DF for fine reporting and operation on 28 Mc. "A" is on 3595 kc. CSY needs more ORS. BTV has new QTH. DAI is fixing BCLs for a living now. 29300 kc., the net frequency for local rag-chewing in Tacoma, is called the Hillbilly Net. LB acquired a new Gonset converter.

Pacific Division

HAWAII—Acting SCM, John Sousa, K7HEL—FB blew filament and h.v. plate transformer on new kw., but is back on 28 Mc. FD has managed 8251 QSOs since Dec. 8, 1945 and has pushed through 621 messages with her single 607. AP is holding schedules with his band of 12,000 feet above sea level. EM schedules AA on 50 Mc. using single 829. Traffic: KH6AF 150, DF 22. 73.

SCM, Carroll Short, jr., 7BVZ. RM: QLP. EC: 7JU, 7TJY. Asst. EC: 7OPP. OBS: 7JUO. OES: 7TJI. 6GSX is on 3.5-, 7-, 14-, and 28-Mc. c.w. with p.p. 35Ts. TJI reports v.h.f. experiments. 7QYK reports a new e.r.o. along with a

new QTH. DAI is fixing BCLs for a living now. 29300 kc., the net frequency for local rag-chewing in Tacoma, is called the Hillbilly Net. LB acquired a new Gonset converter.

FNC has new XYL from Australia and new QTH in La Grande power house. ARN has new HT-6 and HQ-120X on 28 Mc. AEA is busy at KMO site-testing. EHQ installed new QTH. DAI is fixing BCLs for a living now. 29300 kc., the net frequency for local rag-chewing in Tacoma, is called the Hillbilly Net. LB acquired a new Gonset converter.

FNC has new XYL from Australia and new QTH in La Grande power house. ARN has new HT-6 and HQ-120X on 28 Mc. AEA is busy at KMO site-testing. EHQ installed new QTH. DAI is fixing BCLs for a living now. 29300 kc., the net frequency for local rag-chewing in Tacoma, is called the Hillbilly Net. LB acquired a new Gonset converter.

FNC has new XYL from Australia and new QTH in La Grande power house. ARN has new HT-6 and HQ-120X on 28 Mc. AEA is busy at KMO site-testing. EHQ installed new QTH. DAI is fixing BCLs for a living now. 29300 kc., the net frequency for local rag-chewing in Tacoma, is called the Hillbilly Net. LB acquired a new Gonset converter.

FNC has new XYL from Australia and new QTH in La Grande power house. ARN has new HT-6 and HQ-120X on 28 Mc. AEA is busy at KMO site-testing. EHQ installed new QTH. DAI is fixing BCLs for a living now. 29300 kc., the net frequency for local rag-chewing in Tacoma, is called the Hillbilly Net. LB acquired a new Gonset converter.

FNC has new XYL from Australia and new QTH in La Grande power house. ARN has new HT-6 and HQ-120X on 28 Mc. AEA is busy at KMO site-testing. EHQ installed new QTH. DAI is fixing BCLs for a living now. 29300 kc., the net frequency for local rag-chewing in Tacoma, is called the Hillbilly Net. LB acquired a new Gonset converter.

FNC has new XYL from Australia and new QTH in La Grande power house. ARN has new HT-6 and HQ-120X on 28 Mc. AEA is busy at KMO site-testing. EHQ installed new QTH. DAI is fixing BCLs for a living now. 29300 kc., the net frequency for local rag-chewing in Tacoma, is called the Hillbilly Net. LB acquired a new Gonset converter.

FNC has new XYL from Australia and new QTH in La Grande power house. ARN has new HT-6 and HQ-120X on 28 Mc. AEA is busy at KMO site-testing. EHQ installed new QTH. DAI is fixing BCLs for a living now. 29300 kc., the net frequency for local rag-chewing in Tacoma, is called the Hillbilly Net. LB acquired a new Gonset converter.

FNC has new XYL from Australia and new QTH in La Grande power house. ARN has new HT-6 and HQ-120X on 28 Mc. AEA is busy at KMO site-testing. EHQ installed new QTH. DAI is fixing BCLs for a living now. 29300 kc., the net frequency for local rag-chewing in Tacoma, is called the Hillbilly Net. LB acquired a new Gonset converter.

FNC has new XYL from Australia and new QTH in La Grande power house. ARN has new HT-6 and HQ-120X on 28 Mc. AEA is busy at KMO site-testing. EHQ installed new QTH. DAI is fixing BCLs for a living now. 29300 kc., the net frequency for local rag-chewing in Tacoma, is called the Hillbilly Net. LB acquired a new Gonset converter.

FNC has new XYL from Australia and new QTH in La Grande power house. ARN has new HT-6 and HQ-120X on 28 Mc. AEA is busy at KMO site-testing. EHQ installed new QTH. DAI is fixing BCLs for a living now. 29300 kc., the net frequency for local rag-chewing in Tacoma, is called the Hillbilly Net. LB acquired a new Gonset converter.

FNC has new XYL from Australia and new QTH in La Grande power house. ARN has new HT-6 and HQ-120X on 28 Mc. AEA is busy at KMO site-testing. EHQ installed new QTH. DAI is fixing BCLs for a living now. 29300 kc., the net frequency for local rag-chewing in Tacoma, is called the Hillbilly Net. LB acquired a new Gonset converter.

FNC has new XYL from Australia and new QTH in La Grande power house. ARN has new HT-6 and HQ-120X on 28 Mc. AEA is busy at KMO site-testing. EHQ installed new QTH. DAI is fixing BCLs for a living now. 29300 kc., the net frequency for local rag-chewing in Tacoma, is called the Hillbilly Net. LB acquired a new Gonset converter.

FNC has new XYL from Australia and new QTH in La Grande power house. ARN has new HT-6 and HQ-120X on 28 Mc. AEA is busy at KMO site-testing. EHQ installed new QTH. DAI is fixing BCLs for a living now. 29300 kc., the net frequency for local rag-chewing in Tacoma, is called the Hillbilly Net. LB acquired a new Gonset converter.

FNC has new XYL from Australia and new QTH in La Grande power house. ARN has new HT-6 and HQ-120X on 28 Mc. AEA is busy at KMO site-testing. EHQ installed new QTH. DAI is fixing BCLs for a living now. 29300 kc., the net frequency for local rag-chewing in Tacoma, is called the Hillbilly Net. LB acquired a new Gonset converter.

FNC has new XYL from Australia and new QTH in La Grande power house. ARN has new HT-6 and HQ-120X on 28 Mc. AEA is busy at KMO site-testing. EHQ installed new QTH. DAI is fixing BCLs for a living now. 29300 kc., the net frequency for local rag-chewing in Tacoma, is called the Hillbilly Net. LB acquired a new Gonset converter.
Minimum DRIFT with maximum HEAT!

Crystals in amateur service take a beating! To get high output, crystal currents run high ... voltages on the basic exciter stage are pushed to the limit. To have real stability with high output you want a rugged rock, one that will take the highest allowable heating without undue drift. That's where PRs come in. Even on the higher frequencies PRs stand firm ... with less than 2 cycles drift per MC per degree Centigrade. With PRs you get everything ... stability ... long life ... high activity ... moisture and contamination-proof. EXACT FREQUENCY (INTEGRAL KILOCYCLE) AT NO EXTRA COST.

Get PRs at your jobber's. Accept no substitute! They're unconditionally guaranteed. — Petersen Radio Company, Inc., 2800 West Broadway, Council Bluffs, la. (Telephone 2760)
Enjoy Security and Good Pay!   Step Ahead of Competition Into a Better Radio Job with CRE1 Technical Home Study Training

PROTECT your future today. Enjoy the recognition, the interesting, well-paid positions that Radio-Electronics offers men who meet the challenge with modern technical training. FM, Television, Facsimile and other electronic communications systems for both government and industry will require thousands of highly trained expert radio communications engineers and technicians.

NOW is the time to take the time to prepare yourself for these important career jobs. CRE1 home study training can show you the way by providing you with the tools with which to build a firm foundation of ability based on a planned program of modern technical training. This is real, honest-to-goodness practical engineering training that leads to better jobs and more rapid promotions—the type of training for which many thousands of professional radioamateurs have enrolled during the past 19 years.

It costs you nothing to read the interesting facts. Mail coupon for free booklet today.

VETERANS!

CRE1 training is available under the "G.I." Bill!
Purchasers of modern radios deserve good reception on all three bands—standard broadcast, short wave and frequency modulation. Until Amphenol engineers perfected this new all-wave unit, the only way to achieve this was to install three separate antennas, a costly and unsightly solution.

The FM section of this new 3-way antenna is a horizontally polarized dipole. It operates most efficiently between 88 and 108 mc.

A 65-foot length of Amphenol Polyethylene covered copper wire serves as the standard broadcast and short wave antenna. The polyethylene covering minimizes precipitation static and assures long life.

A specially designed series M derived low-pass filter automatically switches the energy from the proper antenna to receiver input.

Installation is simple. The mounting is a 1-inch steel mast 5-feet in length. All hardware is included. A guy clamp bolted to the mast provides for tripod guyng.

Vinyl-jacketed Amphenol 52 ohm coaxial transmission line serves as a low-loss lead-in and eliminates interference from transmission line pickup. Noisy areas are not a problem with this antenna.

In a comparative test with the best available standard double doublet (with matching transformers), the Amphenol All-Wave Antenna proved far superior in gain—as well as being interference free.

Write for complete technical data or see your jobber for full information.
These sturdy irons have proved their dependability and worth in use on countless other jobs, too, for over 25 years. That’s why we say—whatever your needs, you are certain to find a Drake iron that fills the bill exactly!

600-10—the Drake No. 600-10 is ideal for those all-important connections when rewiring your rig. Get back on the air fast. Make good dependable connections with this 100 watt 3½" tip.

400—the Drake No. 400 is the perfect iron for work in small places. Only 9 inches long, it is especially designed for tight corners and delicate connections. 60 watt, ½" tip.

Ask your nearest supplier or write for the name of the distributor nearest you... and give yourself the advantages of these superior irons.

DRAKE ELECTRIC WORKS, INC.
101 E. LINCOLN AVE. CHICAGO 13, ILL.

(Continued from page 108)

Down, DJJ lost his 8JK antenna, 6VPI and 6TLQ lost their three-element beams. V12 is now on 28.35 Mc., phone net. NPO returned to San Francisco and is on the air again after a month’s absence in southern California. NYQ is building a 250-watt rig for his summer QTH. The rig will cover 3.5-28 Mc., c.w./phone, a.m. and f.m. The new call for this QTH will be a two-letter one, SR. ART says he will have everything all set for the spring DX contest. GPB has a new BC-348Q on the air now. OZC worked nine new prizes in Europe on 28 Mc. phone. PEC seem to have licked their troubles in the BC-610, and it sounds fine now. The SO Contest brought out many contestants in this section and many fine scores. Among the best from this section were W6RBQ, W6R, and W6B. The Marin Radio Club held its annual Christmas party December 14th, at the Mill Valley Country Club. Dinner was served and Christmas gift boxes and prizes were distributed. A swell time was had by all. The San Francisco Radio Club held its monthly meeting November 22nd. The speaker of the evening was Phil Gardner. An interesting talk was given on various subjects. Thanks for your reports. Traffic: W6RDB 20, BYL 16, BIP 2, SAM.

SACRAMENTO VALLEY—SCM, John R. Kinney. W6MGC—AF, who engineers giant a.c. super Diesel locomotives through the Feather River Canyon for the W.P.R.R., is our new OBS for Oroville with 6L6, 807, and 810's p.p. Class C, with 750 watts input and output. QTH will be a two-letter one, SR. ART says he will have everything all set for the spring DX contest. GPB has a new BC-348Q on the air now. OZC worked nine new prizes in Europe on 28 Mc. phone. PEC seem to have licked their troubles in the BC-610, and it sounds fine now. The SO Contest brought out many contestants in this section and many fine scores. Among the best from this section were W6RBQ, W6R, and W6B. The Marin Radio Club held its annual Christmas party December 14th, at the Mill Valley Country Club. Dinner was served and Christmas gift boxes and prizes were distributed. A swell time was had by all. The San Francisco Radio Club held its monthly meeting November 22nd. The speaker of the evening was Phil Gardner. An interesting talk was given on various subjects. Thanks for your reports. Traffic: W6RDB 20, BYL 16, BIP 2, SAM.

SACRAMENTO VALLEY—SCM, John R. Kinney. W6MGC—AF, who engineers giant a.c. super Diesel locomotives through the Feather River Canyon for the W.P.R.R., is our new OBS for Oroville with 6L6, 807, and 810's p.p. Class C, with 750 watts input and output. QTH will be a two-letter one, SR. ART says he will have everything all set for the spring DX contest. GPB has a new BC-348Q on the air now. OZC worked nine new prizes in Europe on 28 Mc. phone. PEC seem to have licked their troubles in the BC-610, and it sounds fine now. The SO Contest brought out many contestants in this section and many fine scores. Among the best from this section were W6RBQ, W6R, and W6B. The Marin Radio Club held its annual Christmas party December 14th, at the Mill Valley Country Club. Dinner was served and Christmas gift boxes and prizes were distributed. A swell time was had by all. The San Francisco Radio Club held its monthly meeting November 22nd. The speaker of the evening was Phil Gardner. An interesting talk was given on various subjects. Thanks for your reports. Traffic: W6RDB 20, BYL 16, BIP 2, SAM.

SACRAMENTO VALLEY—SCM, John R. Kinney. W6MGC—AF, who engineers giant a.c. super Diesel locomotives through the Feather River Canyon for the W.P.R.R., is our new OBS for Oroville with 6L6, 807, and 810's p.p. Class C, with 750 watts input and output. QTH will be a two-letter one, SR. ART says he will have everything all set for the spring DX contest. GPB has a new BC-348Q on the air now. OZC worked nine new prizes in Europe on 28 Mc. phone. PEC seem to have licked their troubles in the BC-610, and it sounds fine now. The SO Contest brought out many contestants in this section and many fine scores. Among the best from this section were W6RBQ, W6R, and W6B. The Marin Radio Club held its annual Christmas party December 14th, at the Mill Valley Country Club. Dinner was served and Christmas gift boxes and prizes were distributed. A swell time was had by all. The San Francisco Radio Club held its monthly meeting November 22nd. The speaker of the evening was Phil Gardner. An interesting talk was given on various subjects. Thanks for your reports. Traffic: W6RDB 20, BYL 16, BIP 2, SAM.
MORE REMARKABLE SAVINGS WITH RADIO SHACK CHOICE SURPLUS

⭐⭐⭐ SCR-274-N COMMAND SET

consisting of

3 RECEIVERS — covering frequencies of 190-550 kc; 3 — 6 mc; and 6 — 9.1 mc; tubes included are: 12SK7 — RF amp; 12K8 — mixer; 12SK7 — 1st IF; 12SK7 — 2nd IF; 12SR7 — diode det & CW osc; 12A6 output or AF.

2 XMTRS — covering frequencies of 3 — 4 mc and 4 — 5.3 mc; tubes included are 1626 master oscillator driving two parallel 1625's; a 1629 magic eye tube and a calibrating crystal are also furnished.

4 DYNAMOTORS — for 24-volt d-c service; each receiver has its own dynamotor and another dynamotor powers the transmitters and modulator.

1 MODULATOR — with carbon mike input to 1625 screen-grid modulator with 1215GT side-tone oscillator and VR150-30 regulator.

29 TUBES — a complete set for each unit.

2 TUNING CONTROL BOXES — 1 ANTENNA COUPLING BOX with RF ammeter, antenna relay, and 5000 volt, 50 mmfd. W.E. vacuum condenser.

Price, complete — only $45.00.
Remit in full — No C.O.D.'s.
The whole rig weighs over 400 pounds so it's shipped by freight.

⭐⭐⭐ AAF XMTR BC-375-E

We're back again with more of these exceptional values in transmitting gear. Complete outfit includes, seven of the tuning units, covering 200 kc to 12,000 kc (except broadcast band), plus antenna tuning unit BC-306-A with variometer and tap switch, plus dynamotor unit PE-73-C with relay, fuses, and filter. Power output is 30 to 75 watts, depending on frequency; RF meter reads antenna current; plate meter range is 0-500 milliamperes.

This brand new gear is furnished complete with five tubes — 211 master oscillator, 211 RF power amplifier, 10 speech amplifier or tone oscillator, 2 — 211's PP modulators. 100-page AAF Manual covers every detail of use and maintenance. ORDER NOW!!

Price delivery and save C.O.D. charges — send full amount with order; 50% deposit required on all C.O.D. orders.

THE RADIO SHACK
167 WASHINGTON ST., BOSTON, MASS., U.S.A.
The ALL-PURPOSE RIG
for your work in the
100-156 MC SPECTRUM

Proposed F.C.C. Allocations
in the SCR-522 Spectrum

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 mc</td>
<td>FM Broadcast</td>
</tr>
<tr>
<td>106 mc</td>
<td>Facsimile Broadcast</td>
</tr>
<tr>
<td>108 mc</td>
<td>Air Navigation Aids (Localizer)</td>
</tr>
<tr>
<td>112 mc</td>
<td>Air Navigation Aids (Ranges)</td>
</tr>
<tr>
<td>118 mc</td>
<td>Aeronautical Mobile (Airport Control)</td>
</tr>
<tr>
<td>122 mc</td>
<td>Aeronautical Mobile</td>
</tr>
<tr>
<td>132 mc</td>
<td>Government Aeronautical Mobile</td>
</tr>
<tr>
<td>144 mc</td>
<td>Amateur</td>
</tr>
<tr>
<td>148 mc</td>
<td>Gov't Aeronautical Mobile and Gov't Fixed</td>
</tr>
<tr>
<td>152 mc</td>
<td>Railroad + Relay Press, Urban Telephone, Police + Fire + Maritime, Experimental</td>
</tr>
<tr>
<td>156 mc</td>
<td>Railroad + Relay Press, Urban Telephone, Police + Fire + Maritime, Experimental</td>
</tr>
</tbody>
</table>

4-CHANNEL PUSH-BUTTON OPERATION CRYSTAL-CONTROLLED AM PHONE MOBILE or FIXED STATION SERVICE, ideal for AMATEUR, EXPERIMENTAL, AIRCRAFT, MARINE, RAILROAD, POLICE, and EXPERIMENTAL WORK.

Here's the set that is so good it was made standard equipment in all American or British planes — and now you can have it at only a few percent of its original cost.

THIS VERSATILE SET GIVES YOU

- A 10-tube superheterodyne receiver that includes a squelch circuit with sensitive relay to kill background noise when no signal is being received; 3 microvolts sensitivity at 10 milliwatts output.
- A 7-tube, temperature-stabilized Xmtr delivering 15 watts.
- A remote control box giving push-button selection of four sending and receiving channels.
- A 28-volt d-c dynamotor to power the entire outfit in mobile service.

Furnished with full set of tubes, connecting plugs, and detailed instructions, as published in Radio News, for converting to a-c powered amateur service. Condition — like new; total weight — about 100 pounds. (Incidentally, there's no extra charge if you find eight crystals in your shipment).

TUBE LINE-UP

RECEIVER
9003 RF amp
9003 Mixer
9002 Harm. Gen.
9003 Harm. Amp.
12SG7 1st IF
12SG7 2nd IF
12SG7 3rd IF
12C8 Det, 1st IF and AVC
12J5GT 2nd AF
12AH7GT Osc and AF squelch

TRANSMITTER
6G6G Osc
12A6 1st harm; amp
832 2nd harm. amp
852 Pwr. amp
65G7 Speech amp
2 — 12A6 PP mod

Speed delivery and save C.O.D. charges — send full amount with order; 50% deposit required on all C.O.D. orders.

As COLLINS distributors we are ready to serve you in all your needs for this dependable radio line.
with these superlative values in permanently usable
gear brought you at amazing savings
by the RADIO SHACK!

★★★ BC-221 FREQUENCY STANDARD

Now it's easy to meet FCC Regulations par. 12.135 for regular measurement of your frequency. This extremely stable, heterodyne frequency meter readily checks up to 5th harmonic on most receivers and up to 125th harmonic on the better receivers.

Fundamental ranges 125-250 & 2000-4000 KC.

Stability better than .005%.

Works on 110 v. a-c, vibrapack, or batteries.

Can be used as a signal generator — and you'll be seeing articles telling how to make it into a VFO that can't be duplicated in today's market.

Furnished complete with tubes, original crystal and calibration charts. First quality — can hardly be told from new. Immediate express shipment.

★★★ BC-348 RECEIVER

"The best military receiver for amateur use" is what many wise hams say about this sensitive, smooth-operating, heavily-built, 6-band receiver. Check these features and you'll see why!

- 6-band switching—200-500 kc; 1.5 — 3.5 — 6 — 9.5 — 13.5 — 18 mc.
- Constant sensitivity on all bands.
- Automatic noise compensator.
- Temperature-compensated oscillator.
- Crystal filter · AVC · MVC · BFO.

Output at 300 or 4000 ohms.

TUBE LINE-UP
1st RF — 6K7
2nd RF — 6K7
RF Osc. — 6C5
1st Det. — 6J7
1st IF — 6K7
2nd IF — 6F7
CW Osc — 6F7
3rd IF — 6B8
2nd Det
Aud. Out — 41
V.R. — 991

Smooth vernier tuning; 90 turns of tuning knob for each band.

Furnished complete with built-in dynamotor for 28-volt d-c use and detailed instructions for change-over to 110-volt a-c supply. ORDER NOW for immediate express shipment. Conversion kit available.

ALL POPULAR RECEIVERS are now available thru the Radio Shack.

AAF HAND MIKE
and PHONES
Type T-17 mike with push-to-talk switch, cord, and plug. This is a carbon mike. Only $1.29.

Type HS-33 phones with head-band, rubber cushions, cord, and plug. Only $1.95.

Used, but in A-1 condition.

CAPACITORS

- Oil Xmtg types by leading manufacturers.
- 2 4000 (GE) $5.95
- 2 2000 2.95
- 2 1000 .71
- 4 1000 1.19
- 4 600 .71
- 6 600 .79
- 8 600 1.19
- 10 600 1.29

The RADIO SHACK
167 Washington St.
Boston, Mass., U.S.A.
HERE'S MORE KNOWLEDGE FOR YOU and YOUR STATION

Knowledge is power, the power to enjoy your work in radio, whether it's a career or a hobby. The two books briefly described here are compilations from many outstanding radio minds. They are written so that their signals will come in strong, clear, and easily understandable for any amateur.

