devoted entirely to amateur radio
MINIATURE COMPONENTS FROM STOCK...

SUBONCER UNITS

FOR HEARING AIDS...VEST POCKET RADIOS...MIDGET DEVICES

UTC Sub-ouner units fulfill an essential requirement for miniaturized components having relatively high efficiency and wide frequency response. Through the use of special nickel iron core materials and winding methods, these miniatures units have performance and dependability characteristics far superior to any other comparable items. They are ideal for hearing aids, miniature radios, and other types of miniature electronic equipment. The coils employ automatic layer windings of double Formex wire in a molded Nylon bobbin. All insulation is of cellulose acetate. Four inch color coded flexible leads are employed, securely anchored mechanically. No mounting facilities are provided, since this would include maximum flexibility in location. Units are vacuum impregnated and double (water proof) sealed. The curves below indicate the excellent frequency response available. Alternate curves are shown to indicate operating characteristics in various typical applications.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>$0-1</td>
<td>Inlet</td>
<td>+ 4 V.U.</td>
<td>200</td>
<td>0</td>
<td>2500</td>
<td>16</td>
<td>2650</td>
<td>$5.60</td>
</tr>
<tr>
<td>$0-2</td>
<td>Interstage/3:1</td>
<td>+ 4 V.U.</td>
<td>10000</td>
<td>0</td>
<td>90000</td>
<td>225</td>
<td>1850</td>
<td>$5.60</td>
</tr>
<tr>
<td>$0-3</td>
<td>Plate to Line</td>
<td>+ 20 V.U.</td>
<td>10000</td>
<td>1 mili</td>
<td>200</td>
<td>1300</td>
<td>30</td>
<td>$5.60</td>
</tr>
<tr>
<td>$0-4</td>
<td>Output</td>
<td>+ 20 V.U.</td>
<td>30000</td>
<td>1.0 mili</td>
<td>50</td>
<td>1800</td>
<td>4.3</td>
<td>$5