We can't butt touch lightly on the contents of these books, but we will gladly send them to you to look over personally. If you decide they should be in your shack within your reach, OK, buy them. If you decide you can get along without them, OK again, just send the books back within five days.

**ELECTRONIC CONTROL HANDBOOK**

The true facts, without drama, regarding the fundamentals of electronic control principles. Section I, Basic Elements of Control; Section II, Conversion Elements; Section III, Electronic Modification Circuits; Section IV, Activation Elements; Section V, Control Applications.

350 Pages  $4.50  Hundreds of Illustrations

**ELECTRONIC ENGINEERING HANDBOOK**

Completely covers the basics of communication equipment design. It links up theoretical knowledge with the equipment and applications of the engineering world. Also a working reference for all applications of electron tubes. Section I covers Vacuum Tube Fundamentals; Section II, Electronic Circuit Fundamentals; Section III, Electronic Applications; Section IV, Vacuum Tube Data.

456 Pages  $4.50  560 Illustrations

Send This 5 Day No Risk Coupon Today

(CALDWELL-CLEMENTS, INC.

480K Lexington Ave. New York 17, N.Y.

Publishers to the electronic industries since 1925

Send books checked. If not satisfied, will return within five days. Otherwise will remit payment.

**ELECTRONIC ENGINEERING HANDBOOK** $4.50

**ELECTRONIC CONTROL HANDBOOK** $4.50

Name

Address

City and State

Company Name

(Continued from page 108)
SUPREME TRANSMITTER Model AF-100, 6-Band, 100 Watt 
(output) Desk Type Transmitter. Embodies ALL the features 
most desired by the majority of the amateurs. Designed to 
cover the amateur bands most frequently used: 10, 11, 15, 
20, 40 and 80 meters for CW, ICW, AM and FM Phone 
transmission. This is the very first transmitter offered to the 
amateur which has the new feature of Frequency Modulation 
in the band of frequencies assigned for this purpose, namely 
27.185 to 27.455 and 29 to 29.7 megacycles. Model AF-100 
is continuously tunable throughout the range of each of the 
amateur bands. A highly stable variable oscillator followed 
by slug-tuned buffer and doubler stages which are ganged to 
the oscillator dial simplifies the problem of working through 
severe QRM and further enhances the pleasures of easily es-
ablishing and retaining QSOs. Band changing is easily 
accomplished in the exciter by a band selector switch and in 
the final by the plugging in of a coil for the particular band 
selected. This unit is one of the simplest to operate—and 
highly efficient on all bands, for all types of emission.

Front Panel Controls: Oscillator Dial; Final Amplifier Dial; 
Oscillator Selector Dial; Modulation Selector Dial; Microphone 
Gain Control; Band Selector Switch; Filament Power Switch; 
Plate Power Switch; Emission Selector Switch; Standby Control. 
Metering: PA Plate Current; PA Grid Current; Modulator Plate 
Current.

TUBE COMPLEMENT

<table>
<thead>
<tr>
<th>Type</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-6AC7</td>
<td>Reactance Tube Modulator</td>
</tr>
<tr>
<td>1-6J5</td>
<td>Variable Frequency</td>
</tr>
<tr>
<td></td>
<td>Oscillator</td>
</tr>
<tr>
<td>1-6AC7</td>
<td>Class &quot;A&quot; Amplifier or</td>
</tr>
<tr>
<td></td>
<td>Crystal Oscillator</td>
</tr>
<tr>
<td>1-6L6</td>
<td>80 meter Buffer or 40 meter</td>
</tr>
<tr>
<td></td>
<td>Doubler, or 30 meter Tripler</td>
</tr>
<tr>
<td>1-6L6</td>
<td>20 meter Doubler</td>
</tr>
<tr>
<td>1-6L6</td>
<td>15 meter Doubler</td>
</tr>
<tr>
<td>1-6L6</td>
<td>10 meter Doubler</td>
</tr>
<tr>
<td>1-3D23</td>
<td>Final Amplifier</td>
</tr>
<tr>
<td>2-807</td>
<td>Class AB, Modulators</td>
</tr>
<tr>
<td>1-6J5</td>
<td>Modulator Driver</td>
</tr>
<tr>
<td>1-6J7</td>
<td>Speech Amplifier</td>
</tr>
<tr>
<td>2-866A</td>
<td>High Voltage Rectifiers</td>
</tr>
<tr>
<td>1-5R4GY</td>
<td>Low Voltage Rectifier</td>
</tr>
<tr>
<td>1-5R4GY</td>
<td>Modulator Rectifier</td>
</tr>
<tr>
<td>1-80</td>
<td>Speech Rectifier</td>
</tr>
<tr>
<td>1-6X5GT</td>
<td>Bias Rectifier</td>
</tr>
<tr>
<td>1-VR</td>
<td>150 Voltage Regulator</td>
</tr>
<tr>
<td>1-6SN7GT</td>
<td>Audio Oscillator</td>
</tr>
</tbody>
</table>

ELECTRICAL CHARACTERISTICS

<table>
<thead>
<tr>
<th>Function</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency Range:</td>
<td></td>
</tr>
<tr>
<td>Amateur Bands—10, 11, 15, 20, 40, 80 meters</td>
<td></td>
</tr>
<tr>
<td>Output Power:</td>
<td>100 watts on CW, ICW and Frequency Modulation</td>
</tr>
<tr>
<td>Method of Modulation:</td>
<td>AM—High Level Class AB2, FM—Reactance Tube Modulation</td>
</tr>
<tr>
<td>Modulation Capabilities:</td>
<td>AM—100%, FM—100% = ±75 kilocycles (variable from 0 to 75 kc)</td>
</tr>
<tr>
<td>Input Audio Source:</td>
<td>High Impedance Crystal or Dynamic Microphone. Level 60 DB down</td>
</tr>
<tr>
<td>Audio Frequency Response:</td>
<td>AM—±2DB, 200 to 6000 cps, FM—±1DB, 100 to 7500 cps</td>
</tr>
<tr>
<td>Noise Level:</td>
<td>AM—Minus 45DB below 100% modulation, FM—Minus 60DB below 100% modulation (±75 kilocycles)</td>
</tr>
<tr>
<td>Audio Frequency Distortion:</td>
<td>AM—5% at 85% modulation for 100 watt output, FM—1.5% at 100% modulation</td>
</tr>
<tr>
<td>Frequency Control Elements: Stabilized Variable Frequency Oscillator or two (2) crystal controlled positions</td>
<td></td>
</tr>
</tbody>
</table>


COMPLETE: The only items needed to get "on the air" are a key, a mike and two crystals.

INEXPENSIVE: A WONDERFUL VALUE!

Write for detailed information and catalog
DESIGNERS AND BUILDERS OF BROADCAST STATION EQUIPMENT,
250 WATTS to 50 KW — AM and FM
SUPREME TRANSMITTER CORPORATION
280 NINTH AVENUE, NEW YORK 1, N. Y.
ROCKY MOUNTAIN DIVISION

COLORADO — SCM, Glen Bond, W4QY'T — The San Isabel Amateur Radio Association in Pueblo is on the way to reorganization and reports a good turnaround of members here the last three meetings. JVJ plans to transmit a series of code practice lessons on 11 Mc. at 7:30 p.m. week nights. GUEL and JVA worked Alamosa on 3.5 Mc. with six inches of antenna wire. All this was done with their SCR-248A's with ten watts input. The Western Slope Radio Club is gradually increasing its membership and hopes to increase its ham activity after the first of the year. IQZ did some nice emergency message-handling with Okinawa this month. It seems that regular commercial communication was getting results but Mitch did it on 28-Mc. 'phone. KP4KD asks that Colorado stations on 28 and 14-Mc. 'phone answer his calls when possible as he needs Colorado for WAS on both bands. 9BHC in Oklahoma City has applied for W5FV. The Electron Club Emergency Net holds its first drill Dec. 10th at 8:00 p.m. As soon as the net is operating others besides club members will be invited to join. OWP, in Brush, is on 3.5 Mc. with 23 feet of wire, 1500 V.D.C. and has mounting brackets or feet. All new, in rectangular cans. Standard brands

SHUR 2-element beam for locations with 5.70

winding permeability tuned •••••••••

National, Hammarlund, RME, Holleratter, and Temco Receivers and Transmitters. Send for Big, Free Bulletin TODAY!

Radio Electric Co. of Pennsylvania Inc.

77TH AND ARCH STREETS, PHILA. 6, PENNA.

Branches: 5139 Market St. and 3145 N. Broad St. in Phila. Also in Wilmington, Del., Easton, Pa., Allentown, Pa., Camden, N. J.

Every "Ham" Needs One
As Required by F.C.C.

FREQUENCY STANDARDS

Giving check points every 1,000, $29.95

100, 10 KC up to 45,000 KC...

Oil-Filled FILTER
CAPACITOR SPECIALS

All new, in rectangular cans. Standard brands with mounting brackets or feet.

2 mfd 600 W.V. ........ $ .95

4 mfd 600 W.V. ....... 1.95

1 mfd 1000 W.V. ....... .75

2 mfd 1000 W.V. ....... 1.95

4 mfd 1000 W.V. ....... 2.95

8 mfd 1000 W.V. ....... 3.75

4 mfd 2000 W.V. ....... 3.95

Transmitting Type Mica Capacitors

0.024 1500 V.D.C. ......... 79

0.033 1500 V.D.C. ......... 95

0.056 1000 V.D.C. ......... 95

TELEVISION EQUIPMENT

8 mc IF transformer for sound channel, 2 winding permeability tuned ......... .95

12 mc, IF transformer for video single winding permeability tuned ........ .55

14-prong sockets for television tubes ........ .60

Binkbach adjustable dipole antenna, perfect for 60-66 television band ... 3.30

SHUR 2-element beam for locations with low signal strength ... 5.70

National, Hammarlund, RME, Holleratter, and Temco Receivers and Transmitters. Send for Big, Free Bulletin TODAY!

(Continued from page 118)

Jackson County, is the only amateur in the County and is quite popular in the WACWV. All West Virginia hams should start getting their rigs in shape for the 3rd West Virginia Party in April similar to one in April '41 QST. Besides winning a prize this will be a swell time to pick up new counties. WSL is DXing on 7 Mc. with low power. CCN, an old-timer, is on 3.5- and 7-Mc. cw. again after an absence of twenty years. TCK is active with Trunk Line graffiti. MOL renewed OPS appointment and reports Huntington Radio Club activity is on the increase. Traffic: W8DMU 11, C8F 4, DFC 3, LXF 3, JM 2, 73, Den.

TUBE SPECIALS

TAYLOR T-40 .... $2.95

JAN 813 .... 9.95

RCA 829B .... 4.95

RCA 806 .... 15.00

DU MONT 3GP .... 4.95

EMAC 304TH .... 9.95

Socket for above .... .90

SPECIALS

8 mfd 600 W.V. ........ 4.95

2 mfd 1000 W.V. ....... 3.75

4 mfd 1000 W.V. ....... 3.95

8 mfd 1000 W.V. ....... 2.95

1 mfd 1000 W.V. ....... .79

1 mfd 1000 W.V. ....... 1.95

2 mfd 1000 W.V. ....... 2.95

4 mfd 1000 W.V. ....... 3.75

8 mfd 1000 W.V. ....... 3.75

The Electron Club Annual Dinner. The Ogden Amateur Radio Operators Club reports FB comments on its code practice lessons on 3825 kc. at 8 P.M. MST. Besides winning a prize this will be a swell time to pick up new counties. WSL is DXing on 7 Mc. with low power. CCN, an old-timer, is on 3.5- and 7-Mc. cw. again after an absence of twenty years. TCK is active with Trunk Line graffiti. MOL renewed OPS appointment and reports Huntington Radio Club activity is on the increase. Traffic: W8DMU 11, C8F 4, DFC 3, LXF 3, JM 2, 73, Den.

(Continued on page 118)
**TRANSMITTING TUBES!**

**WAR SURPLUS STOCKS!**
**ALL NEW! ALL GUARANTEED!**
**AT FRACTION OF ORIGINAL COST!**

**NEWARK** has a reputation for getting "Thar fastest with the mostest." And we've done it again with this first offering of government surplus transmitting tubes. Look at the list. All the tubes you have been waiting for — 31 different types. Don't gasp when you see how sensationally low the prices are — just take advantage of them NOW! They're all new and guaranteed. Now you can really get going on that experimental work you have been planning. Stocks are large, but still limited. So hurry and get your orders in.

### TYPE DESCRIPTION PRICE

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>2AP1</td>
<td>Cathode Ray</td>
<td>$2.25</td>
</tr>
<tr>
<td>2C40</td>
<td>Receiving UHF Triode</td>
<td>$2.63</td>
</tr>
<tr>
<td>2X2/879</td>
<td>Diode Rectifier</td>
<td>$0.90</td>
</tr>
<tr>
<td>3E29/879</td>
<td>Trans. twin pentode amplifier</td>
<td>$2.09</td>
</tr>
<tr>
<td>100TH</td>
<td>Trans. triode modulator amplifier</td>
<td>$4.13</td>
</tr>
<tr>
<td>211</td>
<td>Trans. triode amplifier oscillator</td>
<td>$1.13</td>
</tr>
<tr>
<td>250TH</td>
<td>Trans. triode amplifier oscillator</td>
<td>$9.00</td>
</tr>
<tr>
<td>304TH</td>
<td>Trans. power amplifier</td>
<td>$12.00</td>
</tr>
<tr>
<td>800</td>
<td>Trans. triode amplifier</td>
<td>$2.25</td>
</tr>
<tr>
<td>801A</td>
<td>Trans. triode amplifier</td>
<td>$1.73</td>
</tr>
<tr>
<td>809</td>
<td>Trans. pentode amplifier</td>
<td>$9.00</td>
</tr>
<tr>
<td>810</td>
<td>Trans. triode amplifier</td>
<td>$2.53</td>
</tr>
<tr>
<td>811</td>
<td>Trans. triode</td>
<td>$1.95</td>
</tr>
<tr>
<td>814</td>
<td>Trans. triode amplifier</td>
<td>$4.50</td>
</tr>
<tr>
<td>815</td>
<td>Trans. HF pentode</td>
<td>$2.25</td>
</tr>
<tr>
<td>816</td>
<td>Trans. UHF triode</td>
<td>$2.25</td>
</tr>
<tr>
<td>829B</td>
<td>Trans. UHF twin pentode amplifier oscillator</td>
<td>$5.25</td>
</tr>
<tr>
<td>830B</td>
<td>Trans. triode amplifier</td>
<td>$5.25</td>
</tr>
<tr>
<td>832A</td>
<td>Trans. twin pentode amplifier</td>
<td>$4.05</td>
</tr>
<tr>
<td>838</td>
<td>Trans. triode amplifier</td>
<td>$3.75</td>
</tr>
<tr>
<td>860</td>
<td>Trans. triode amplifier</td>
<td>$3.00</td>
</tr>
<tr>
<td>861</td>
<td>Trans. tetrode amplifier</td>
<td>$9.00</td>
</tr>
<tr>
<td>865</td>
<td>Trans. tetrode amplifier</td>
<td>$1.50</td>
</tr>
<tr>
<td>872A</td>
<td>Trans. diode gas rectifier</td>
<td>$2.25</td>
</tr>
<tr>
<td>875A</td>
<td>Vacuum multiplier phototube</td>
<td>$1.88</td>
</tr>
<tr>
<td>2050</td>
<td>Grid-controlled gas rect. (tetrode)</td>
<td>$0.90</td>
</tr>
<tr>
<td>2051</td>
<td>Grid-controlled gas rect. (tetrode)</td>
<td>$0.90</td>
</tr>
</tbody>
</table>

TWO-CHANNEL INTER-COM CONTROL BOX

This 2-channel control box has wide & varied application in Ham shacks, P. A. & intercom work. Incorporates 4P. OT & PR switches, 3 terminal plugs, several X-watt resistors and illuminated dial light including both, three 5-pin cables and plugs. Brand new—a terrific buy!

EF-50 69¢
E-1148 99¢

**SENSATIONAL BARGAINS!**

Mark II Tube Replacements

These tubes are all Brand New, in factory-sealed cartons, and perfect. Order a pair at this amazingly low price.

**DYNAMOTOR POWER SUPPLY**

A fortunate buy enables us to offer a sensational new low price. All brand new. Operates from 6-12 volt battery. Delivers 500 V DC at 150 ma. Special, your cost $9.95

**T-17B MICROPHONE**

Sturdy, high quality, lightweight 200 ohm single button carbon mike with press to talk button for transmitters, P. A., etc. Built-in filter to suppress carbon hiss. 5-ft. rubber-covered cable and PL-61 3 circuit plug. Metal screw cover. Special, your cost $1.49

**MAIL ORDERS FILLED FROM EITHER NEW YORK OR CHICAGO**

**Write:** 242-S W. 55th St., N. Y. C. or 323-S W. Madison St., Chicago

**Send 20% deposit with order. Prices subject to change.**

NEW YORK CHICAGO
Offices & Warehouse 323 W. Madison St.
242 W. 55th St., N. Y. C.
Chicago 6, Ill.

New York City Stores: 115-17 W. 45th St. & 212 Fulton St.

**VISIT OUR BOOTH AT THE IRE SHOW**
Designed to meet the most exacting requirements of the modern amateur, the new Meissner Signal Shifter has built-in band-switching. No coils to change... six position switch. Normally equipped with five sets of coils for 10, 15, 20, 40 and 80 meter bands plus a blank strip for any additional new band. All controls placed on front panel. Reduced warm-up time. Minimum power output six watts on all bands.

Choice of built-in or separate power supply.

For complete specifications... write to the address below today.
requirements!

THORDARSON

Transformers

Power your new rig with Thordarson... the transformer that has been helping to make and break DX records since radio began. New Thordarson designs now available to match the newest tubes.

Ask for them at your dealers today.

ELECTRONIC DISTRIBUTOR
AND
INDUSTRIAL SALES
DEPARTMENT

INDUSTRIES, INCORPORATED

CHICAGO 11, ILLINOIS
Here they are—the newest Post-War "Ham" Receivers with all the latest improvements in technique and design.

NATIONAL HRO - 5TA - 1  Net $274.35
697 Power Unit $20.36 - MCS Speaker $12
A Receiver, designed for the Amateur, to provide dependable communications, under most severe conditions. New Noise Limiter incorporated. Band, spread on all "Ham" Bands—Coverage 1.7 to 30 MC.

HAMMARLUND HQ-129-X - Net $173.25
Price Includes Cabinet Speaker
A "Ham" Receiver with the professional touch, providing flexibility of operation. Six bands for easy location of stations. Has all "Ham" features with sensitive and stable performance.

HALLCRAFTER S-40 - Net $79.50
With Built In Speaker
Performance and beauty are combined in this outstanding Receiver value. Many circuit refinements never before available at this price. Electrical Bandspread Dial—Coverage 340 KC to 43 MC.

HAM RADIO SUPPLIERS SINCE 1919

CAMERADADIO CO.
963 LIBERTY AVE. • PITTSBURGH 22, PA.

(Continued from page 114)

Gunter Field. J2D is on 33-Mc. "phone. JLB's traffic total is 12, EVJ, FM1, and ATF of the Rebel Net handled traffic. 73, Lary.

EASTERN FLORIDA — SCM, Robert B. Murphy, W4IF — ACZ is doing his part to push our emergency net along. AAO is in San Juan beating out on the 14- and 28-Mc. bands. A new club, the "Tropical Radio Club," has been formed in Miami. AKV is having trouble with RCA's v.f.o. in the Ham Guide. Any of you fellows want to help him out? Comdr. McGlathery is secretary of the Key West Ham Club, which is very active. IEPK has a few days in Jacksonville and Tampa with the ham clubs. DOO has accepted appointment as ORS and OBS and is getting set for EC. Louis like AXY is getting ready for OBS appointment. AXY is now selling v.f.o. and getting in on the buying end with a Deka 4-BV for the job. JBA, son of AR, is now at the U. of F., and writes for the Gator Club there. DFU is the new call assigned the club station. EZT is president and active members are BJT, HEB, IBO, LJE, JAS, JPH, KCM, KKM, and EZGA/4. KWA is an ex-BSYS and is getting lined up for OBS appointment. DRA is working everything he can get on 28 Mc., and has eighty-two counties to date. 8NGR is in Orange City, HGO has moved and CPG will move his 80-ft. steel tower to Orlando. IMJ has a new DB20. 2LJ is in Washington and is working over 31AI with 75 watts on 14 Mc. BXL worked a 68-year-old ham, HRA, on Pine Island. 9ZV0/4 is making his first QPS report from Bocca Raton; he is on 14-Mc. 9ZV0/4 is working 9ZV0/4/4 in the Rye band spread on an "Ham" Bands—Coverage 340 KC to 43 MC.

WESTERN FLORIDA — SCM, Lt. Comdr. Edward J. Collins, W4IA — D and DZK take the honors this week with 8 exam. SCC's ART-13 is getting PB. JGQ is going to high with a pair of 100THA. KFP has a new beam. EQR has a new three-element beam. FHQ and JPA are on 7 Mc. DOO has been working schedules with ex-EJAD up in WI! Land. HJA has his four-element beam up but is give up to the top of a 85-foot windchaser tower. CNX has been getting the DX cards. JI spent his vacation putting up an antenna. #MB1/4 has been working 14-Mc. "phone. DZK has a new pair of 810s. 5KXM/4 sounds FB on 3.9 Mc. Please send reports to the new QTH, 1003 E. Blount St. MS has been on 14 Mc. The 50-Mc. Gulf Storm Net is getting under way. JBA is getting the bugs out of his old FB 813 rig. KJK lost a plate transformer but JY came to the rescue with a spare. HWA picked up a FB bunch of DX QSLs for the Jax gang. EQR works the gang at Fairhope on 28-Mc. ground wave (60 miles). Traffic: W4AYP 19. 73.

GEORGIA — SCM, Thomas M. Moore, W4HYW — HKA advises that the Atlanta Radio Club meets on alternating Tuesdays at his shack. GLB is pre., and DIA, secy. ADEI, GZV, and IPW are in Albany now. GSH is sporting a concrete block shack. The Valdosta Amateur Radio Club has been formed with JZV, pres.; AZA, vice-pres.; and APS, secy-treas. The club had a station in operation at the South Georgia Fair. GCD has opened a b.c. station at Palatka. FLA. is at Moody Field. CFT has returned to Atlanta. QPG is back in Valdosta. QH has been working on installation of WDAR, new b.c. station in Savannah. ICC and JOP are with CAA at Hunter Field. 2DGMI is with RMCA and KOP with State Police at Savannah. IAB is chief engineer at W8XIF in Cartersville, with GQG and GEG also on staff. ERS is invading the "ultra highs." His ir. operator is out in the Navy and probably will get a ticket. GRO and 5LMN are students at Georgia Tech. KMC, at Brunswick, is ex-5TVF and 2GLB. FME, with FCC, has been transferred to KF4. FLN, of Eastern Air Lines, also is in KF4 now. KRL/TG90C has been on vacation at Atlanta. 6SYW now is 4JUG. ILH is with wholesale supply house in Atlanta. Our Class I OOs are: BOL, EWY, IKJ, and KAD. They'll help you out on frequency checks. DXI also ill 00 (Class II).

(Continued on page 117)
The latest developments in communication science are incorporated in the Wilcox 99A Transmitter. This advanced multi-frequency, 400 Watt carrier unit is now in use by major airlines in the United States. Rectifier, Modulator, Remote Control equipment, and four R.F. Transmitter Channels are housed in one modern steel cabinet. Bands can be instantly selected by telephone dial. Write for complete information.

WILCOX STAFF DEVELOPING AMATEUR EQUIPMENT

A staff of 22 licensed amateurs under the direction of "Vince" Dawson, W9ZJB/3JSL, is developing amateur equipment of the same high quality that has brought fame and universal use to Wilcox commercial and airline products.

Watch for these developments from Wilcox.

Amateur Division of
WILCOX ELECTRIC COMPANY, INC.
14th AND CHESTNUT STS. • KANSAS CITY 1, MO.
SURPLUS SPECIALS

<table>
<thead>
<tr>
<th>Item</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>RK60 Rectifier</td>
<td>$1.45</td>
</tr>
<tr>
<td>GL446A</td>
<td>$2.95</td>
</tr>
<tr>
<td>354E</td>
<td>$8.95</td>
</tr>
<tr>
<td>250TH</td>
<td>$18.75</td>
</tr>
</tbody>
</table>

TRANSMITTING MICAS

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>5000 V. DC Working</td>
<td>$1.19</td>
</tr>
<tr>
<td>.0001 MFD</td>
<td>$1.19</td>
</tr>
<tr>
<td>.0025 MFD</td>
<td>$1.19</td>
</tr>
<tr>
<td>.004 MFD</td>
<td>$1.19</td>
</tr>
<tr>
<td>.003 3000 V. DC Working</td>
<td>$1.19</td>
</tr>
<tr>
<td>.006 3000 V. DC Working</td>
<td>$1.19</td>
</tr>
</tbody>
</table>

THORDARSON TRANSFORMERS

<table>
<thead>
<tr>
<th>Model</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>T68R26, 5 V., 3 A.</td>
<td>30 W.</td>
</tr>
<tr>
<td>T19M14, Universal modulation</td>
<td>30 W.</td>
</tr>
</tbody>
</table>

G. E. TELEVISION CAPACITOR

<table>
<thead>
<tr>
<th>Model</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>.1 MFD, 7000 V.</td>
<td>$3.45</td>
</tr>
</tbody>
</table>

RECEIVERS IN STOCK

<table>
<thead>
<tr>
<th>Model</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>National HR0-ST1</td>
<td>$274.35</td>
</tr>
<tr>
<td>Hammarlund HQ-129X</td>
<td>$173.40</td>
</tr>
<tr>
<td>Hallicrafter S-38</td>
<td>$47.50</td>
</tr>
<tr>
<td>Hallicrafter SX-42, less Speaker</td>
<td>$275.00</td>
</tr>
</tbody>
</table>

MICROPHONES

<table>
<thead>
<tr>
<th>Model</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Astatic, JT30, Crystal</td>
<td>$10.17</td>
</tr>
<tr>
<td>Universal &quot;KD&quot; Dynamic</td>
<td>$10.65</td>
</tr>
<tr>
<td>Electro-Voice 902 &quot;COMET&quot;</td>
<td>$7.95</td>
</tr>
</tbody>
</table>

(Continued from page 118)

HYW, IEO, ILP, IRA, IRL, and IRT. Thanks for the news, fellows. Traffic: W4KV 77, HYW 44, JBM 59. 73. Tom.

WEST INDIES—Acting SCM, Everett Mayer, KP4TD, made his debut on 28-Mc 'phone. AJ, BK, KD, and NY4CM were active in SS. Converted to 14-Mc. CK gets out on 28-Mc, 'phone with 15 watts. AU contacts W0FFB regularly on 28-Mc 'phone and replaced S1A with S0X. JA and UG are running 600 watts on 'phone. JA is building combined 14-and 28-Mc, rotary two-element beam. AJ has bisquare beam working FB and made WAC in three hours with W0UGU operating. KD was on 7 Mc in SS. KP4AB/QSB, BGT, CT, and 2SW are rebuilding to higher power. 2BX and 2SW are tied at sixty-nine postwar countries. 2CT worked CR9AG, VSTES, CR7AD and made WAC in six hours. KP4BC has a new call, KV4AD, for Virgin Islands QTH. KB4EHN/V and KG4JS/A are active. KB4GK/T is putting "touch" on 14Mc, rig. KA4WO is active on 14 Mc. c.w. The QSL Manager has many cards on hand but few envelopes have come. Traffic: KP4AM 11. 73.

SOUTHWESTERN DIVISION

LOS ANGELES — SCM, Ben W. Oatneck, W6QWZ—The Ingleswood Amateur Radio Club now has a combination ragchew and AEC net going on 50 Mc. Some of the boys are using MBs and some are using a rig and converter designed by SJF. They are using their old WERS calls. The Los Angeles Emergency Council is using 50 Mc. for its net operations. BLZ is the new EC for Inglewood. MS0 having resigned to take over duties as club president. JQB, Box 235, Lone Pine, is Assistant SCM for this new club. Holiday areas and will handle them from Lone Pine. SUD is now QC as are 7PB and NIF. SUD is ex-KUS02, IOX is busy with traffic on the Hit and Bounce Net. The Mission Trail Net started on Dec. 7th using a frequency of 3854 kc. JRT reports a regular schedule with JNA, who is ex-CLY. UFJ reported a few of the active CAA hams are: UTD, VU, AGF, SPL, CHG, POM, WTO, OEN, QAE, RXT, J1 and 5JBC, BUK is on 28-Mc 'phone with 400 watts. FNH reports the CQN soon will open again on 144 Mc. JMB is a new 28-Mc mobile rig. New calls are K5Q, ex-IXC; K2H, ex-IXC; W6JX, ex-IXC; and K5Q. Another OM-XYL team is JYH and SHR. OMH has a new call, KV4AC, for Virgin Islands QTH.

ARIZONA — SCM, Gladden E. Elliott, W7MLL—Arizona SS entrants were QAP, JPY, MLL, and JHB. KP5 was high with 67016. TJG is new vice-president of the Owens Valley area and will handle the work from Lone Pine. SUD is new 00.

AZORES — SCM, E. Way, W1AG — The Inglewood Amateur Radio Club now has a combination ragchew and AEC net going on 50 Mc. Some of the boys are using MBs and some are using a rig and converter designed by SJF. They are using their old WERS calls. The Los Angeles Emergency Council is using 50 Mc. for its net operations. BLZ is the new EC for Inglewood. MS0 having resigned to take over duties as club president. JQB, Box 235, Lone Pine, is Assistant SCM for this new club. Holiday areas and will handle them from Lone Pine. SUD is now QC as are 7PB and NIF. SUD is ex-KUS02, IOX is busy with traffic on the Hit and Bounce Net. The Mission Trail Net started on Dec. 7th using a frequency of 3854 kc. JRT reports a regular schedule with JNA, who is ex-CLY. UFJ reported a few of the active CAA hams are: UTD, VU, AGF, SPL, CHG, POM, WTO, OEN, QAE, RXT, J1 and 5JBC, BUK is on 28-Mc 'phone with 400 watts. FNH reports the CQN soon will open again on 144 Mc. JMB is a new 28-Mc mobile rig. New calls are K5Q, ex-IXC; K2H, ex-IXC; W6JX, ex-IXC; and K5Q. Another OM-XYL team is JYH and SHR. OMH has a new call, KV4AC, for Virgin Islands QTH.
Order Your Communications Receiver
from ALLIED
IMMEDIATE DELIVERY
on most models
Time Payments Available
Trade-Ins Accepted
NEW! HALLICRAFTERS SX-42 $275.00. Order yours now!

<table>
<thead>
<tr>
<th>Product</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hallcrafters 5-38</td>
<td>$47.50</td>
</tr>
<tr>
<td>Hallcrafters 5-40A</td>
<td>$59.50</td>
</tr>
<tr>
<td>Hallcrafters S-41G</td>
<td>$36.75</td>
</tr>
<tr>
<td>National NC-46 &amp; Spkr.</td>
<td>$107.40</td>
</tr>
<tr>
<td>RME-84</td>
<td>$98.70</td>
</tr>
<tr>
<td>RME-VHF-152 Converter</td>
<td>$88.20</td>
</tr>
<tr>
<td>Hammarlund HQ-120X</td>
<td>$172.25</td>
</tr>
<tr>
<td>Hammarlund HQ-122X</td>
<td>$172.25</td>
</tr>
<tr>
<td>Hammarlund HQ-128X</td>
<td>$190.70</td>
</tr>
<tr>
<td>National NC-240D</td>
<td>$225.00</td>
</tr>
<tr>
<td>National NC-241D</td>
<td>$274.35</td>
</tr>
<tr>
<td>Hammarlund HQ-125X</td>
<td>$385.00</td>
</tr>
<tr>
<td>RME-45</td>
<td>$198.70</td>
</tr>
<tr>
<td>National HRO</td>
<td>$274.35</td>
</tr>
<tr>
<td>National NC-2400</td>
<td>$225.00</td>
</tr>
<tr>
<td>Hammarlund HQ-129X</td>
<td>$342.00</td>
</tr>
</tbody>
</table>

ALLIED HAM "FLASH"
NEW!
2-Meter Transceiver Kit
For the new 2-meter band! Uses 6N4 as mod.-osc. in transmit position and as super regens det. in receiver position; 7C5 as mod. in transmitting, and as power audio amp. in receiving. Supplies current for single button carbon mike; has output transformer for coupling to speaker or headphones. Requires 250 v. at 75 ma., 6.3 v. at .65 amp. for power. Kit when completed measures 6" x 5" x 9". Includes all necessary parts and tubes (less mike, speaker and power supply). No. 83-220. NET...............$15.00

Power Supply Kit. Includes all parts necessary to build power supply for transceiver. No. 83-371. NET...............$10.25

W9FHZ—Louis McCoy, of Blue Island, Illinois. Listen for him on 10 meters; hear him occasionally on 20 meter CW.

"Mac" is a "post-war" newly licensed Amateur who received his ticket in September, 1946, and immediately put a 15 watt phone transmitter on 10 meters using narrow band FM. From this modest beginning, W9FHZ has grown to full-fledged rating as an up and coming Ham, now using a 600 watt phone rig of his own construction. Primarily a ten meter DX-er, "Mac" can point with pride to a total of 34 countries worked in his first two months of operation. As a secondary activity W9FHZ can also be heard doing an occasional bit of brass-pounding on the twenty meter CW band...

Newly licensed Amateurs are our pride and joy. Just as in the case of W9FHZ, we take to them and they take to us. We get as much real satisfaction out of helping to build "up and coming" stations as we have in serving our old-time Amateur friends.

"Equipped by ALLIED" is more than just a popular phrase. Behind these words are the whole-hearted interest of ALLIED's hams, the personal service, the vast stocks of station equipment and supplies, the speedy action and the help of a veteran Amateur institution.

Everything for the Amateur

Here's the Buying Guide that lists everything for the Ham... communication receivers, transmitters, Ham gear, code apparatus, parts, kits, tubes, test instruments, etc. Send for your FREE copy.

ALLIED RADIO CORP., D. L. Warner, W91BC
833 W. Jackson Blvd., Dept. 27-BB-7
Chicago 7, Illinois

□ Enter order for... Model...
□ Enclosed $... Full Payment □ Part Payment (Balance C. O. D.)
□ Send Literature on Receivers and Time Payment Plan.
□ Send FREE 1946 Catalog.
□ Send special bulletins on Surplus Equipment.

Name.................................................................
Address..............................................................
City.......................................... Zone........ State......
WRL GLOBE TROTTER
TRANSMITTER KIT

Field Reports Testify to Its Superior Performance

From Sandusky, Ohio — "May I congratulate you on turning out such a hot little Trott as the 'Globe Trotter.' It's amazing the way this sea-power transmitter bucks the heaviest QRM." — JAY LEBKACH.

From Bethany, W. Va. — "I am very well pleased with my WRL Globe Trotter (6L-80T). My first call resulted in a daytime report of 40/40 over 30 at 20 miles on 75 meter phone. The quality is excellent, and no hum is reported." — J. S. V. ALLEN, WBUNS.

From San Diego, Calif. — "The particular feature of the 'Globe Trotter' that appeals to me is its versatility. With a change of a switch emission can be changed to any desired band and to either CW or F.H.S. For the money charged for these sets in these days of high prices for every little widget, it really is a buy!" — O. M. DeReme, W7FST.

IMMEDIATE DELIVERY

Many other actual field reports of amateurs using the Globe Trotter testify to its excellent performance. It's the hottest ham equipment on the market today. The WRL Globe Trotter is capable of 40 watts input on C.W. and 25 watts input on phone on all bands from 1560 KC through 25 Megacycles. Incorporates the Trott Oscillator using a 40 meter Xtal; Helical choke modulation; three bands, all preset; 10, 30, and 80 meters; two power supplies, one for 807 final and modulator tubes, one for speech amplifier and oscillator stage.

IMMEDIATE DELIVERY— 40 Watt Input Cat. No. 70-300... ...$69.95

Complete including all parts, chassis panel, streamlined cabinets, less tubes, coils, and meter.

No. 70-315 is always wired by our engineers. $79.50 1 Set Cover, Meter, Tubes $16.15 Extra

New Type PHONO OSCILLATOR

Needed required. Utilizes highest quality loop both as part of oscillator circuit, and radiating medium. Trimmer provided to adjust frequency to any portion of broadcast band between 1250 KC and 1700 KC. Uses 35L6 and 3525 tubes.

Wired, less tubes. Cat. No. 16-191... ...$5.25

All well-known Receivers available on easy payment plan, Liberal trade warranty. Write us on your wants. All prices are domestic. Write for our monthly catalog.

Get Our New Flyer! Just Printed! FREE!

Giant Radio Map (also 3¼ ft. x 4½ ft) ... 15c
Handy Tube-Base Calculator ... 26c
Tube and Circuit Book ... 1c

SOUTHERN TEXAS — SCm, James B. Rivas, WAJC — HQ reports the Corps Christi Club sponsored a contest for participants in the AEC simulated emergency tests and QEL, KSS, GMT, FH, and QRH were the most active. BUU took third place going to QAM, who is connected with the communication facilities of the San Antonio Police Department, advises that he is making the trip to the South Pole with Admiral Byrd and would like to contact stations in this section. BUU has a new four-element beam and BUU is back in San Antonio as an operator and will be on the air soon. HQJ, LGF, LHL, and LHC were active in the SS Contest. KTL is adding another 813 to his final and incorporating compression in the speech amplifier. HBQ has a new three-element beam in operation. LCU, FAU, BWZ, EMV, and FNQ participated in a first-minute program over a Harlingen broadcasting station featuring a 28-Mc. QSO with a mobile station in Chicago. ARRL Assistant Secretary JEPF and our WSC were recent visitors at a meeting of the Houston Amateur Radio Club. BHO is active on 144-Mc. 'phone. QWI is out of the service and has a new rig on all bands in Houston. AOK is operating 15 Mc. with CBWU and EJH is on 28 Mc. BOA is on an element beam on 50 Mc. and is interested in schedules with other stations in this section. ALEX has 200 watts input and a "V" beam on 14 Mc. GU8P has been issued the call EMV and now is located in Harlingen. EYC has completed W29AD for shifts at the broadcasting station. MN is maintaining daily traffic schedules. 73, Jim.

NEW MEXICO — SCM, G. J. Hanzack, W5HJF — VN is in traffic work on 7 Mc. KXX reports a new YL jr. operator to help jn. operator Jimmy. HJF was active in Sweepstakes with forty-six sections worked out of ninety-five contacts in sixteen hours, twenty-five minutes. Traffic: W5YJ 10, HJF 4, 73. Vale.

CONTINUED FROM PAGE 180

NEW MEXICO — SCM, J. G. Hancock, W5HJF — VN is in traffic work on 7 Mc. KXX reports a new YL jr. operator to help jn. operator Jimmy. HJF was active in Sweepstakes with forty-six sections worked out of ninety-five contacts in sixteen hours, twenty-five minutes. Traffic: W5YJ 10, HJF 4, 73. Vale.

(Continued on page 184)

FOR SALE — HRO receiver 6 coils, speaker and power supply, covers broad casts and FM, plus 2900, 2920, 2940, 2970, 3000, 3030, 3050, 3070, 3100, 3150 kHz. $30. Warrick, 117 W. Fourth St., Mt. Carmel, Ill.


WANTED — Communications type receiver, Sky Champion or what have you? Have German Weka Camera and case to swap. Dorella Co., 268 P. O. Box 775, Rapid City, S0. Dak.

FOR SALE — 3000-3000 v. d-o at 600 to 800 ma. one pr. National lead through bushings, 20 recept. and books. WANTED — Communications type receiver, Type XS-3; collection amateur with 110-220 primary (Thermador B-44 SW AP OR SELL — State coils, condition and price. Ted Marie, Michigan.

FOR SALE — 2-meter transmitting capacitor in a size no larger than 2¼" wide x 3½" high — conservatively rated and fully guaranteed in the bargain! Or a 2 mfd. 1000 v round job that is only 2" diameter x 2½" high! These sizes are typical of the new Sprague types filled and impregnated with KVO, the famous wartime oil development. They’re absolute tops for performance and they’re modest in price. See them at your jobber’s today. Streamline your new rig with compact, modern components that give you full benefit of engineering progress achieved during the critical war years!
Get back on the AIR with . . .
SHURE STRATOLINER MICROPHONE

This expensive-looking, low-cost Microphone reproduces your voice clearly and fully. High output level with sharp speech response. Designed especially for Communications, Recording and Public Address. Has all the features of more expensive Microphones such as swivel-head, built-in cable connector. Genuine Bimorph Crystal. Model 708A.

List Price . . . . . $21.35

SHURE 707A CRYSTAL MICROPHONE

A quality Microphone at low-cost—has long been a favorite among HAMS for dependable service and clear speech reproduction. High output. Attractive modern die-cast case in Iridescent Gray finish with highly-polished plating on front grille. Model 707A.

List Price . . . . . $13.50

Available at Shure Distributors everywhere

SHURE BROTHERS, Inc.
Microphones and Acoustic Devices
225 W. Huron St., Chicago 10, Illinois
Cable Address: SHUREMICRO

SHURE BROTHERS, Inc.

SHURE STRATOLINER
Get back on the AIR
with . . .

SHURE 707A CRYSTAL MICROPHONE

A quality Microphone at low-cost—has long been a favorite among HAMS for dependable service and clear speech reproduction. High output. Attractive modern die-cast case in Iridescent Gray finish with highly-polished plating on front grille. Model 707A.

List Price . . . . . $13.50

Available at Shure Distributors everywhere

SHURE BROTHERS, Inc.
Microphones and Acoustic Devices
225 W. Huron St., Chicago 10, Illinois
Cable Address: SHUREMICRO

MARITIME DIVISION

MARITIME — SCM, A. M. Crowell, VE1DQ — EY, our KM, is net control station for Maritime Net on 3845 kc. with 400 watts input looking for some live schedules. He now schedules VE2TDU daily at 7:25 p.m. AST. PV says he has a tough time contacting Cape Breton boys on 3.5 Mc. OK and OM were recent visitors of DZ and HR in Trenton, N. S. The Halifax Ladies Lidi and Dab Club is showing a steady increase in members and code class is making good progress. GI was a recent visitor at LCARC meeting. JO is on 3.8-Mc. "phone now. LZ got the new "scope" working. JE has the new 800-watt "rockcrusher" putting out FB on 3.8-Mc. "phone. Secretary Inglis of the Lunenburg Radio Club reports FB progress with thirty members. LO and QT request more 50-Mc. activity. PA is once again active on 2.8 and 14 Mc. IU's very FB commercial-looking job is going strong on 3.8, 7, and 14 Mc. TN still gets good reports from the BCLs. KE is lining up the high power — looks like an 813. QT snagged a few Gs on 3.8 Mc. BF, who works on 14 and 28 Mc. has some good DX and twenty-five countries so far. VESARA hopes to hit the air with a small half-kw. soon. Q8 gets out well with the three element, and just finished 16-tube super. Traffic: VE1HJ 26, EY 13.

ONTARIO DIVISION

ONTARIO — SCM, David S. Hutchinson, VE3DU — I would like to see all the Ontario boys qualify for a Code Proficiency Certificate, and give the boys the chance to get on these bands. ND has always been a favorite among HAMS for dependable service and clear speech reproduction. High output. Attractive modern die-cast case in Iridescent Gray finish with highly-polished plating on front grille. Model 707A.

List Price . . . . . $13.50

Available at Shure Distributors everywhere

SHURE BROTHERS, Inc.
Microphones and Acoustic Devices
225 W. Huron St., Chicago 10, Illinois
Cable Address: SHUREMICRO

(Continued from page 189)

CANADA

MARITIME DIVISION

MARITIME — SCM, A. M. Crowell, VE1DQ — EY, our KM, is net control station for Maritime Net on 3845 kc. with 400 watts input looking for some live schedules. He now schedules VE2TDU daily at 7:25 p.m. AST. PV says he has a tough time contacting Cape Breton boys on 3.5 Mc. OK and OM were recent visitors of DZ and HR in Trenton, N. S. The Halifax Ladies Lidi and Dab Club is showing a steady increase in members and code class is making good progress. GI was a recent visitor at LCARC meeting. JO is on 3.8-Mc. "phone now. LZ got the new "scope" working. JE has the new 800-watt "rockcrusher" putting out FB on 3.8-Mc. "phone. Secretary Inglis of the Lunenburg Radio Club reports FB progress with thirty members. LO and QT request more 50-Mc. activity. PA is once again active on 2.8 and 14 Mc. IU's very FB commercial-looking job is going strong on 3.8, 7, and 14 Mc. TN still gets good reports from the BCLs. KE is lining up the high power — looks like an 813. QT snagged a few Gs on 3.8 Mc. BF, who works on 14 and 28 Mc. has some good DX and twenty-five countries so far. VESARA hopes to hit the air with a small half-kw. soon. Q8 gets out well with the three element, and just finished 16-tube super. Traffic: VE1HJ 26, EY 13.

ONTARIO DIVISION

ONTARIO — SCM, David S. Hutchinson, VE3DU — I would like to see all the Ontario boys qualify for a Code Proficiency Certificate, and give the boys the chance to get on these bands. ND has always been a favorite among HAMS for dependable service and clear speech reproduction. High output. Attractive modern die-cast case in Iridescent Gray finish with highly-polished plating on front grille. Model 707A.

List Price . . . . . $13.50

Available at Shure Distributors everywhere

SHURE BROTHERS, Inc.
Microphones and Acoustic Devices
225 W. Huron St., Chicago 10, Illinois
Cable Address: SHUREMICRO

(Continued from page 189)

CANADA

MARITIME DIVISION

MARITIME — SCM, A. M. Crowell, VE1DQ — EY, our KM, is net control station for Maritime Net on 3845 kc. with 400 watts input looking for some live schedules. He now schedules VE2TDU daily at 7:25 p.m. AST. PV says he has a tough time contacting Cape Breton boys on 3.5 Mc. OK and OM were recent visitors of DZ and HR in Trenton, N. S. The Halifax Ladies Lidi and Dab Club is showing a steady increase in members and code class is making good progress. GI was a recent visitor at LCARC meeting. JO is on 3.8-Mc. "phone now. LZ got the new "scope" working. JE has the new 800-watt "rockcrusher" putting out FB on 3.8-Mc. "phone. Secretary Inglis of the Lunenburg Radio Club reports FB progress with thirty members. LO and QT request more 50-Mc. activity. PA is once again active on 2.8 and 14 Mc. IU's very FB commercial-looking job is going strong on 3.8, 7, and 14 Mc. TN still gets good reports from the BCLs. KE is lining up the high power — looks like an 813. QT snagged a few Gs on 3.8 Mc. BF, who works on 14 and 28 Mc. has some good DX and twenty-five countries so far. VESARA hopes to hit the air with a small half-kw. soon. Q8 gets out well with the three element, and just finished 16-tube super. Traffic: VE1HJ 26, EY 13.

ONTARIO DIVISION

ONTARIO — SCM, David S. Hutchinson, VE3DU — I would like to see all the Ontario boys qualify for a Code Proficiency Certificate, and give the boys the chance to get on these bands. ND has always been a favorite among HAMS for dependable service and clear speech reproduction. High output. Attractive modern die-cast case in Iridescent Gray finish with highly-polished plating on front grille. Model 707A.

List Price . . . . . $13.50

Available at Shure Distributors everywhere

SHURE BROTHERS, Inc.
Microphones and Acoustic Devices
225 W. Huron St., Chicago 10, Illinois
Cable Address: SHUREMICRO

(Continued from page 189)
NEW! 152-162 Mc fm
Specifically designed for the Urban Mobile Service Band

KAAR Radiotelephones
INSTANT HEATING

★ Improved Voice Quality
★ Higher Sensitivity
★ Greater Noise Rejection
★ Lower Battery Drain

Tested and proved equipment specifically designed for the 152-162 Mc band is now brought you by the engineers who made instant-heating FM practical. The new KAAR FM-175X transmitter and FM-40X receiver are thoroughly engineered to do a better job in the urban mobile service band.

You will hear a startling improvement in voice quality. A special circuit boosts the low tones, rounding out the voice quality to a naturalness that actually permits recognition of the speaker’s voice! Controls are reduced to a minimum, making operation almost automatic!

Service men will find that this new KAAR equipment requires a minimum of upkeep and repair. For quick checking and servicing dust covers can be removed by a quarter turn of two airlock fasteners. The entire chassis can be released simply by freeing two slide catches.

KAAR instant-heating transmitters with zero standby current eliminate the need for costly special generators or extra batteries. Only about 4% of the current used by conventional equipment is needed.

SEND FOR NEW BULLETIN
Write today for illustrated bulletin number 26-47 giving complete details of the FM-175X transmitter and FM-40X receiver. No obligation, of course. KAAR ENGINEERING CO., 605 Emerson St., Palo Alto, California.

READY TO GO...INSTANTLY!

KAAR ENGINEERING CO.
PALO ALTO, CALIFORNIA
FEBRUARY SPECIALS

- 4 mfd. 600 V Oil Cond. $0.60¢
- 2 mfd. 600 V Oil Cond. $0.50¢
- 3 mfd. 1200 V Oil Cond. $0.90¢
- TUBES TUBES!
  6AG7 ..........49¢ 834 ..........$3.95
  6AC7 ..........49¢ 832 ..........$5.50
- The Best 807's Only
  5BP1—90-day Guarantee $0.50
  3E29—829 $3.95 684G $1.25
- Russian Tank Job—Complete—As Army packed—All Parts and Tubes $78.50

CONNECTICUT: Hartford, New Haven, Bridgeport, New London, Stamford, Waterbury. MASSACHUSETTS: Boston and Lawrence

HATRY & YOUNG

The Electronic

EASY TO LEARN CODE

It is easy and pleasant to learn or increase speed in the modern way—with an Instructograph Code Teacher. Excellent for the beginner or advanced student. A quick, practical, and dependable method. Available tapes from beginner's alphabet to typical messages on all subjects. Speed range 5 to 40 WPM. Always ready, no QRM, beats having someone send to you.

ENDORSED BY THOUSANDS!
The Instructograph Code Teacher literally takes the place of an operator-instructor and enables anyone to learn and master code without further assistance. Thousands of successful operators have acquired the code with the Instructograph System. Write today for full particulars and convenient rental plans.

INSTRUCTOGRAPH COMPANY

4709 SHERIDAN ROAD, CHICAGO 40, ILLINOIS

(Continued from page 114)

and VE5AU on Mondays, Wednesdays, and Fridays at 2000 and schedules VEBAU and VE5AL at 2200 three times weekly. AO participated in SS Contest. WG has schedule with W3OE. MJ increased power to 180 watts. Traffic: VE5A0 43, LQ 32, WG 18, MJ 4.

YUKON—Acting SCM, W. R. Williamson, VE8AK—A meeting of the YARC is held every two weeks at different homes in Whitehorse. Regular attendants are BB, AS, AJ, AG, AK, and AT. AS is on 14-Mc. c.w. AT uses 813 on 14 and 28-Mc. AW operates 14-Mc. AW uses pair of W2PR's Code Teachers on 3.8-14, and 28-Mc. 'phone. AB rebuilt rig to 809 final and is getting out FB on 3.8-14, and 28-Mc. 'phone. AK has rack-mounting rig, using a single 807 on 'phone and c.w. on 3.8, 14, and 28 Mc. AR is using 507. AO can be heard on all bands, 'phone or c.w. AL and AI operate from Telssin Lake. AM is heard with low power on 3.5-Mc. c.w. Look for VE8s between 3.8 and 3.85 Mc. on 'phone. On 14 Mc. most of the Whitehorse VE8s operate between 14.150 and 14.200-ke. 'phone, while on 28 Mc. they operate from 28.200- to 28,500-ke. 'phone. 28 Mc. has been very disappointing, as far as DX goes. Forward reports to VE8AK the first of the month.

PRAIRIE DIVISION

MANITOBA—SCM, A. W. Morley, VE4AM—Traffic is on the upgrade but we can use some more CD men. What appointment meets your qualifications and interest? RC, at Rivers, left for Lethbridge. RD is rebuilding to p.p. 807. RV has been changing antennas. RD is trying to get popping crystals. ET, of Riverbelle, is on 7 Mc. JN, Waskada, is putting in p.p. 807. DG, our 50-Mc. expert, is spending some time on 3.5 Mc. WE is running p.p. 813 on all bands. XO went to town in SS. FW moved from the shack to house because of cold. LH, Berens River, is on 7 Mc. RH, Riverlnd, is rebuilding. ET, of Riverlnd, is putting in p.p. 813 when time allows. AW runs 2AS, 807, p.p. T40. XP is never satisfied and is rebuilding again. PA is working on new final but won't let us in on it until it is finished. CN is new call and runs 807. p.p. 807. KW also is new. Welcome, fellows. AC is our PAM and has been doing FB work on a trans-Canada 'phone net. It's kinda late but HAPPY NEW YEAR ALL. Traffic: VE4AM 68, KD 55, AC 8, HS 5, Art.

SASKATCHEWAN—SCM, Arthur Chesworth, VE8SS—MP is on 28 Mc. and worked a G. GA has been made life member of the Regina Radio Club. RB has a 5-watt rig on the air. CI is looking for a new RME-84. RP has been doing FB work on a trans-Canada 'phone final. It's kinda late but HAPPY NEW YEAR ALL. Traffic: VE8SS 68, KD 55, AC 8, HS 5, Art.

“IT SEEMS TO US...”

(Continued from page 114)

Obviously the operator of a club station or one with more than one operator might occasionally engage in “we” if that's what he means, but there is no excuse otherwise for we-we-ing all over the place. And if he can’t shake the ham-radio jargon during his operating, he should at least try to get back to “I” during his off-the-air hours. Otherwise, when he comes up with “we,” people will think he has little men surrounding him or perched on his shoulders. We don't know—but maybe he has.

B. G.
You've been waiting for it and here it is—the complete Collins line. Harvey is now taking orders for quick delivery on the entire line.

The Model 30K-1 Xmitr complete with 310A-1 Exciter and all tubes. 500 watts input on cw, 375 watts on phone. $1250

32V-1 150-watt Xmitr (120 watts on phone) Complete with tubes, using the stable and accurate Collins VFO. $475

70E-8, a VFO that is really engineered. It is new, versatile and extremely accurate. Overall accuracy and stability are within 0.015%. Can be used for all bands with appropriate doublers up to ¾ meter. Complete with calibrated dial. One of these is the heart of a good band switching exciter unit that will make multiband operation a pleasure. $40.00

The receiver to end all receivers... the Collins 75A. 80-40-20-15-11-10 meter bands. Straight line tuning, dial calibrated directly in frequency. 50db image rejection on all bands, uses double conversion. Permeability tuned. Extremely high stability, uses separate oscillator for mixers. Complete with tubes, crystals and speaker. $375.00

HARVEY'S HITS OF THE MONTH

Harvey has 20 meter crystals for a buck! Mounted in holder with ½" pin spacing. Also 40 and 80 meter and 6 and 12 mc bands at the same low price. $1.00

Special 8 mc. xtals for 2 meter xtal control, only. $1.50

Also in stock complete line of Billey AX-2 xtals.

Include 10¢ postage with your crystal order.

HARVEY’S HAMFESTIVAL OF VALUES

Type 1616 Half wave high vacuum rectifier. Quantities limited on this excellent value so order at once. Characteristics: Filament, 2.5 volts, 5 amperes; Peak inverse, 5500 volts; Peak current, 8 amp; Surge current, 2.5 amp; Average plate current, .130 amps. List price $7.50... Harvey Special Price, 98¢

 Handy-Talky HT-144... a 1947 engineered transceiver for the 2 meter band. Completely telescoping antenna actuates on-off switch. Press-to-talk single hand control. 45 to 75 hour 6-battery life, A battery 10 hours. Rapid change battery compartment. 6C4 and 154 tubes. Weights 4 pounds with bats. Hi-144... $31.50, A batt. 50¢, 8 batt. $1.75, tubes $2.49 set.

Millen 90790 ECO in stock for immediate delivery. Quantity limited. Complete with tubes and output coupling. $42.50

(Quantities limited on some items, send your order at once.)

Notes: All prices quoted are Net, F.O.B. New York City and are subject to change without notice.
Feather-Light
MINIATURE
Test Meter

Dependable accuracy plus convenient, pocket size make these little instruments most useful and popular aids to better amateur station performance. Self-contained standard size batteries supply current for resistance readings. Three models are available in this small size: 3 15/16" x 2 7/16" x 2".

Model 450A Volt-Ohm-Milliampmeter
The outstanding value in the test equipment field. D'Arsonval movement. Zero adjustment. Rotary range switch. 1000 Ohms per volt. Volts DC: 0-10/50/100/500/1000
Mils DC: 0-1
Ohms: 30/300/1000/5000/50,000/500,000
Shipping weight 2 lbs. Price only $9.75 net

Model 451A AC-DC Volt-Ohmmeter with Output Ranges
Volts DC: 0-10/50/100/500/1000
Volts AC and Output: 0-10/50/100/500/1000
Ohms center scale: 7200
Price only $13.65

Model 452A High Sensitivity Volt-Ohmmeter
10,000 Ohms per Volt
Volts DC: 0-10/50/100/500/1000
Volts full scale: 2000/3000/5000/10,000/20,000
Ohms center scale: 30/300/3000/30,000
Price only $13.65

Ask your Jobber or write direct for circular

America's Pioneer Makers of Pocket Test Equipment

CHICAGO INDUSTRIAL INSTRUMENT CO.
219 West Chicago Avenue
CHICAGO 10, ILLINOIS

PRECISION MOVEMENT
DEPENDABILITY UNLIMITED

Burlington
INSTRUMENTS

- Alnico Magnets in all DC Instruments - phosphor bronze control springs - perfectly aligned jewel supports - non-shifting balance weights - added to many other superior construction features enables Burlington to maintain critical characteristics.

All ranges AC or DC available in 2 7/16", 3 5/8", 4 1/2" sizes, rectangular and round.

Inquiries invited for your specific requirements.

BURLINGTON INSTRUMENT COMPANY
813 Fourth Street • Burlington, Iowa

813 Amplifier
(Continued from page 87)

ating it at full input and then suddenly removing both excitation and load. The cathode current should immediately fall to a very low value, about 15 or 20 ma., and it should remain at that value regardless of any setting of the grid or plate tuning condensers. This and only this is the real indication of stability. If the cathode current shows the slightest tendency to "kick" at any setting of the dials, the neutralization is probably incomplete, and it should be rechecked after disconnecting the plate voltage.

Operation

The new published ratings for c.w. operation of the 813 permit plate input to be run as high as 500 watts for intermittent commercial and amateur service. To obtain this input, the tube ratings are 2250 volts on the plate, 400 volts on the screen, -155 volts grid bias. Plate current under these conditions should be no more than 220 ma., screen current no more than 40 ma., and grid current 15 ma. With lower plate input, the grid current and grid bias can be less. For example, with a 1500-volt plate supply, the operating conditions are as follows: screen voltage 300, grid bias -90, plate current 180 ma., screen current 30 ma., grid current 12 ma. (if a 7500-ohm grid resistor is used). The new "phone ratings permit a maximum plate input of 400 watts, secured as follows: plate voltage 2000, screen voltage 350, grid bias -175 volts, plate current 200 ma., screen current 40 ma., grid current 16 ma. (assuming a grid resistor of 11,000 ohms). For 1600-volt operation the values are reduced as follows: plate voltage 1600, screen voltage 400, grid bias -130, plate current 150 ma., screen current 20 ma., and grid current 6 ma. (assuming a grid resistor of 21,600 ohms).

The amplifier should remain stable under all operating conditions. Under plate modulation the plate current should remain constant up to 100-per-cent modulation unless the grid drive is inadequate or unless the screen is not operating under the proper conditions. Again it should be stressed that the adjustment of the screen voltage in a tube of this sort is almost the key to success or failure. If the screen is given the kind of treatment it demands, no troubles should be encountered.

A Stacked Array
(Continued from page 41)

wide range either side of the cut frequency that is all one need worry about.

The ease with which the system takes power should not be regarded as an indication of proper matching; in fact, it may be quite the opposite. Moving the "T" clips close to the center will increase the loading, but it will be noted that when this is carried too far the standing-wave ratio will go up sharply. Broad frequency response and low standing-wave ratio are the things to watch

(Continued on page 180)
CUSTOM MADE TECHNICAL CERAMICS

FOR ELECTRONIC AND ELECTRICAL USES

SOLD ONLY TO MANUFACTURERS

AMERICAN LAVA CORPORATION

CHATTANOOGA 5, TENNESSEE

44TH YEAR OF CERAMIC LEADERSHIP
for. Don't worry if the system appears to require fairly close coupling, as compared to resonant-line antennas having tuning devices.

No adjustment of the 50-Mc. array should be necessary. We made provision for adjusting the elements, and many workers will wish to do this, but be assured that it is not mandatory. This array, as finally erected, was an exact duplicate of the 4-element job erected last March, except for the use of 1-inch tubing for all elements.

**Performance**

In stating performance data, we would like to point out that no directive array is a worker of miracles. We hear of beams which give 20-db. gain over a comparison antenna, and some receivers have given these arrays that sort of report, but it just doesn't happen. When it appears to be certain that the 8-meter in question is lying, or the comparison antenna is no good. These arrays have been tested in comparison with good dipoles using receivers with carefully-calibrated meters, and the gain in both cases is close to the theoretical limits for 3- and 4-element arrays.

The 50-Mc. array shows a gain of approximately 10 db., and a front-to-back ratio of 15 db. The 10-meter section exhibits a gain of 7 db., and a front-to-back ratio of 12 db. The front-to-back figures could be improved somewhat by retuning slightly, but we aimed for maximum gain, the primary object in the erection of such systems. The 50-Mc. array can be made to take power over a range from 50 to 53 Mc., and its performance is good over a range from 50 to 51.5. On 10 we regularly use 28,580 and 29,116 kc., with no change in coupling. Schedules are kept with KH6AR on 29.4, and we have gone as high as 29.6 on occasion. There is enough loading on 28,002 to do a creditable job in working c.w. DX. Such ranges are well beyond the capability of a close-spaced system which is tuned "on the nose," and being able to cover this much territory is of great value in receiving, especially in these days of full use of the 10-meter band.

These performance figures have been checked with numerous stations at all distances, the most reliable checks being made over a 90-mile path during the evening hours, when conditions are stable. Fortunately, a somewhat similar antenna installation is in use at W1PFJ, Waltham, Mass., and both stations have carefully-calibrated receivers. The signals over this path are reliable on 28,002 to do a creditable job in working c.w. DX. Such ranges are well beyond the capability of a close-spaced system which is tuned "on the nose," and being able to cover this much territory is of great value in receiving, especially in these days of full use of the 10-meter band.

These performance figures have been checked with numerous stations at all distances, the most reliable checks being made over a 90-mile path during the evening hours, when conditions are stable. Fortunately, a somewhat similar antenna installation is in use at W1PFJ, Waltham, Mass., and both stations have carefully-calibrated receivers. The signals over this path are reliable on both bands, and checks have been made under all conditions of propagation. The 10-meter section of the array has boosted our success in working DX, and the performance of the 6-meter job leaves nothing to be desired, in comparison with the former single array for that band.

We wish to thank Bud Barnard, W1NSS, for his days on end of working with us on the development and erection of this array, and to Doc Farrar, W1PFJ, for the hours we have taken from his operating time in the course of nightly testing on 6 and 10. The cooperation of scores of other stations, local and DX, is greatly appreciated.
NEWS and NOTES
ACROSS the COUNTER

Frank Miller, W2BUS

Fellows who attended last Hudson radiotelephone League meeting saw that ham harmonics could do to television reception ... isn't there a

sight enough BCL trouble now? ... observing post-war broadcast receivers there seems to be less use of an RF Stage

than before — and that was not existent ... will they never learn? 

... and those slug-tuning switches ... harder to think what even a 

getter will do to them ... many amateur house boys (cifl dwellers) are using the Sonar for narrow-band

receiver tuning during BCL hours. (Sonar XE-10 — 39.45 — adv.) ... helps a lot ... would like to see it 

made lawful for the lower frequency bands ... 73.

STANDARD LINES

INVENTORY RISES

You'll always find complete stocks of standard radio equipment at TERMINAL! Everything for the radio amateur, from nuts and bolts to complete ready-to-operate transmitters!

INSIDE STORY OF TERMINAL'S SURPLUS

Only a small percentage of Government surplus passes inspection of Terminal's purchasing men — and then we buy! Careful examination by our men who know the values hams look for results in Terminal handling only the best and usable equipment, requiring little or no alteration to make them suitable for our customers.

For example, when we examined a quantity of brand new, boxed 0·1 milliamperc G.E. meters, we found that at $2.95 it had a terrific value to offer hams who would build field strength meters and frequency meters, besides many everyday applications. The bakelite case is 1½" square, with a black luminous scale and pointer. For a compact D.C. voltmeter, add 1000 ohms per volt for direct scale reading. One of our 0.1 meg. 1% accurate resistors (95c—adv.) in series makes this a cute 0-1000 volt D.C. Meter.

We set high standards on the choice surplus equipment we sell and guarantee each surplus item with the same warranty that backs the thousands of standard parts we sell regularly.

MAY WE HELP?

Most of our counter salesmen are active hams whose friendly service is yours for the asking.

SOUND STUDIO GOES HI-FI

Altec-Lansing, Pickering, and Brook Thrill Visitors

A high fidelity chain of audio units, including the Pickering pickup, Brook amplifier and Altec-Lansing reproducers is on demonstration in Terminal's Sound Studio in conjunction with other new equipment. The new Browning AM-FM tuner can be heard at its best by the most critical ears.

Engineers who want to be shown are invited to bring along their own test records. If unable to visit us in New York, send a letter or postcard for descriptive literature.

"Hear it at Terminal" are the bywords of value-wise sound equipment customers. All well-known makes of amplifiers, speakers, microphones and pickups are carried in stock.

NEW RECEIVERS

ON DEMONSTRATION

Our Ham Shack is a cozy room where you may see and hear all the new communications receivers. Also on display are the latest amateur transmitters from free-power up to a half-kilowatt. If you're interested in a "ham" receiver, don't wait. but come in NOW!

Sets shown are the latest models made by Hallcraf ters, National, Hammarlund, RME, Gen-Set, TREX, Cross Communications and RTL.

CHOOSE BUYS NOW AVAILABLE AT TERMINAL

Brand New! Fully Guaranteed! Low Prices!

C-D Oil-Filled CAPACITOR

10 Mfd. — 600 Volts DCW

Husky, hermetically-sealed Choice Surplus condensers built for heavy duty and priced far below its regular value! Each 98¢

General Electric 0·1 Ma. Miniature Meter — 1½" Sq.

Compact and accurate! Mounts in 1½" hole. Complete with faceplate and mfg. hardware. Ideal for innumerable applications! Our special. Each only 2.98

Leach Antenna Relay

Handles up to 400 Watts

115 volt AC coil, all-ceramic insulation. DPDT contacts, plus SPDT for break-in. Your cost, each only 2.95

Sprague Fixed

Koolohm Resistor

10,000 ohms — 120 Watts. Completely insulated, easy to mount. Some value! Each... 39¢

If unable to visit our store, send us your mail orders with 25% deposit. Remit in full all orders under $5.00. Prices are F.O.B. New York.

PETERSEN CRYSTALS—YOU NAME YOUR FREQUENCY!

40 & 80 meter bands........... 2.05 ea.
20 meter band................ 3.50 ea.
10 meter band................. 5.00 ea.

Special frequency crystals for working into 2, 6 & 11 meter bands.................. 3.50 ea.

TUBES

Transmitting & Special Types

RELEASED BY GOVERNMENT through War Assets Administration

Made by nation's leading tube

plants! All new! JAN Approved! Buy now and save — Order spares at these

low prices! Following are only some of the popular types we have in stock:

802 815 866A

805 811 884

807 813 2AP1A

815 822B 3ES9

822A 830 820

250TH 250 5R5

Write for complete JAN tube lists

New Items — In Stock

10.7 MC IF Transformers NC-IFN........ 6.45
NATIONAL IFM.................. 6.45
NC-IFL (discriminator)............. 6.95
Sylvania Modulation Meter........ 29.50
B & W Baby Coils — 25 Watts, all bands........ 1.04

TERMINAL RADIO CORP.

85 CORTLANDT STREET

PHONE: WOrth 2-4415

NEW YORK 7, N. Y.

TERMINAL RADIO CORP.

85 CORTLANDT STREET

NEW YORK 7, N. Y.

WEATHER REPORT

Monday, windy, followed by Tuesday.

Check your guy wires!
TRYLON ROTARY BEAM ANTENNA SUPPORT

for 4-element 20-meter array

Quick, easy to install on any tower. Stainless steel, spot-welded construction. 19' 2" long, yet weighs only 30 lbs. Adaptable to either manual or motor drive. Ball bearing design provides full 360° traverse. Support can be tilted in either direction for easy accessibility. Has ample safety margin to withstand severe wind and icing conditions. Write for descriptive circular.

TRYLON TOWER AND ANTENNA DIVISION
Wind Turbine Co., West Chester, Pa.

GON-SET CONVERTERS

Now available for 20, 10-11, or 6 Meters

Immediate Delivery
Price Complete, $39.95—Special Noise Silencer, $8.25—High Frequency Antenna Lead Cable, 8 Cents Foot
See Your Dealer
Manufactured by
WATERPROOF ELECTRIC CO.
Burbank, California

Old Stand-By

(Continued from page 44)

are located along the right-hand side of the chassis and are not visible. The placement of the rest of the components can be determined by inspection of the photographs.

It is recommended that double-bearing condensers (rotors supported at both ends of the shaft) be used in the detector circuit to minimize modulation of the received signals because of mechanical vibration.

The detector-tube socket must be set below the chassis about an inch, so that the tube will fit into the cabinet. The exact distance can be determined when the parts are mounted.

The coils are all close-wound on 1% inch diameter forms (tube bases) with No. 22 d.c.c. wire. With the 50-meter coil in the socket, 3500 kc. should be found at about 50 on the band-set dial, with the vernier set at maximum capacity. With the 40-meter coil, 7000 kc. will be around 40 on the band-set dial. With the 20-meter coil, 14,000 kc. will be about 20 on the band-set dial, and io meters will be covered by the bandspread dial when the main tuning condenser is at minimum capacity.

The terminals for turning off the B+ to the detector during transmitting periods are not shown. However, they were placed directly below the two 'speaker terminals, and a twisted pair connects them to the proper point in the circuit. Incidentally, if the send-receive switch were placed in the B+ line feeding all the tubes (between the power supply and the decoupling filters) it would take several seconds for these filters to charge up each time the switch was closed. In a congested band this might confuse the operator sufficiently to cause him to completely lose the signal. This difficulty is avoided if the switch is placed as shown in the diagram.

Performance

For c.w. operation this receiver will equal the sensitivity of some of the best superhets on the market. It, a Super Pro, and an NC-2-40D were placed side by side and the weakest signal audible on either of the superhets could be copied on the regenerative receiver with no difficulty. This was on 40 meters.

G6 -- needs "New Mexico and Omaha for 28-Mc. 'phone WAS," according to his recent letter.
You'll hear it in many a QSO—you'll overhear it at Hamfests. "I got it from Walter Ashe." And more and more—one Ham tells another what a time and money saving habit it is to order from Walter Ashe for both standard and hard-to-get items—delivered in a hurry.

**One Ham Tells Another...**

You'll hear it in many a QSO—you'll overhear it at Hamfest... "I got it from Walter Ashe." And more and more—one Ham tells another what a time and money saving habit it is to order from Walter Ashe for both standard and hard-to-get items—delivered in a hurry.

### Receivers for Immediate Delivery

This is no dream. In stock now—for INSTANT delivery—these popular makes of receivers. And we are giving trade-in allowances you won't want to pass up!

**HAMMARLUND HQ-129-X**—with much-praised noise silencer. Complete for...**$173.25**

**NATIONAL NC-240—**outstanding stability and built-in quality. A value...**$241.44**

**RME 45**—one of the first entirely re-designed Ham receivers of post-war era...**$198.70**

**NATIONAL HR-50A**—one of the leaders in the field. Less speaker and power supply...**$274.35**

### Deluxe Amplifier Chassis

With covers. Chrome trim, gray enamel.

<table>
<thead>
<tr>
<th>Number</th>
<th>Size</th>
<th>Reg. Price</th>
<th>Safe Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>3973</td>
<td>7 x 17 x 9</td>
<td>$4.95</td>
<td><strong>$3.72</strong></td>
</tr>
<tr>
<td>3974</td>
<td>10 x 14 x 9</td>
<td>$5.20</td>
<td><strong>$4.03</strong></td>
</tr>
<tr>
<td>3975</td>
<td>10 x 17 x 9</td>
<td>$5.70</td>
<td><strong>$4.28</strong></td>
</tr>
<tr>
<td>3983</td>
<td>10 x 14 x 9</td>
<td>$3.51</td>
<td><strong>$2.64</strong></td>
</tr>
</tbody>
</table>

### Transformers and Chokes

**Thordarson** Smoothing Choke, 200 Mills, 12 Hy, $3.50

**Surplus Filament Transformer**, 110 V AC pri., sec. 63...**$1.18**

**V @ 3.6 A, 6.3 V @ .6 A.**

**Surplus Filament Transformer**, 110 V AC pri., sec. 63...**$1.08**

**V @ 3 A.**

**Midget Transceiver Transformer, Mike to Grid, Plate to Voice Coll.**...**$74.40**

**Thordarson Heavy Duty Broadcast Type Plate Transformer**, 115 or 230 V AC pri. 1510-0-1510 V ½ A sec., tapped at 1230 and 1230 V, easily work 3 sec. tapped at 1330 and 1230 V, easily work 3 sec. tapped at 1330 and 1230 V, easily work 3 sec. tapped at 1330 and 1230 V, easily work 3...**$39.50**

**Thordarson Heavy Duty Swinging Choke, 200 Mill, 5-16 Hy 7500 V RMS. This choke is rated at 500 Mills can be...**

### Other Outstanding Bargains

**SELSYN MOTORS**—type 5G, special per pair...**$12.50**

**REVERSIBLE MOTOR**, ½ to 2 r.p.m., with conversion instructions for rotory beam drive, has 50-inch pounds torque...**$4.95**

**MODEL 905 "TRANS-METER"** transmitter tester...**$49.50**

**MOSLEY STATION QSO BOOK**—new indexed...**$1.25**

**SONAR FM EXCITER**—price complete, less crystal...**$39.45**

**RCA 1 KW. MODULATION TRANSFORMER**, pri...**$25.00**

**GET ON OUR MAILING LIST**

### For Your Dream Rig

**AMERTRAN PLATE**

Transformer...**$39.95**

Free Delivery in Continental U.S.A.

Rated at 2 KVA. Pri. 105-150-150-105, 60 cycle, Sec. 3100-0-3100, full voltage across sec. 6200 V @ 700 Ma.

### Write for Free Catalog

**DYNAMOTOR POWER SUPPLY**

**$11.95**

LIMITED QUANTITY

Brand new, U.S. Army PE-703 operates from 6 or 12-volt battery, will deliver 500 volts DC at 160 Ma. A real value. Brand new, U.S. Army PE-703 operates from 6 or 12-volt battery, will deliver 500 volts DC at 160 Ma. A real value.

**FOR YOUR DREAM RIG**

**MERTRAN PLATE**

Transformer...**$39.95**

Free Delivery in Continental U.S.A.

Rated at 2 KVA. Pri. 105-110-115, 60 cycle, Sec. 3100-0-3100, full voltage across sec. 6200 V @ 700 Ma.

### Get on Our Mailing List

**RADIO CO.**

**1125 PINE ST. ST. LOUIS, MO.**

W1XLD W1XPL W1XLP W1XLP
The Tower You’ve Been Wanting!

RUGGED
Aluminum alloy throughout. Guaranteed to support 200 lbs. with an area of 5 sq. ft. in 70 mile wind.

SIMPLE
Triangular, tapered, self-supporting, light weight. 30 ft. tower can be assembled anywhere, using only wrenches, erected by hand.

ECONOMICAL
Buy the height you need; 10, 20 or 30 feet. All fastenings and metal parts of footing finished, Reasonably priced.

Write immediately for Brochure FREE!

FABRICATED LIGHTMETALS CO.
42 West 15th St. New York City 11, N. Y.

Field Day
(Continued from page 48)

Two Transmitters QSOs Power Score

<table>
<thead>
<tr>
<th>Transmitter</th>
<th>QSOs</th>
<th>Power</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>W0RCM/9</td>
<td>230</td>
<td>A</td>
<td>4206</td>
</tr>
<tr>
<td>W8OC/8</td>
<td>108</td>
<td>A</td>
<td>3267</td>
</tr>
<tr>
<td>W3ATR/3</td>
<td>201</td>
<td>A</td>
<td>2907</td>
</tr>
<tr>
<td>W5AA/6</td>
<td>123</td>
<td>AB</td>
<td>2145</td>
</tr>
<tr>
<td>W3BE/3</td>
<td>129</td>
<td>A</td>
<td>2061</td>
</tr>
<tr>
<td>W9ME/9</td>
<td>106</td>
<td>A</td>
<td>1720</td>
</tr>
<tr>
<td>W3CH/8</td>
<td>107</td>
<td>A</td>
<td>1511</td>
</tr>
<tr>
<td>W3FX/9</td>
<td>114</td>
<td>A</td>
<td>1339</td>
</tr>
<tr>
<td>W5AOA/6</td>
<td>146</td>
<td>A</td>
<td>1500</td>
</tr>
<tr>
<td>W3UT/7</td>
<td>98</td>
<td>A</td>
<td>1472</td>
</tr>
<tr>
<td>W1GJ/1</td>
<td>116</td>
<td>A</td>
<td>1315</td>
</tr>
<tr>
<td>W6DXU/0</td>
<td>104</td>
<td>A</td>
<td>1359</td>
</tr>
<tr>
<td>W7UM/7</td>
<td>106</td>
<td>A</td>
<td>1274</td>
</tr>
<tr>
<td>W6Z/6</td>
<td>114</td>
<td>A</td>
<td>1222</td>
</tr>
<tr>
<td>W8RK/3</td>
<td>65</td>
<td>A</td>
<td>1098</td>
</tr>
<tr>
<td>W4CA/4</td>
<td>102</td>
<td>A</td>
<td>1002</td>
</tr>
<tr>
<td>W1NDS/1</td>
<td>82</td>
<td>A</td>
<td>914</td>
</tr>
<tr>
<td>V2EO/2</td>
<td>51</td>
<td>A</td>
<td>909</td>
</tr>
<tr>
<td>W8I/8</td>
<td>58</td>
<td>A</td>
<td>891</td>
</tr>
<tr>
<td>W2L/0</td>
<td>36</td>
<td>A</td>
<td>737</td>
</tr>
<tr>
<td>W4T/4</td>
<td>95</td>
<td>AC</td>
<td>907</td>
</tr>
<tr>
<td>W5IT/5</td>
<td>74</td>
<td>A</td>
<td>758</td>
</tr>
<tr>
<td>W8TP/8</td>
<td>90</td>
<td>A</td>
<td>624</td>
</tr>
<tr>
<td>W3AQ/5</td>
<td>106</td>
<td>C</td>
<td>617</td>
</tr>
<tr>
<td>W8EE/7/7</td>
<td>80</td>
<td>A</td>
<td>617</td>
</tr>
<tr>
<td>W9UN/8</td>
<td>42</td>
<td>A</td>
<td>585</td>
</tr>
<tr>
<td>W8BJ/9</td>
<td>40</td>
<td>B</td>
<td>501</td>
</tr>
<tr>
<td>W8KE/6</td>
<td>67</td>
<td>B</td>
<td>477</td>
</tr>
<tr>
<td>W8AQ/8</td>
<td>53</td>
<td>B</td>
<td>395</td>
</tr>
<tr>
<td>W4DUG/4</td>
<td>33</td>
<td>B</td>
<td>74</td>
</tr>
</tbody>
</table>

Three Transmitters Operated Simultaneously

<table>
<thead>
<tr>
<th>Transmitter</th>
<th>QSOs</th>
<th>Power</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>W8ONE/8</td>
<td>319</td>
<td>A</td>
<td>4500</td>
</tr>
<tr>
<td>W8OBM/9</td>
<td>251</td>
<td>A</td>
<td>2961</td>
</tr>
<tr>
<td>W8DM/8</td>
<td>229</td>
<td>A</td>
<td>2817</td>
</tr>
<tr>
<td>V8EJ/4</td>
<td>107</td>
<td>B</td>
<td>2555</td>
</tr>
<tr>
<td>W1KWN/1</td>
<td>182</td>
<td>A</td>
<td>2555</td>
</tr>
</tbody>
</table>

19 W8DUG/4, ESF, FZC, JBF, JBE, LED, PRM, QJB, RJB, RQM, SMP, Plaats, Madson, Britton. 20 W3WNB, KQF, USF, VTY, RUM, PTL, KPO, KJN, TZX, W8OC, UGJ, RNO, RCQ, VYP, KPL, SFL, MFK, UED, KSW, AJY, UST, JBD, QZM, UCI, 21 W3TFP, HTM, IKP, ATR, GSF, ILQ, FFY, ETA, NTS, DYL. 22 W5DFU, HCH, KTA, AAE, BNO, CVB, SBE, KIN, KXW, JSS, JOF, LHF, GDY, VQ, APW, ELC, SH, FRD, W9DR/5. 23 Eight. 24 Twelve. 25 Sixteen. 26 Fifteen. 27 W1DMG, OGV, IPQ, JOX, KJC, KIY, MYD, LLO, LWF, W6ECO. 28 W4PRC, XPH, UTV, NQJ, KUP, UTA, PSQ, LTO. 29 JPU, KPW, K6RGL/6. 30 Forty. 31 Twenty. 32 Ten. 33 V6EIK, DB, KB, HJ, TH. 34 W8I/8, GFB, VTP, WTVX/8, FIH, TTS. 35 W8REC, KLI, HPG, YVD, ADF, IYX, FEX, AAW, Sendo. 36 Eight. 37 W8HOT, JIC, 10S, HNU, GTS, IWL, IYW, HPL. 38 W8HBB, BBM, KDI, CVY, EST, BMK, GUT, QAU, AQE, YL, Lou Lacy, Grace Elkan. 39 Ten. 40 Fifteen. 41 Nine. 42 Nine. 43 W8AQ, EEI, KNF, LFJ, LAI. 44 W8KAI/8, W7LA/1, 45 W8XEM, WEF, IPV, DQX, TCB. 46 JFQ, DEC, B3, ANS, YLZ, VEL, PFI, GHE, W8OWK, OBM, EHL, MGY GQK, NFD, DBC, YDD, RVS, JCF, JNC, MIN, YPN, WAB, IRO, CUD, IPX, WTV, BXO. 47 W8BKX, JPT, YIA, W0D, GTO, HDM, DM, VMI, DUA, W8ZN/8. 48 Fifteen. 49 Sixteen. 50 Fifteen.
Most models listed below are in stock... ready for immediate delivery:

- Hallicrafters S38 complete: $47.50
- Hallicrafters S4OA
- Hallicrafters SX 42
- Hammerlund HQ-129X and speaker: 168.00
- Hammerlund SP-400-X and speaker: 342.00
- National NC-2-40D (complete with speaker): 241.44
- National HRO-STA1 and HRO-SRA1: 274.35
- National NC-4A: 97.50
- National 1-10A with tubes and coils: 68.00
- RME-45 complete: 198.70
- RME-84 complete: 98.70
- Pierson KP-81 complete: 342.00
- Pancorpanadaptor complete: 99.75
- Temco 75G transmitter: 495.00
- McKe 60T transmitters: 150.00
- Millen 90800 ECO: 42.50
- Millen 90800 exciter: 37.50
- Millen 92281 power supply: 84.50
- Millen 90902 scope: 42.50
- Gordon, Amphenol, other rotary beams: 98.70

The new Hallicrafters and Collins receivers, transmitters, VFO, etc. as fast as available.

Prices subject to change.

The delivery situation is much improved. I can make immediate delivery of most receivers and other apparatus. Take advantage of the extra service and selection you get by dealing with me, based on my reputation as the world's largest distributor of short wave receivers. Send me your order now. Send five dollars and I will ship at once C.O.D. Or order on my 6% terms, I finance the terms myself to give you better service and save you money. Trade-ins accepted. Tell me what you have to trade, and let's make a deal. Besides having all amateur receivers and transmitters, I also have a complete stock of all other amateur apparatus and parts, also test equipment, etc. I have real bargains in the really good war surplus. Write, phone, wire or visit either of my stores.
This book gives you the fundamentals of wireless and telegraphy. It contains the codes and how to learn wireless and telegraphy. Having passed the quarter century mark, we feel like "Old Hands" at giving our customers better service and more for their money, with only one purpose in mind; keeping our customers satisfied. Because of our long experience, we feel we are more able now, than ever before, to help the amateur in all of his radio needs. Remember... when you see "KIERULFF", think of FAST SERVICE and QUALITY MERCHANDISE.

KIERULFF AND COMPANY
828 W. Olympic Blvd.,
Los Angeles 15, California

LEARN WIRELESS and TELEGRAPHY!
A BOOK EVERY AMATEUR SHOULD HAVE —

Send Now!

Hundred of amateurs have learned from this book so can you.

This book gives you the fundamentals of wireless and telegraphy. It contains the codes and how to learn them. Mail your order now to:

SIGNAL ELECTRIC MFG. CO., Menominee, Mich.

ESTABLISHED 1892

(Continued from page 134)

<table>
<thead>
<tr>
<th>Transmitter</th>
<th>QSO's Power* Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>W3AQ/2</td>
<td>Delaware Valley Radio Association</td>
</tr>
<tr>
<td>W3ST/9</td>
<td>Milwaukee Radio Amateurs Club</td>
</tr>
<tr>
<td>W3QV/2</td>
<td>York Radio Club</td>
</tr>
<tr>
<td>W4TUC/0</td>
<td>Oakland Amateur Radio Club</td>
</tr>
<tr>
<td>W2PY/2</td>
<td>North Newark Amateur Radio Club</td>
</tr>
<tr>
<td>W2HY/8</td>
<td>Johns Island Amateur Radio Society</td>
</tr>
<tr>
<td>W3AEP/8</td>
<td>Toledo Radio Club</td>
</tr>
<tr>
<td>W3BUX/2</td>
<td>Iowa City Radio Club</td>
</tr>
<tr>
<td>W2YY/2</td>
<td>Amateur Radio Club of North Dakota</td>
</tr>
<tr>
<td>W3HE/1</td>
<td>Piedmont Radio Club</td>
</tr>
<tr>
<td>V3BKK</td>
<td>Key Klick Radio</td>
</tr>
<tr>
<td>W3HVA/0</td>
<td>OQ Club of Gary, Indiana</td>
</tr>
<tr>
<td>W3WIA/2</td>
<td>Middle East Amateur Radio Club</td>
</tr>
<tr>
<td>W3ST/3</td>
<td>Sunrise Radio Club</td>
</tr>
<tr>
<td>W3PY/7</td>
<td>Racine Megacycle Club</td>
</tr>
<tr>
<td>W2WX/9</td>
<td>First Amateur Radio Society</td>
</tr>
<tr>
<td>W3EG/3</td>
<td>Sperry Radio Club</td>
</tr>
<tr>
<td>W2US/8</td>
<td>Eastern Suffolk Radio Club</td>
</tr>
<tr>
<td>W4LU/7</td>
<td>Radio Club of Yonkers, Inc.</td>
</tr>
<tr>
<td>W3DNL/8</td>
<td>Dayton Amateur Radio Association</td>
</tr>
<tr>
<td>W1NRC/1</td>
<td>Manchester Radio Club</td>
</tr>
<tr>
<td>W3TWF/7/7</td>
<td>Olympics Radio Club</td>
</tr>
<tr>
<td>W3KRP/1</td>
<td>Candlewood Amateur Radio Association</td>
</tr>
<tr>
<td>W2YTG/3</td>
<td>West Philadelphia Radio Association</td>
</tr>
<tr>
<td>W2AT/2</td>
<td>Barton Valley Radio Club</td>
</tr>
</tbody>
</table>

Four Transmitters Operated Simultaneously

<table>
<thead>
<tr>
<th>Transmitter</th>
<th>QSO's Power* Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>W4RX/6</td>
<td>Four Lakes Amateur Radio Club</td>
</tr>
<tr>
<td>W3BB/0/3</td>
<td>The Amateur Transmitters Association of Western Pennsylvania</td>
</tr>
<tr>
<td>W3J3/5</td>
<td>Tulsa Amateur Radio Club</td>
</tr>
<tr>
<td>W4ST/7/7</td>
<td>Amateur Radio Researchers</td>
</tr>
<tr>
<td>W3GB/1</td>
<td>New Haven Amateur Radio Association</td>
</tr>
<tr>
<td>W2SS/8/8</td>
<td>South Cleveland Radio Club</td>
</tr>
<tr>
<td>W3RL/7/7</td>
<td>Niagara Radio Club, Inc.</td>
</tr>
<tr>
<td>W3SW/8/8</td>
<td>Queen City Emergency Net</td>
</tr>
<tr>
<td>W3US/0/7</td>
<td>Prairie Dog's Group, Hamilton Radio Club, Inc.</td>
</tr>
<tr>
<td>W3EX/8/8</td>
<td>Buckeye Radio Club</td>
</tr>
<tr>
<td>W2YH/7/7</td>
<td>Kaw Valley Radio Club</td>
</tr>
<tr>
<td>W3AL/8/8</td>
<td>Canton Amateur Radio Club</td>
</tr>
<tr>
<td>W2SWX/8/8</td>
<td>Civilian Amateur Radio Monitoring and Relay System</td>
</tr>
</tbody>
</table>

Five Transmitters Operated Simultaneously

<table>
<thead>
<tr>
<th>Transmitter</th>
<th>QSO's Power* Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>W3TF/7/7</td>
<td>Northwest Amateur Radio Club</td>
</tr>
<tr>
<td>W3SIF/6/6</td>
<td>The Mike and Key Club of Santa Monica</td>
</tr>
</tbody>
</table>

KENYON
FILAMENT
TRANSFORMER
Primary 115 Volt, Secondary 2 1/2 Volt, center-tapped 60 to 10 amps; 10,000 V insulation. Husky, fully cased, stellite terminals. A real buck stretcher at...

WESTINGHOUSE
METER
0-150 VOLTS AC
25-125 cycles. Bakelite case. 1/2" face, Mounts in 2 1/4" hole. A must for every rig to measure input line voltage.

Price......................................$5.25

BUCK'S FEATURE LINE OF THE MONTH
(James Millen Mfg. Co.)
#37001—High Voltage Safety Connecting Terminal, 2 for
#80001—Panel Making Decalometer, 1 for
#74001—Permeability Tuned Shielded Form
#89041—Permeability Tuned Midget Isolante Coil Form (VHF)
#10012—Right Angle Gear Drive, 1:1 ratio
Accessory Coils for Millen Exciter: 80, 40, 20, 10 Meters
You can always use a better receiver!

SUN RADIO & ELECTRONICS CO., Inc.
ESTABLISHED 1922
122-124 DUANE ST. • NEW YORK 7, N. Y. • BARclay 7-1840

FOR HAMS ONLY
KEENON FILAMENT TRANSFORMER
Primary 115 Volt, Secondary 2 1/2 Volt, center-tapped 60 to 10 amps; 10,000 V insulation. Husky, fully cased, stellite terminals. A real buck stretcher at...

FOR FUTURE HAMS
LEARN RADIO CODE
TO REFRESH OLD HAMS

With This Signal Corps Practice Kit

Learn radio code from the ground up by the same method, and with the same equipment, used at home by thousands of Signal Corps trains.

No other home training system will enable you to learn radio code faster and better than this course. It’s actually the same as getting private instruction in a classroom.

Faithful and consistent practice will enable you to receive code messages accurately up to the speed of 10 words per minute. This can be increased by continued practice.

Each set comes complete with:
17 unbreakable 12” records (34 sides), produced by RCA Victor. Instructor’s voice anticipates your questions and clearly tells you just what to do. Code signals give you plenty of practice in receiving. Crammed full of instruction and self-testing exercises. Records can be played on any standard 78 r.p.m. record player.

Two beautiful record albums, bound in simulated leather and stamped in gold.

10 self-scoring practice pads (50 sheets per pad).

Package of printing charts showing you how to write letters and numbers when receiving code. Also has names for letters of the alphabet.

This course meets the highest standards of educational experts.

Only a limited number available. Order yours now. They cost the government $35.00 per set. Sun Radio brings them to you for only $14.95.

SUN RADIO & ELECTRONICS CO., Inc.
122-124 DUANE STREET
NEW YORK 7, N. Y.

Dear Buck:

Please send me your flyer as soon as it is printed.

Name

Call

Address

City

Zone

State

137
Discusses the basic considerations which underlie systems of various radar systems. From the standpoint of the designer, it is the time to align yourself with ARCTURUS—the oldest name in radio tubes. Mail us your tube requirements immediately... and you will receive our monthly bulletins on available tubes.

Radar System Engineering

Edited by L. N. Ridenour, Associate Professor of Physics, University of Pennsylvania. Over 900 pages. $7.50. This book takes up design considerations for the important components that make up a radar set. Detailed examples of actual systems are given. Two new and important auxiliary techniques—moving target indication and the transmission of radar displays to a remote indicator by radio means—are fully treated.

A.R.R.L. EMERGENCY CORPS N0NCLUB GROUPS AND INDIVIDUALS

One Transmitter QSOs Power Score
W3FJR/1 W3RBC 150- 129
W2FBA/2 W2PLX-W2FBA 115- 1827
W3KLY/1 W3KLY-W3WBI 112- 1216
W3JY/4 Four opns 118- 1620

NONCLUB GROUPS AND INDIVIDUALS

One Transmitter QSOs Power Score
W9NCS W9QI 125- 1727
W8WBC/6 W8WBC 117- 1577
W9WBC/3 W9WBC 117- 1577
W3XHU/4 W3XHU 118- 1620
W3M/3 W3M 115- 1827
W9WBC/3 W9WBC 117- 1577
W3XHU/4 W3XHU 118- 1620

(Continued from page 140)

Fire Transmitters

<table>
<thead>
<tr>
<th>Name</th>
<th>QSOs</th>
<th>Power</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>W6RBC/6</td>
<td>384</td>
<td>ABC</td>
<td>5224</td>
</tr>
<tr>
<td>W2RZ/2</td>
<td>399</td>
<td>A</td>
<td>5675</td>
</tr>
<tr>
<td>W3IU/2</td>
<td>389</td>
<td>A</td>
<td>3579</td>
</tr>
<tr>
<td>W8TUD/3</td>
<td>395</td>
<td>A</td>
<td>3875</td>
</tr>
<tr>
<td>W6TRK/6</td>
<td>369</td>
<td>A</td>
<td>3125</td>
</tr>
<tr>
<td>W2FIV/2</td>
<td>128</td>
<td>A</td>
<td>2907</td>
</tr>
<tr>
<td>W6GM/6</td>
<td>204</td>
<td>A</td>
<td>2760</td>
</tr>
<tr>
<td>V2EM/6</td>
<td>147</td>
<td>A</td>
<td>2013</td>
</tr>
</tbody>
</table>

Six Transmitters Operated Simultaneously

<table>
<thead>
<tr>
<th>Name</th>
<th>QSOs</th>
<th>Power Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>W5JS/6</td>
<td>350</td>
<td>1989</td>
</tr>
<tr>
<td>W2VZ/3</td>
<td>296</td>
<td>3504</td>
</tr>
<tr>
<td>W6BEZ/6</td>
<td>206</td>
<td>3707</td>
</tr>
<tr>
<td>W3BQ/3</td>
<td>255</td>
<td>3555</td>
</tr>
<tr>
<td>W1OM/1</td>
<td>201</td>
<td>1590</td>
</tr>
</tbody>
</table>

Seven Transmitters Operated Simultaneously

<table>
<thead>
<tr>
<th>Name</th>
<th>QSOs</th>
<th>Power Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>W3BBS/3</td>
<td>651</td>
<td>8568</td>
</tr>
<tr>
<td>W3AC/2</td>
<td>467</td>
<td>6227</td>
</tr>
<tr>
<td>W9KCY/6</td>
<td>367</td>
<td>4388</td>
</tr>
</tbody>
</table>

Eight Transmitters Operated Simultaneously

<table>
<thead>
<tr>
<th>Name</th>
<th>QSOs</th>
<th>Power Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>W2FIV/2</td>
<td>609</td>
<td>8421</td>
</tr>
<tr>
<td>W2KHK/2</td>
<td>544</td>
<td>8912</td>
</tr>
</tbody>
</table>

A.R.R.L. EMERGENCY CORPS

Nonclub Groups and Individuals

One Transmitter QSOs Power Score

<table>
<thead>
<tr>
<th>Name</th>
<th>QSOs</th>
<th>Power</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>W9RBC/1</td>
<td>152</td>
<td>2115</td>
<td></td>
</tr>
<tr>
<td>W2FBA/2</td>
<td>117</td>
<td>1427</td>
<td></td>
</tr>
<tr>
<td>W3M/1</td>
<td>167</td>
<td>1856</td>
<td></td>
</tr>
<tr>
<td>W3JY/4</td>
<td>136</td>
<td>1620</td>
<td></td>
</tr>
</tbody>
</table>

(Continued on page 140)
Modern functionally designed capacitors. Metal ferrules are soldered to silver bands fused to each end of heavy-walled glass tubes. This vacuum tight assembly is fungus-proof and passes Signal Corps, Air Corps and Navy thermal cycle and immersion tests.

An illustrated technical booklet on uses of Plasticon® Glassmikes contains the following subjects:

- Glassmike characteristics and design data
- Comparison of Glassmikes and Mica Capacitors
- Uses of Glassmikes for improved RF and Audio bypassing
- Use in Audio and RF coupling
- Glassmikes in television power supplies
- Video coupling
- Vibrator buffer applications
- Geiger Counter Capacitors
- Instrument capacitors
- And many other applications

Write for above free booklet on your firm letterhead or give your call letters

Order from your jobber: If he cannot supply you, order direct

Condenser Products Company
1375 North Branch Street • Chicago 22, Illinois
(Continued from page 189)

W6N1K/6 W6N1K-JQX-K7GOM (ex-W6KBD) 27- A- 1530
W6PGD/8 W6PGD-EHG-D3GJN 64- A- 1487
W6LIX/1 W6LIX-W6BTTJ 113- B- 1428
W6DBF/1 W6DBF-BDI-3TY-3TD-U6-ABF 157- B- 1428
W6R7T/7 W6R7T 35- A- 1435
W6C3L/7 W6C3L 68- A- 1435
W6QGK/1 W6QGK-9K4-NK4-4XX 85- A- 1166
W6LL/4 W6LL-W6J4W-4-W6P3G/4-W6TXC/4-W6PGQ/4- 106- A- 1107
W6QW/1 W6QW-JWJ 53- A- 1098
W6VMP/2 W6VMP-OML-JH9-VMP 53- A- 1044
W6PMU/6 W6PMU 30- A- 961
W6EB/6 Four opera. 41- A- 833
W6LE/5/3 Seven opera. 81- A- 828
W6R7Y/6 W6R7Y-JQV 72- A- 728
W6WNP/2 W6WNP 43- A- 665
W6X9T/9 W6X9T-HU 30- A- 665
W6KBP/3 W6KBP-JTJ 69- A- 625
W6QGK/6 W6QGK 18- A- 675
W6ECQ V6ECQ-S6-CE-CW 49- A- 657
W6JUJ/3 W6JUJ-Z6ATWQ 64- A- 630
W6VBPT V6VBPT-TY 21- A- 458
W6FIW/4 W6FIW-EGO-G8S 38- A- 477
W6GZ/2 W6GZ-XX 29- A- 450
W6V9P/2 W6V9P-QP-QP-PY-PY-9F-HF 22- A- 402
W6AX/8 W6AX-JB 21- A- 369
W6Q9K/2 W6Q9K-Q9K-59A 22- A- 365
W6QOJ/1 W6QOJ 33- A- 255
W6JWO/9 W6JWO 6- A- 178
W6MBW/5 W6MBW-MGB-MGB 32- B- 146
W3DZ/8 W3DZ/8 2- A- 18

Two Transmitters Operated Simultaneously
W6PMU/6 W6PMU-A6-ALA-PNU 17- A- 1278
W6QGQ/6 W6QGQ-PPT-B9P 107- A- 1277
W6Q2M/8 W6Q2M-OM-OM-OM-OM-99P 108- A- 1300
W6XL/6 W6XL-XX 60- A- 163
W6SVJ/6 W6SVJ-XIX 16- A- 73
W6QGZ/6 W6QGZ-ZQZ-ZQZ-ZQZ 61- A- 555
W3DZ/4 W3DZ/4-DW-DW-DW-DW 8- A- 135

Three Transmitters Operated Simultaneously
W6F7E/51 W6F7E/51 110- A- 1512
W6W4E/9 W6W4E-V9D-V9D-V9D 107- A- 1431

Four Transmitters Operated Simultaneously
W6JWZ/8 W6JWZ/8-W6JWZ-W6JWZ-W6JWZ 46- ABC- 381

V.H.F.-ONLY PARTICIPANTS
One Transmitter
W6HSB/6 W6HSB-Topp-Vallette-Rh Findley 45- A- 276
W6VQ5/8 W6VQ5-ERA 25- A- 729
W6LP4/6 W6LP4-ERA 15- A- 729
W6MLX/2 W6MLX 30- A- 333
W6CSQ/2 W6CSQ-ERA-ERA-ERA 261- A- 333
W6E5G/51 W6E5G-V9E-V9E-V9E 107- A- 1431
W6EO/8 W6EO-J9D-99Q-99Q 5- A- 90
W6WIP/3 W6WIP-J9D-J9D-J9D 5- A- 68
W6SLX/2 W6SLX-J9D-J9D 4- A- 44
W6BB/1 W6BB 3- A- 44

HOME-STATION SCORES
W60WP 87 W60WP 27 W60WP 18
W60RO 85 W60RO 25 W60BP 18
W60JZ 74 W60JZ 25 W60BP 17
W60LM 24 W60LM 63 W60BP 17
W60TT 53 W60TT 23 W60BP 15
W60WX 48 W60WX 22 W60BP 13
W60BG 36 W60BG 21 W60BP 13
W60BP 24 W60BP 21 W60BP 12
W60JX 25 W60JX 20 W60BP 12
W60US 20 W60US 10 W60BP 11

(HOME-STATION SCORES CONTINUED ON PAGE 190)
Modulate Your Rig with

TAYLOR 805's

Whether it's a 1/2 KW or a 1 KW—
These Tubes Will Do it Efficiently

The 805 is a high mu zero bias tube of popular type incorporating the use of the famous heat tested Speer processed carbon anodes together with the Taylor Floating anode type of construction. The plate lead is brought out at the top greatly minimizing the chances of voltage breakdowns.

The no-signal or static plate current is about 85 MA per tube at 1250 volts (zero bias) and about 30 MA per tube at 1500 volts when 15 bias volts are added. Because the 805 is a zero bias tube, or practically so, grid current flows during nearly all of the input cycle. Due to this, the input transformer design requirements are less involved and excellent frequency response with minimum distortion is easily realized. The maximum average grid driving power is approximately 8 watts. Low impedance triodes such as 2A3's or 6A3's should be used in the driver stage.

805 CLASS B AUDIO DATA

<table>
<thead>
<tr>
<th>Supply Voltage</th>
<th>275</th>
<th>325</th>
<th>400</th>
<th>450</th>
</tr>
</thead>
<tbody>
<tr>
<td>1750</td>
<td>275</td>
<td>330</td>
<td>390</td>
<td></td>
</tr>
<tr>
<td></td>
<td>15,000</td>
<td>12,000</td>
<td>10,000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4.5</td>
<td>8.0</td>
<td>9.0</td>
<td></td>
</tr>
<tr>
<td>1500</td>
<td>275</td>
<td>330</td>
<td>420</td>
<td>420</td>
</tr>
<tr>
<td></td>
<td>12,000</td>
<td>10,000</td>
<td>8,000</td>
<td>9,350</td>
</tr>
<tr>
<td></td>
<td>5.0</td>
<td>7.0</td>
<td>9.5</td>
<td>10.0</td>
</tr>
<tr>
<td>1250</td>
<td>335</td>
<td>395</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>8,000</td>
<td>6,800</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>6.25</td>
<td>8.5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The chart above gives proper Class B Audio operating conditions for various outputs at different plate voltages. The most important value is the reflected load impedance which is given for the entire primary or plate to plate. The current value is the maximum average value as would be indicated on the plate current meter with sine wave input. For the same peak output with voice input the maximum average plate current will be approximately 50% to 60% of this value.

AVAILABLE NOW
At All Leading Parts Distributors
IN STOCK READY FOR IMMEDIATE SHIPMENT

400 ma. Smoothing and Swinging Filter Chokes—Thordarson 19C37 and 19C44. $12.45 Net

Stancer Poly-Pedance 60-watt Modulation Transformer A-3893. $7.29 Net

Mail orders given prompt attention

ALL PRICES FOR OAKLAND, CALIFORNIA
ALL SUBJECT TO PRIOR SALE

Mass. Radio School
271 Huntington Ave., Boston 15, Mass.


Licensed by Commonwealth of Mass. Department of Education

Puerto Rico ........ 11
W4DXI ........ 11
W4DKH ......................... 7
W4RT ........ 10
W5CB ........ 8
W5GJ ........ 9
W5HB ........ 9
W5JH ........ 9
W6FJ ........ 8

WWV Schedules

Standard-frequency transmissions are made available as a public service by the National Bureau of Standards over its standard-frequency station, WWV, on the following schedules and frequencies:

- 2.5 Mc. — 7 A.M. to 9 A.M. EST (0000 to 1400 GCT).
- 5.0 Mc. — Continuously, day and night.
- 10.0 Mc. — Continuously, day and night.
- 15.0 Mc. — Continuously, day and night.

The 10- and 15-Mc. radio frequencies are modulated simultaneously at accurate audio frequencies of 440 and 4000 cycles. Five Mc. carries both frequencies during the daytime but only 440 cycles from 7:00 p.m. to 7:00 a.m. EST, while 2.5 Mc. carries only the 440-cycle modulation. A 0.005-second pulse may be heard as a faint tick every second, except the 59th second of each minute. These pulses may be used for accurate time signals, and their one-second spacing provides an accurate time interval for physical measurements.

The audio frequencies are interrupted precisely on the hour and each five minutes thereafter, resuming after an interval of precisely one minute. This one-minute interval is provided to give Eastern Standard Time in telegraphic code and to afford an interval for the checking of radio-frequency measurements free from the presence of the audio frequencies. Ionospheric disturbance warnings applicable to the North Atlantic path are given at 20 and 50 minutes past each hour. If a disturbance is in progress or is anticipated within 24 hours, the time announcement is followed by 6 Ws; if conditions are quiet or normal, the time announcement is followed by 8 Ns. The announcement of the station’s services and of the station’s call (WWV) is given by voice at the hour and half hour.

The accuracy of all the frequencies, radio and audio, as transmitted, is better than a part in 10,000,000. Transmission effects in the medium may result in slight fluctuations in the audio frequencies as received at a particular place; the average frequency received, however, is as accurate as that transmitted. The time interval marked by the pulse every second is accurate to 0.00001 second. The 1-minute, 4-minute and 5-minute intervals, synchronized with the second pulses and marked by the beginning and ending of the periods when the audio frequencies are off, are accurate to a part in 10,000,000. The beginnings of the periods when the audio frequencies are off are so synchronized with the basic time service of the U. S. Naval Observatory that they mark accurately the hour and the successive 5-minute periods.
NATIONAL'S HRO RECEIVER

A receiver designed primarily for Amateurs. Recognized as the finest communications receiver available. Complete with four sets of coils having handspread on Amateur bands as well as general coverage. HRO-STA Table Model or HRO-5RA Rack Model (less speaker and power supply). Price. $274.35

4E27 (8001) TUBE

New—JAN 4E27 (8001) Beam power amplifier tube. 300 watts input at 75 Mc. with only 1.4 watts drive. Regular $27.50 tube. Only ............... $6.95

NR-150 VOLTAGE REGULATOR TUBE

New JAN series VR-150 tubes. SPECIAL 97c

MINIATURE TUBES

New R.C.A. Miniature Tubes. Unboxed. Lots of 50 or more assorted, 10% additional discount. 12A7A, 75c 12BA6, 89c 12B6E, 89c 35W4, 57c 5085, 89c

1625 TUBE

New R.C.A. 1625 Tube. (Same as 807 type but with 12V, Fil.) Regular $2.30 net. Special ............... $1.29

FAN MOTOR

Small, compact, 110 A.C. induction motor. Quiet. 2400 RPM. Ideal for cooling transmitting tubes. Complete with fan .......... $2.19

VOR-150 VOLTAGE REGULATOR TUBE

New JAN series VR-150 tubes. SPECIAL 97c

SANGAMO MICA CONDENSER KIT

Kit consists of 1 each: .0005, .0007, .002, .0035, .0045, .007, .010, .012, .015, .020, .022, .025, .030, .035, .040, .045, .050, .060, .070, .080, .090, .100, .120. Ideal for obtaining D.C. bias voltages from filament supplies. With mounting bracket. Complete .......... $2.95

SELENIUM RECTIFIERS

Embry Selenium Rectifiers take up to 10 V. A.C. giving low D.C. voltages at 10 Ma. maximum. Excellent for obtaining D.C. bias voltages from filament supplies. With mounting bracket. Complete .......... $49c

HS-32 HEADSET

Low impedance single receiver type headset complete with head band, 36" cord and PL-55 plug. Complete ............... 99c

We carry in stock all standard brands. Regular shipments are being received of communications receivers:

RME
COLLINS
MILLEN
PIERSON
CARDWELL
HALLICRAFTERS
NATIONAL
HAMMARLUND

— and all other major lines.

Orders filled promptly

COMPLETE EXPORT FACILITIES. CABLE "RASPEC"

BROADCASTERS: WE CARRY A FULL LINE OF CANNON "X," "XL," AND "P" PLUGS AND RECEPTACLES.

LEACH AC RELAY

Type 2125G, 110 Volt A.C. coil. Four pole double throw. Heavy 1/4" 10 Amp. contacts. Excellent for plate transformer primary switching, antenna changeover, break-in relay operation. Double throw arrangement on each pole allows various combinations for multi circuit switching. Relay complete ............... $2.95

TRIPLETT METER


R. F. AMMETER

$3.95


COLLINS MBF TEST METER

1" diameter, 0-2 D.C. Ma. test meter. Mounted in square bakelite box equipped with 30" cord and PL-68 plug. Same type as used with the Collins "MBF" units. Each ............... $2.95

Please Ship .......... Cash $ .......... C.O.D.

NAME
ADDRESS
CITY
ZONE
STATE

RADIO SPECIALTIES COMPANY
1956 S. FIGUEROA ST. • PROSPECT 7271 • LOS ANGELES 7, CALIF.
compensate for a slight change with frequency in the rectification efficiency of the 1N34. The crystal acts as a shunt diode detector, and with the left-hand toggle switch at "R.F.," serves as a peak-reading r.f. voltmeter. The r.f. choke, in conjunction with the by-pass condenser, \( C_4 \), serves to separate the radio-frequency voltage from the d.c. current passing through the meter. The resistor, \( R_2 \), in series with \( MA \), acts as the diode load. The value of \( R_2 \) is chosen so that when sufficient energy is fed into the unit to obtain a reading of 1.0 ma. for voice (0.7 ma. for sine wave), the meter will read directly in per­centage-modulation when switched to the "A.F." position. With the constants given, 1.0 ma. represents 100 per cent, 0.9 shows 90 per cent, etc., in linear fashion.

With the switch in the "A.F." position, the primary of transformer \( T_1 \) becomes the diode load. Thus, the detected audio component of the carrier is passed to the secondary, and thence through the reversing d.p.d.t. switch, \( S_2 \), to the second 1N34 and its load, the meter. The audio­frequency component is then rectified and ap­pears as a d.c. current through \( MA \). This current is directly proportional to the a.f. voltage applied, for percentages of modulation over 10.

The condenser, \( C_5 \), serves to by-pass stray r.f. \( S_2 \) is connected so that in the upward position, positive modulation is rectified, and in the down­ward position, negative. Since in passing through \( T_1 \) the exact d.c. level, representing average r.f.-carrier level, is lost, the unit will only give a qualitative picture of the difference between positive and negative peaks. To have designed the meter to give exact readings would have necessitated the incorporation of a d.c. restoring circuit which would greatly increase the meter's complexity and consequent cost. The type of modulation in which loss of the d.c. level would cause a serious error is almost never encountered in amplitude-modulated radiophone installations. It is felt that the present system, if utilized in conjunction with the frequent observations of "carrier shift," will serve to help the amateur in detecting asymmetry in his modulation.

The jack, \( J_1 \), is arranged to disconnect the a.f. rectifier and meter circuit when the headphone plug is inserted, thus allowing the audio-frequency voltage in the secondary to be applied directly across the operator's headphones.

**Accuracy**

The accuracy of the modulation meter is deter­mined by several factors. First, it has been proven by experiment that if the components listed in the parts list are used, it is not necessary to calibrate each individual meter. However, it is absolutely necessary that \( R_1 \) and \( R_2 \) be within 5 per cent of their nominal value. The ordinary run of resistors is not within this tolerance and will render the instrument inaccurate. Many
## Number Price Number Price Number Price

<table>
<thead>
<tr>
<th>Number</th>
<th>Price</th>
<th>Number</th>
<th>Price</th>
<th>Number</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>G24</td>
<td>$1.45</td>
<td>R58</td>
<td>$1.10</td>
<td>126EX7</td>
<td>$1.20</td>
</tr>
<tr>
<td>1AG7T</td>
<td>1.00</td>
<td>10D5</td>
<td>1.00</td>
<td>126NT7</td>
<td>1.95</td>
</tr>
<tr>
<td>1BH</td>
<td>1.00</td>
<td>126HT7</td>
<td>1.00</td>
<td>126NT7</td>
<td>1.95</td>
</tr>
<tr>
<td>1H7</td>
<td>1.00</td>
<td>14H7</td>
<td>1.00</td>
<td>126NT7</td>
<td>1.95</td>
</tr>
<tr>
<td>1I7G7</td>
<td>1.00</td>
<td>126NT7</td>
<td>1.95</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1J1</td>
<td>1.00</td>
<td>126NT7</td>
<td>1.95</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17D7</td>
<td>1.00</td>
<td>126NT7</td>
<td>1.95</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1DNT7</td>
<td>1.00</td>
<td>126NT7</td>
<td>1.95</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1F4</td>
<td>1.00</td>
<td>126NT7</td>
<td>1.95</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1F7</td>
<td>1.00</td>
<td>126NT7</td>
<td>1.95</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1G4</td>
<td>1.00</td>
<td>126NT7</td>
<td>1.95</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1H4</td>
<td>1.00</td>
<td>126NT7</td>
<td>1.95</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1H6</td>
<td>1.00</td>
<td>126NT7</td>
<td>1.95</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1IH4</td>
<td>1.00</td>
<td>126NT7</td>
<td>1.95</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1LD5</td>
<td>1.00</td>
<td>126NT7</td>
<td>1.95</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1G4</td>
<td>1.00</td>
<td>126NT7</td>
<td>1.95</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1H5</td>
<td>1.00</td>
<td>126NT7</td>
<td>1.95</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1U5</td>
<td>1.00</td>
<td>126NT7</td>
<td>1.95</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1U7</td>
<td>1.00</td>
<td>126NT7</td>
<td>1.95</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1V7</td>
<td>1.00</td>
<td>126NT7</td>
<td>1.95</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1W7</td>
<td>1.00</td>
<td>126NT7</td>
<td>1.95</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1X7</td>
<td>1.00</td>
<td>126NT7</td>
<td>1.95</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1Y7</td>
<td>1.00</td>
<td>126NT7</td>
<td>1.95</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1Z7</td>
<td>1.00</td>
<td>126NT7</td>
<td>1.95</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1A7</td>
<td>1.00</td>
<td>126NT7</td>
<td>1.95</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1B7</td>
<td>1.00</td>
<td>126NT7</td>
<td>1.95</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1C7</td>
<td>1.00</td>
<td>126NT7</td>
<td>1.95</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1D7</td>
<td>1.00</td>
<td>126NT7</td>
<td>1.95</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1E7</td>
<td>1.00</td>
<td>126NT7</td>
<td>1.95</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1F7</td>
<td>1.00</td>
<td>126NT7</td>
<td>1.95</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## FOR IMMEDIATE DELIVERY!

| Hallicrafter | $40.00 | $79.50 |
| Hammerlund H.Q. | 129X | $173.25 |
| Hammerlund S.P. | 400X | $347.50 |

Prices subject to change.

**SUN RADIO**

OF WASHINGTON, D. C.

938 F STREET, N.W. WASH., 4, D. C.

### R. F. TUNING UNIT

Black cranked aluminum cabinet with 2 Variable Transmitting Condensers and 2 Vernon dials. Heavy duty ceramic 4 position water switch, 2 or more mica condensers. 2000 Working Volts and coils wound on porcelain ribbed forms. Only...

**$3.89**

### NAVY V.H.F. RADIO TRANSMITTER

**BRAND NEW**

**$14.95**

Battery operated (67½ V.B. and 12 Volt), Frequency 30 to 105 M.C. Complete with 2-104 tubes and full instruction manual.

**NOTE:** All items, F.O.B., Washington, D. C. All orders $30.00 or less cash with order. Above $30.00, 25 percent with order, balance C.O.D. Foreign orders cash with all orders plus exchange rate.
1N34 diodes were tested and were found sufficiently linear to cause negligible error, even at low levels of modulation. The transformer recommended is loaded in such a way that ordinary off-the-shelf transformers gave very reproducible readings. The frequency characteristic of the transformer is such that it gives quite linear modulation readings from 200 to 4000 c.p.s., which adequately cover the voice range. The accuracy of the modulation meter with 1000-c.p.s. sine-wave modulation is better than 10 per cent, from 30 Mc. to 3.9 Mc., and 20 per cent up to 54 Mc.

If the reader desires to check the calibration of his instrument, it is suggested that he compare it with an oscilloscope at some other shack. Experience has proved that comparison with a good sine-wave pattern on a 'scope is the simplest and most accurate method.

When the modulation meter was demonstrated, almost invariably it evoked such comments as, "Why not use it for a field-strength meter, too?" or, "Put a dial on it, add plug-in coils, and use it for an absorption wavemeter." It may be possible to do these things and more, but the writers feel that to combine too many such features in this article would confuse the issue, and their efforts were devoted to the original problem of constructing a simple but accurate modulation meter.

This meter has been tested on all amateur 'phone bands from 3.85 to 54 Mc. In many instances it is satisfactory up to 148 Mc., but above 54 Mc. the performance is sometimes erratic. The model in the photographs has now replaced a much more complex vacuum-tube moddemeter at the operating position of W1HKK. It has been found to be an indispensable adjunct to that station, and it is hoped that it will give other 'phone operators equal pleasure.

The writers wish to thank Mr. Robert Moses, W1HMM, for valuable aid rendered in the development of the modulation meter.

The Amateur Radio Assn. of Bremerton will hold its annual hamfest on February 8th. Registration will be held at the Enetai Inn, with banquet and dance at Rau’s Chicken Dinner Inn. Prizes, contests and big doings! Admission $3.50, by ticket only. Make reservations in advance through A. Swan, A.R.A.B. Secy.-Treas., 1133 Trenton, Bremerton, Washington.

Some call ex-W9TSA has now, gang — WTSA?

A prospective Young Squirt recently wrote us, "I am mortally interested in radio and television and most of all in amateur radio." (Italics ours.) Gosh, we hope so!

WGOG ran into W6STY — on 7 Mc.
ACE HIGH
with Amateurs

The Turner Model 22
Crystal or Dynamic

Turner Microphones need no introduction to veteran amateurs. They're known all over the world for accurate pick-up and smooth even response to voice and music without distortion. Take the Model 22. Its high quality crystal or rugged dynamic circuit is precision engineered to deliver ace high results. It has every worthwhile feature you want plus modern eye appealing styling. And the cost is attractive too. When buying for your rig—investigate and select a dependable Turner Model 22.

At your dealer's or write for specifications

THE TURNER COMPANY
917 17th STREET, N. E. - - - CEDAR RAPIDS, IOWA

Microphones by Turner


Are you sure you're in the band?

You Can Now Build A Secondary Frequency Standard At Low Cost
With A JK Stabilized
100 KC CRYSTAL

Here, at last, is a precision 100 KC crystal that the amateur can afford. It can be used to excellent advantage when building a Secondary Frequency Standard to work the edge of the bands and check points throughout all of the bands. In spite of its low price, the finest techniques known to the industry today are employed in its construction. The crystal has extremely low drift, the electrodes are pure silver and mounting wires are soldered directly to the silver plating. Result: A rugged unit that will stand vibration without changing frequency, nor will it age or increase frequency with use. Holder is completely sealed against dust and moisture. Don’t let the low price deceive you — it’s a beautiful item — has eye appeal and a performance record that will please you for years to come!

Amateur Net Price $6.95

Circuit Diagram Furnished

A circuit is supplied with each crystal giving complete information on how to build an inexpensive Secondary Frequency Standard.

the JAMES KNIGHTS Co.
SANDWICH, ILLINOIS
A NEW HIGH "Q" TWO METER RING-TUNER

A COMPLETE variable tuning unit, having a tuning range of 140 m/c. to 160 m/c. (with 2.5 uuf tube capacity) designed for single tuning range of 140 m/c. to wave meters, frequency meters, low power transmitters and oscillators. Manufactured expressly for use in the amateur 144 m/c. to 148 m/c. band. Compact and easy to assemble. no condensers to trim, no coils to wind, no sliding contacts. "Q" is many times greater than conventional condenser combinations. Send check or money order for a Clarkstan Ring Tuner today! Write for free technical bulletin 110Q.

CLARKSTAN CORPORATION
11927 W. Pico Blvd.
Los Angeles 34, Cal.

W8CFK
Aluminum Call Plates
Yours call cast in aluminum with black background, 2/3" by 6½" by 10 each, postpaid.

P & H SALES CO.
619 Jasper St.
Kalamazoo 31, Michigan

ANTENNAS!
FM TELEVISION and AMATEUR ROTARY BEAMS;
FIXED BEAMS; 2-6-10-20 METERS.
ELEMENTS, COAXIAL CABLE. Send for Circulars.
S/C LABORATORIES, INC.
20-22 Van Wagener St., Newark 4, N. J.

Milliwatts on 10 KMc.
(Continued from page 61)

Operation
To transmit, modulation need only be applied to the 723A/B tube which is used for the local oscillator. It is not necessary to remove or change any of the applied voltage, except to apply modulation as shown in Fig. 5. Since the wave-guide section is already coupled to the antenna, the modulated signal is propagated in a concentrated beam. Since the two stations operate 30 M/c. apart, duplex operation is possible. All tuning may be done at one of the stations, as this will automatically compensate the other station. Technically speaking, this method of operation is somewhat inefficient, as compared with the use of a separate transmitter and receiver, or some means of r.f. switching. A portion of the signal is dissipated across the crystal, but this does not appear to be a serious handicap in actual operation, as the received signal is very strong over visual paths. Transmitter power output is of the order of 35 milliwatts.

The modulator used in our first tests was the conventional choke-coupled system, the output of which is applied between the cathode and reflector elements of the 723A/B tube. The gain control should be operated at the lowest possible setting, as the amount of frequency modulation is dependent upon how hard this system is driven. To cause intentional frequency modulation, the system described by Sharbaugh and Watters may be used to good advantage.

For those interested in conducting further tests with amplitude modulation, an alternative method might be tried. It has been observed in past experience with this tube that shifting the potential on the resonator element will change the frequency in one direction, while variation of the voltage on the reflector element will move the frequency in the opposite direction. Since a positive potential is applied to the resonator and a negative voltage is applied to the reflector, it is apparent that if the modulation voltage applied to these two elements is out of phase the effect of the frequency shifts will be canceled. Since the sensitivity of the two elements to voltage changes is unequal, the applied modulation must be in the ratio of this difference, which is approximately 5 to 1, the reflector element being the more sensitive. With the modulation applied in this manner, and the amplitude held at the proper level, resultant frequency modulation should be held to a minimum.

The author wishes to acknowledge, with thanks, the wholehearted interest and cooperation of Charles K. Atwater, W2JN, without whom these experiments could not have been carried out.

1 "Our Best DX — 800 Feet," Sharbaugh and Watters, QST, August, 1946.

2 This 5-to-1 ratio is not always constant, and may vary wildly with different tubes. — BD.
In the design of the 10 meter beam, our engineers have considered the band width of the antenna to be a very important factor. The impedance match, gain, and "front to back" ratio of the antenna should remain constant over the entire band, particularly with ECO operation.

Workshop's 10 meter beam has been designed to meet these conditions. After extensive measurements, the element spacings and lengths were selected to give relatively constant impedance match, gain and front to back ratio over the band.

The graph shows the small variation in standing wave ratio over the entire band. This means optimum performance over the whole band instead of sacrifice of signal strength due to a detuned antenna. Structurally, as well as electrically, the Workshop beam is far ahead of the field. The entire antenna assembly is built with utmost care so as to deliver continual service and withstand severe weather conditions.

The WORKSHOP ASSOCIATES, INC.
Specialists in High-Frequency Antennas
66 NEEDHAM STREET, NEWTON HIGHLANDS 61, MASSACHUSETTS

Workshop Antennas and Equipment

2-Meter Beam Antenna Model #146AB
High-gain, directional, 6 element array with two driven elements $19.00

6-Meter Beam Antenna Model #52AB
High gain, directional, 3 element antenna to be used with Workshop rotating mast $8.00

10-Meter Dipole Antenna Model #29AD
Bi-directional antenna for 27 to 30 mc band. Adjustable elements $6.75

10-Meter 3-Element Beam Conversion Kit Model #29B, converts dipole #29AD to a 3-element beam $27.50

20-Meter Beam Antenna (To be announced soon)

Antenna Mast Kit Model #AM. Two sections complete with all mounting accessories. A stationary mast for all Workshop antennas. $7.25

Model #AM1. Extra 4-foot sections to lengthen the above mast $1.30

Rotating Accessory Kit Model #AM2. To convert Model #AM mast to a manually rotated mast, complete with instructions $4.25

Workshop Rotator. Remote control reversible electric motor drive with 360 degree azimuth dial indicator $142.50

Available at better dealers
The above are the amateur net prices — slightly higher in the Far West. Prices are subject to change without notice.

Electronic Volt-Ohmmeter, Model 406

We invite comparison of this instrument with any at any price for appearance, ruggedness, accuracy, stability. 0-1 to 1,000 volts U.H.F., A.C., D.C. 0-1,000 megohms. Pen-type dual-diode A.C. probe. No extras to buy. Send for details or order today.

Clippard INSTRUMENT LABORATORY, INC.
Dept. 4, 1127 Bank Street, Cincinnati 14, Ohio
U.H.F. RESONATOR CO.

3 ELEMENT RESONATOR CO.

ELECTRICITY
FOR RADIO AND ELECTRONIC APPLICATIONS

ONAN ELECTRIC GENERATING PLANTS supply electric service for electronics applications and general use. Modulo or stationery, driven by Onan 4-cycle gasoline engines, they are single-unit, compact design and study construction.

ONAN Electric Plants are available in many sizes and models.

ALTERNATING CURRENT: 500 to 35,000 watts in all standard voltages and frequencies.

DIRECT CURRENT: 600 to 10,000 watts, 115 and 230 volts.

BATTERY CHARGERS: 500 to 3,500 watts; 6, 12, 24 and 32 volts. Write for detailed literature or engineering assistance.

50 Mc.

(Continued from page 78)

schedules with interested parties. He has a 10-meter rig which can be used for crossband checking, and a 6-meter job is under construction. The gear is made in such form that it can be taken to mountain tops when the right weather for that sort of activity comes around again.

There is quite a bit of activity within reach of Wilmington, Del. W1NSS, returning from Willing, brought back a list of 53 stations heard on 144 Mc. by W3DQZ, who complains that many stations are heard from distant points, but that it is often difficult to raise them because they are not expecting to hear anything from outside their own locality and are not tuning the band frequently or carefully enough.

There was a time when it was impossible to use a selective receiver on 144 Mc., even in the populous areas, but the advent of more such receivers and a few converters which are operated in conjunction with low-frequency receivers is forcing the trend to crystal control, according to the Midwest VHF News. A few of the boys who had good intentions but hadn't gotten around to doing anything about it have had a chance to hear the signals from unstable stations, as they are received on selective jobs, and the result is enough to start anyone working on a crystal rig. They really do sound pretty awful — even the two-stage MOPA rigs which come through quite cleanly on the broader spacers — and the quality with which the crystal rigs may be received is quite a revelation. Narrow-band f.m. is received well on the sharp receivers, in contrast to the appearance of unmodulated carrier which such emission produces in the superregens.

At Last — a Record for 235 Mc.!

The one v.h.f. band which has been missing from our two-way records has now been supplied with a contact worthy of being listed as a record. On Dec. 15th W9OA/6 atop Mt. St. Helena maintained contact with W6WN/Q6 at Mt. Hamilton on 237 Mc., a distance of 110 miles, with S9 signals. Identical crystal-controlled transmitters (832-A in final, 15 watts input) and superhet receivers (11-tube jobs with 6AK5s in r.f. and i.f. stages) were used by both stations. W9OA/Q6 had a 5-element array, while W6WN/Q6 used a 3-element job. Both vertical and horizontal polarization were tried, with very little difference noted, as long as the same was used at each end. Cross-polarization dropped the signal from over S9 down into the noise.

Definition of a good c.w. operator, gleaned from reams of Headquarters correspondence: feller who can come in at 5 a.m., after an all-night party, and copy 40 w.p.m. in Old English with a six-inch paint brush.
MODERNIZE your rig with BAND SWITCHING!

Treat your layout to fast, positive-acting band switching. B & W Turret Assemblies make it easy. They're a cinch to install—moderate in cost—adaptable to any bands—highly efficient in operation. Write for bulletin giving full details on

B & W "BABY" TURRETS (up to 35 watts)
B & W "BAND HOPPERS" (up to 75 watts)
B & W 75-WATT TURRETS • B & W 150-WATT TURRETS

It takes an Air-Wound Inductor to assure full efficiency for modern rigs!

BARKER & WILLIAMSON
237 FAIRFIELD AVE., UPPER DARBY, PA.

WATERMAN DOES IT AGAIN!

A NEW PORTABLE INDUSTRIAL AND TELEVISION

POCKETSCOPE MODEL 5-11-A

LIGHT...COMPACT EFFICIENT

...and the GENERAL PURPOSE

POCKETSCOPE MODEL S-10-A

Widely known, widely used by engineers, industry, amateurs and laboratories for convenient, efficient and accurate testing and measuring requirements...an instrument of versatile application and dependable performance.

$66 F.O.B. PHILA.

WATERMAN PRODUCTS COMPANY
INCORPORATED
PHILADELPHIA 25, PENNSYLVANIA
Hints and Kinks
(Continued from page 75)

the sketch, and consult the manual. If the two “halves” match well, the locking ring will hold them securely in place, and the socket can then be mounted in the chassis. If you are extra careful to get a perfect fit, the mounting plate may be eliminated and the assembly can be mounted in a 11/4-inch hole with the locking ring alone.

Ceramic sockets cannot be used in this gadget because they are insufficient. If, however, low-loss mica-filled bakelite sockets are used, the losses should be low enough to make the entire assembly satisfactory. It makes about the only satisfactory three-way crystal socket seen here to date. — Basil C. Barbee, W5PPT; ex-W2MWX, WIOCE

BOOK REVIEW


Mr. Cosgrove has chosen as the title for his book Basic Mathematics for Radio Students; however, as pointed out by Mr. G. O. Howe, the treatment is not that specific in its applications. In this reviewer’s opinion, except for the material in the last chapter, the application is both broad and general. Here is a book which is not a text in the ordinary sense; more properly it should perhaps be titled, “An Introduction to the Philosophy of the Mathematical Approach.” The author is obviously completely at home with his subject. His discussions of mathematical truths and basic concepts will be startling to the reader who feels that he is well grounded in mathematics but who in reality is familiar only with the manipulations of mathematical symbols and who knows little or nothing about the theory of the game he is playing — like the chap who buys his transmitter, turns this dial and dips that meter because it will get him on the air, but who is ignorant of the “why.”

The book discusses the essential notions and fundamental operations of algebra, logarithms, equations and complex algebra. The section on continuity, limits and series is sufficient and stimulating. The chapter on geometry and trigonometry treat vectors and the operator j in an interesting and somewhat unusual way. The treatment of the differential and integral calculus is brief but will serve to acquaint the serious student with the basic concepts of this absorbing branch of mathematics. The final chapter deals with the application of mathematical methods to radio problems. No more adequate treatment of the subjects covered would seem to be possible in the 203 pages of this little book. Basic Mathematics for Radio Students is recommended to those who are interested in elementary mathematics and who have some acquaintance with the subject. It is not a self-teaching text but it will serve as an excellent auxiliary to supply insight into the mathematical method. There are far too few practice problems and the author’s suggestion that the student make up his own problems for drill is not believed to be a satisfactory substitute for this lack, except possibly for the exceptional student. The subject matter will certainly stimulate the imaginations of those who recognize the usefulness of mathematics as a tool, and will afford any thinking reader many hours of pleasure. This reviewer has been impressed frequently with the comprehensive and thorough treatment of radio and allied subjects by British writers and this book is no exception. Mr. Cosgrove may well feel proud of his contribution to the literature of electronics.

— E. B. Redington, WlAM
HARRISON HAS IT!

ALL STANDARD LINES

We are Factory Authorized Distributors for the top quality manufacturers and we now have in stock lots more new, latest improved production Ham gear! Visit our stores today, for everything you need. We promise you fresh, clean material — quicker — at the lowest current prices. — and if you don’t, all our sincere desire to be of friendly, helpful service.

As one of the world’s largest distributors of Communications Equipment, we are delivering plenty of

RECEIVERS

Right Now! ALL MAKES — practically all models.
If you want your new set in the quickest possible time send your order to HARRISON! For example:

HALLICRAFTERS —
5-1AS $29.50 5-40... $79.50 5-1BA,FM-AM-CW — 175 to 145 Mc. $79.50 5-25 150 to 110 Mc. $91.75 5-42 — New FM-AM — 34 to 110 Mc. $160.00
HAMMARLUND — New "Super-Pro"
SPC-400-X --. 55 to 30 Mc. Speaker in Cabinet $13.20 EQ129X, complete with speaker in cabinet $173.25

NATIONAL —
NC-240-D — Complete with speaker $241.44 HPE-214-1 Complete with pack and speaker $135.00 RME-41 — Complete with speaker $196.70 RME-84 — Complete with speaker $98.70

Collins J2V-1...
Temco 500...
Mec:k60T .

Here are a

1'riumphJJ3-S... $75 to 30 Mc...

SPC-400-X - .S5 to 30 Mc...

HQ129X, complete with speaker in cabinet...

HAMMARLUND - New "Super-Pro"

SPC-400-X...

RME-45 - Complete with speaker $198.70

HARRISON HAS IT!

HARRISON SELECT SURPLUS BARGAINS

The cream of the surplus market! Good — new — genuine chance when you buy anything from Harrison!

• TUBES — 3C24/24G HF Triode $1.49 $37.95/829B $3.89

• ANTENNA TUNER — BC 930-A Hallivathers AT-3 (Complete with condensers) $29.95

• TELESCOPING ANTENNA — Light weight, 15-Inch, extends to 12' 10" Best din. FB for mobile, or rotary elements SIX FOR $10.44

• VARIABLE CONDENSERS — Dual 150 mmf per section, 175" gap. Johnson 150 D1100, Dual 300 muf. Each $7.95 $9.95

• ROTARY COAXIAL COUPLING — Continuous rotation, 32 ohm input, internal coaxial sockets each end. Lapp $7.75

• CRYSTAL CONTROLLED CALIBRATOR AND MONITOR — Navy CCR-0683. With spare (With batteries $5.95)

• KW MODULATION TRANSFORMER — 1:1 ratio. Conservative 550 Watt Audio rating. 525-1000 Mc. Portable. BC 610 (H74) TU Tuning Units $24.75 $24.75

• NATIONA 1 —

NC-240-D — Complete with speaker $334.05

RME-41 — Complete with pack and speaker $135.00

RME-84 — Complete with pack and speaker $98.70

Collins J2V-1... $75 to 30 Mc

Temco 500 GA... $135.00

Collins J2Y-1... $275.00 Panorama... $99.50

TRANSMITTERS

Meck 60T... $150.00 Sonar Narrow Band... $110.00

Collins J2Y-1... $425.00 Klafter... $39.45

Temco 390 GA... $185.00 Collins KE-2 Extreme... $173.25

TEST EQUIPMENT?

Certainly! Harrison has it! We can supply practically anything for the Amateur, marine, or laboratory.
Here are a few of the many items we have in stock right now for immediate delivery to you — (even if what you want is not listed here, send us your order — we’ll do the rest!)

MULTIMETERS

Supreme 543... $18.95 RCP 424 A-P... $33.50

Precision 832-A... $38.04 Simpson 160... $38.95

Supreme 542 M... $44.15 RCP 461 A... $43.50

Weston 604... $28.80 Triplod 625-N... $45.00

Triumph M-1... $97.00 Triplod 2005... $86.75

Simpson 125... $52.50 Supreme 592... $89.95

Precision 644... $85.25

OSCILLOSCOPES

National U-929... $38.90 RCA 155-C... $145.00

Dumont 274... $99.75 RCA 160-B... $185.00

Waterman Pocketoscope... $66.00

VACUUM TUBE VOLTMETERS

Silver "Eclipse" Jackson 642... $75.00

RCA 195-A... $69.50 Hickok 203... $79.80

Hickok 125... $94.75

SIGNAL GENERATORS

Jackson 640... $49.90 Jackson 765... $68.95

RCP 705... $49.80 Triplod 2432... $88.50

RCA 167-A... $65.75 Biley 1A Crystal Oscillator... $69.50

TUBE CHECKERS

RCP 315... $59.50 Jackson 636 CP... $62.50

Precision 902... $84.61

Hickok 534... $42.90 Silver "Sparx" Signal Tracer... $39.90

Supreme 502 Amplifier... $127.00

TUBE AND SET TESTERS

Hickok 534... $138.20

Silver "Sparx" Signal Tracer... $39.90

Hickok 502 Amplifier... $127.00

HARRISON RADIO CORPORATION

12 WEST BROADWAY • NEW YORK CITY 7
PHONE—BARDLEY 7-8534 • EXPORT DEPT.—CABLE—"HARRISORD"

[JAMAICA BRANCH—172-31 Hillside Ave. • Republic 9-4102]

Bil Harrison, W2AVA
REMEMBER YOUR NEW YEAR RESOLUTION...

* ELIMINATE BCI
* REDUCE QRM
* INCREASE DX

CONVERTS ANY CW RIG TO N.F.M. FONE
CAN BE RECEIVED WITH ANY AM RECEIVER

SEE JANUARY 47
QST FOR DETAILED STORY OF N.B.F.M.

P. O. BOX 445
SONAR RADIO CORP.
BROOKLYN 1, N. Y.

The Radio Amateur’s Library

These are the publications which every amateur needs. They form a complete reference library for the amateur radio field; are authoritative, accurate and up to date.

<table>
<thead>
<tr>
<th>Title</th>
<th>Price</th>
<th>Title</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>QST ..................................................</td>
<td>$2.50 per year*</td>
<td>Hints &amp; Kinks for the Radio</td>
<td>50c</td>
</tr>
<tr>
<td>Operating an Amateur Radio Station — Free to members; to others......</td>
<td>10c</td>
<td>Amateur .............................................</td>
<td>50c</td>
</tr>
<tr>
<td>The Radio Amateur’s Handbook,</td>
<td>$1.25**</td>
<td>Lightning Calculators:</td>
<td></td>
</tr>
<tr>
<td>The Log .............. 35c each; 3 for $1.00</td>
<td></td>
<td>a. Radio (Type A) ................................</td>
<td>$1.00</td>
</tr>
<tr>
<td>How to Become a Radio Amateur . 25c</td>
<td></td>
<td>b. Ohm’s Law (Type B) .......................</td>
<td>$1.00</td>
</tr>
<tr>
<td>Learning the Radiotelegraph Code ............</td>
<td>25c</td>
<td>The Minilog ....................................</td>
<td>25c</td>
</tr>
<tr>
<td>A Course in Radio Fundamentals .............</td>
<td>50c</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Subscription rate in United States and Possessions, $2.50 per year, postpaid; $3.00 in the Dominion of Canada, $4.00 in all other countries. Single copies, 35 cents.

**Postpaid in U.S.A. Proper — $2.00, postpaid, elsewhere. (No stamps, please.)

THE AMERICAN RADIO RELAY LEAGUE, Incorporated
WEST HARTFORD 7, CONNECTICUT
THE LATEST EDITION of THE RADIO AMATEUR'S HANDBOOK is postwar in content, containing the kind of information which has made the HANDBOOK world-famous. To maintain the high standard of practical usefulness set by previous editions, a new treatment of the constructional sections of the HANDBOOK has been accomplished. The theory and design sections cover every subject encountered in practical radio communication. Completely sectionalized by topics with abundant cross-referencing, and fully indexed. The HANDBOOK continues to be the world's most valuable and widely-used radio book.

POSTPAID IN U. S. A. PROPER $1.25
BUCKRAM BOUND $2.00 ELSEWHERE
$2.50 in U. S. A.
$3.00 ELSEWHERE

AMERICAN RADIO RELAY LEAGUE
WEST HARTFORD 7 CONNECTICUT
HAM-ADS

(1) Advertising shall pertain to radio and shall be of nature of interest to radio amateurs or experimenters in that field.

(2) No display of any character will be accepted, nor can any display or correspondence course, box, or place or capital letters be used which would tend to make one advertisement stand out from the others.

(3) The Ham-Ad rate is 25¢ per word, except as noted in preceding paragraphs.

(4) Remittance in full must accompany copy. No cash or contract discount or agency commission will be allowed.

(5) Closing date for Ham-Ads is the 25th of the second month of publication date.

(6) A special rate of 75¢ per word will apply to advertising when in our judgment it is obvious that the advertisement is not in nature and is placed and signed by a member of the American Radio Relay League. It is an advertising of bona fide surplus equipment, owned and used for individual or apparatus offered for exchange or advertising inquiring for special equipment, if by a member of the American Radio Relay League takes the rate of 75¢. An attempt to deal in apparatus is in quantity for profit, even if by an individual, is commercial and all advertising by him taken the 30¢ rate. (This rate must be paid when the advertisement is column regarding of which rate may apply.)

(7) Because error is more easily avoided, it is requested that address and signature be printed plainly.

Having made no investigation of the advertisers in the classified columns of QST or any search for their integrity or for the grade or character of the products or services advertised.


CRYSTALS: Precision low drift . . . units. Type 100A in 80, 40, and 20 meter band. Electrical Instrument Co., 319 Belmont Ave., Haledon, N. J.

QSLS. highest quality, samples free. VYS Print, 1704 Hale Ave., W2EA (ex-SE~ incor~atin& your ideas, personality, etc. Reason-

In Stock: new and used Microwave and general parts. Deflecting coil-formed circuits, picture and sound IF channels using latest circuits with the newest miniature tubes, RF high voltage power supplies and RF tuners. These units built on sub-assembly for main on main channels. Send for our price list now. Television Specialties Co., J. 315 Madison, Oak Park, Ill.

30th ray scope, radar 16-93/A FC-13A, 115v, 400 cps. New. Complete with 14 tubes. $175. Send for free cata-

VFO, 5312 Murdock St., St. Louis 9, Mo.

WANTED: National-101X, just rebuilt by National Co, and no noise limited. $79.95 ex-W2JB. Send for cata-

WER, 1523 41st St. Brooklyn 18, N. Y.

SUPER-PRO, new, army model. First $195 takes it, also P 11, 83, 19, 180, 180, 180, 190. Turnover, $5.25. 30-120-120-120-120-120, 120. W1HIL, Wakefield, Mass. NATIONAL FBXSA, . . . completely read- and supplied, and crystal- alized parts.

FOR $ale: 300-400 watt xmtr, complete, 705 tube, 1 kW. L. M. Streeter, W3FVQ. 1 Kw, 75 meter fone xmtr for sales. For details, write Mildred Schell, Myerstown, Pa.


FOR SALE: HQ-120X rack mount. Jen

WANTED: Transmitter H76 or Meissner 150B. State condition and price. Double, W3JMW, Slippery Rock, Pa.


Selling out new National AC broadcast to 30 Mc, communic- ations receiver, $200, complete, prepaid U. S. A. Original packing, used 30 hours. Also 3 kw. parts. Write Geo. E. Houdy, 943 So. Main, Adrian, Michigan.

SOLD, high quality, sample free. VVS Print, 1704 Hale Ave, W2EA, 40, 40, 40.

AMATEURS, experimenters, industrial and export accounts write for catalog and monthly bulletins. Buy the newest guaranteed way and save. Buy American. New York 6, N. Y.

AUTO STRM: 115-volt, 60 cycle, 16 amp. output. Ideal way to radio or television. Send for list. By means of a 110 volt outlet of 72 to 140 words available in approx. 8 volt base on long wave, 6 volt base on medium wave. Complete, base of 150 rhino. $11.50. E. Dohrer, W5RR/1, 131 State St. Boston, 9 Mass.

SURPLUS tubes: Four GL-389-B rectifiers at $2 each; two 890 triodes at 895 each (guaranteed); a 300 volt receiver, good condition. 200, B. W. Smith, W90PG, Wausau, Wisc.

SELLING out new National AC broadcast to 30 Mc, communic- ations receiver, $200, complete, prepaid U. S. A. Original packing, used 30 hours. Also 3 kw. parts. Write Geo. E. Houdy, 943 So. Main, Adrian, Michigan.

SELVSK: for your remote indication requirements: 110-volt, 60 cycle Bendix type 1-1, 4-1 by 4". $7.50 per pair, fob. Shipping weight approx. 12 oz. 100 each, freight paid. New, complete with tubes. $14.25 fob. Shipping weight approx. 25 lbs. Cambridge Electro- nics Company, 208 So. Pulaski St., Baltimore 25, Md.

NEW regulated power supplies, 100-130 volt AC, 130 to 230 volt DC, 30 Mill, 6.5 volt 3 amp. Excellent regulation, extremely low hum level. Beautiful chassis, black or gray grill 9" by 5" by 4". Price $20.00 each case, 5 each $7.10. $49. E. Dohrer, W5RR/1, 131 State St. Boston, 9 Mass.

SELLING shack: Stancor 60-P xmtr, mtnua coils, xtal, $90. Misc. $10; Wayne Phelps, 1710 Richmond, Houston 6, Texas.

TRADE: New Lexia tubes, coils, complete with bandspread coils, power supply, complete for 80 to 10-meter bands. Xtal mike. 20 watts phone, 40 watts cw. 125 watts input. Price: $8.25. 815 tubes, $3.50; recg tubes all types including 6AC7, $1.59; 6F6, 80¢; 6A8, 80¢; 7B7, 90¢; 6SK7, 60¢. Write or wire J. E. Keller, 1636 Light St., Baltimore, Maryland.

FOR SALE: 1/40 H. P. motors, 3600 rpm, 110-volt, 60-cycles, 3-phase, I.C.A. Deluxe code oscillator, $8.50; Instructograph with 5 tapes, $10; S-meter $75. Meissner De Luxe §t•nal shifter, $45. A. Lukach, 35 Salem Circle, Evanston, Ill.

BEAM antenna, all aluminum. High efficiency with minimum weight and torque. 2 to 20 meters. Write for Information. Housekeeper, 1831 W. 29th Pl., Kansas City, Mo.


FOR SALE: Meissner 150B, 500-watt xmtr, $175. Complete set of operating instructions and parts list. Details. Don Kadish, 9 Peters St., Cambridge 39, Mass. W10ER.

KENTUCKY Values! 3500 cycle speech clipped filter kit, instructions, $7.25; large 25 volt cycle sealed tube, $9.25; 350 watt cycle sealed tube, $10.50. J. A. Rademacher, W0KDT/7, Missoula, Mont.

WANTED: Meissner 150B, Hallicrafters BC-610 or other type Ham Headset, all types. Carl Arnold, Middletown, Pa.


FOR SALE: HRO 4520; Tuba, $99.95; 6SK7, $5; 6AC7, $10; 6F6, 80¢; 6A8, 80¢; 6SK7, 60¢; 6B6, $1.50; 6G6, $3.50. 匹 shaker station. Price $9.95. HAK, 451 Terrace, Altadena, Calif.

FOR SALE: 20-10-6-2 meter bands, holder fits five-prong socket, 14-15 watts, 250 volts; cost $2.50, 16-16.5 Mc., $3.50; 16.67-18 Mc., $4.50. Henry S. Palmer Co., 2132 May St., Dayton, Ohio.

FOR SALE: BC-610-D xmtr, as new in original box. Beck, 907 No. 35th, Omaha, Nebr.


PRE-INVETER specials: $300-1000-yt. 25A. Very good condition. Complete with power supply, spkr, and 6 coils 2 broadcast and 4 SW. 480 Kc to 30 Mc, SW coils have been removed. For 40, 20, 10, 15. Price $300. E. Shuster, WBSM, 2889 East 116th, Cleveland, Ohio.

TRANSMITTER for sale. Harris 80-T. Like New. Xsia tubes, coils, complete with bandspread coils, power supply, complete for 80 to 150 Mc. 20 watts phone, 30 watts cw. 40 watts phone. Price $95. W1KIC, 240 Moreland St., Worcester, Mass.

FOR SALE: BC-610-D x Mr, as new in original box. Beck, 907 No. 35th, Omaha, Nebr.

FOR SALE: BC-610-D x Mr, as new in original box. Beck, 907 No. 35th, Omaha, Nebr.

FOR SALE: S-band xmtr, complete, with Automatic tube changer, 10 to 150 Mc. and beat deals. World Radio, Box 1115, Lancaster, Pa.

FOR SALE: S-band xmtr, complete, with Automatic tube changer, 10 to 150 Mc. and beat deals. World Radio, Box 1115, Lancaster, Pa.


FOR SALE: 20-10-6-2 meter bands, holder fits five-prong socket, 14-15 watts, 250 volts; cost $2.50, 16-16.5 Mc., $3.50; 16.67-18 Mc., $4.50. Henry S. Palmer Co., 2132 May St., Dayton, Ohio.

FOR SALE: BC-610-D x Mr, as new in original box. Beck, 907 No. 35th, Omaha, Nebr.

FOR SALE: BC-610-D x Mr, as new in original box. Beck, 907 No. 35th, Omaha, Nebr.

FOR SALE: BC-610-D x Mr, as new in original box. Beck, 907 No. 35th, Omaha, Nebr.

FOR SALE: BC-610-D x Mr, as new in original box. Beck, 907 No. 35th, Omaha, Nebr.

FOR SALE: BC-610-D x Mr, as new in original box. Beck, 907 No. 35th, Omaha, Nebr.

FOR SALE: BC-610-D x Mr, as new in original box. Beck, 907 No. 35th, Omaha, Nebr.
The No. 90881
RF POWER AMPLIFIER

This "500" watt, RF power amplifier unit may be used as the basis of a high power amateur band transmitter or as a means for increasing the power output of an existing transmitter. As shipped from the factory, the No. 90881 RF power amplifier is wired for use with the common RCA or G.E. "812" type tubes, but adequate instructions are furnished for re-adjusting for operation with other popular amateur style transmitting tubes as Taylor T240, Eimac 35T, etc. The amplifier is of unusually sturdy mechanical construction, on a 10¼" relay rack panel. The panel contains the grid and plate tank tuning capacitor dial, as well as the grid and plate current milliammeters. Plug-in inductors are available for operation on 10, 20, 40 or 80 meter amateur bands, from stock, as well as special coils to order for commercial frequencies. The standard Millen No. 90800 exciter unit is an ideal driver for the new No. 90881 RF power amplifier.
CONSTANTLY IMPROVED—
BUT NO YEARLY MODELS

In the RME 45 you will now find:

1 **Two Speed Tuning.** A dual drive mechanism is now provided, in line with the calibrated, bandspread scale, which gives rapid tuning to cover the band, slow tuning to locate that station. Smooth, effortless, single dial control, calibration on five amateur bands, plenty of spread and real efficiency.

2 **Voltage Regulation.** Incorporated as an added feature, the RME 45 is now equipped with a VR-150 regulator tube to further reduce any drift to an absolute minimum and to stabilize the overall performance of an already fine instrument. You will like this addition.

3 **Improved Noise Limiter.** To make operation in a noisy location more enjoyable, a series noise limiter with an ON-OFF switch is being built into the RME 45. It works exceptionally well on all types of interference and goes after the spark-plug type with a vengeance.

Now more than ever, you MUST hear the RME 45 perform!
This latest addition to the famous Jensen Hypex line meets a real need for paging and intercommunication applications. Particularly efficient in the voice frequency range, it delivers clear, intelligible speech with maximum "punch" to override high noise levels.

By reason of an extremely clever mounting bracket, this projector can be pointed in any direction and securely locked into position with a single wing nut. Two holes in the bracket are provided for mounting on table, wall, ceiling or a post.

The diaphragm is cloth base, phenolic impregnated. Nominal voice coil impedance, 8 ohms; power handling capacity, 15 watts maximum speech signal input. Two-wire RC cable is provided for connections. Mounting facilities are also provided on the bracket for a 3/8" x 7/8" core or smaller transformer. Because of the Hypex flare formula, useful output is attained for a 100° total angle.

This new Hypex projector is now in production; deliveries are expected early in 1947 and literature will be available shortly.

JENSEN MANUFACTURING COMPANY
6611 S. LARAMIE AVE., CHICAGO 38, U.S.A.
In Canada: Copper Wire Products Ltd., 11 King St. W., Toronto, Ont.

*Trade Mark Registered
WHEREVER the choice of a communication receiver is based on proven performance, the HRO is a logical selection. For the HRO is cleanly designed for crack operators, free from superfluous tubes or details, yet including everything that can aid the user’s skill. The HRO combines ease of operation with brilliant performance and superb reliability.

NATIONAL COMPANY, INC.
MALDEN, MASS.
These RCA mercury-vapor rectifiers deliver steady, dependable power—and more of it

RCA-866-A/866 and 816 half-wave mercury-vapor rectifiers give you a full measure of power, a longer useful life, and extreme ruggedness at no extra cost. Their unusual performance records in prewar rigs and in wartime service explain why experienced amateurs power their transmitters with these time-proven types.

Both types are characterized by their ability to withstand high peak inverse voltages and to start conduction at low plate voltage. The internal voltage drop is approximately 15 volts.

RCA-866-A/866 combines the best features of the earlier 866 and 8-66-A types. Its edgewise-wound coated filament, drawing 5 amps. at 2.5 volts, has enormous emission reserve—hence, greater useful life. High-voltage insulation is provided by bringing the plate lead out at the top of the bulb. Two RCA-866-A/866's in a full-wave circuit will deliver 500 ma. dc at 3100 volts—more than enough power for a full kilowatt final.

RCA-816 has the same rugged design features as its big brother—including an edgewise-wound filament that draws 2 amps. at 2.5 volts. Though the 816 is no larger than a receiving tube, two of them in a full-wave circuit will deliver 250 ma. dc at 1500 volts and will handle transmitters up to 400 watts input!

For further details on these low-cost, heavy-duty rectifiers, see your local RCA Tube Distributor, or write RCA, Commercial Engineering, Section M54B, Harrison, N. J.

Have you seen HAM TIPS? Get a free copy from your local RCA Tube Distributor

THE FOUNTAINHEAD OF MODERN TUBE DEVELOPMENT IS RCA

RADIO CORPORATION OF AMERICA
HARRISON, N. J.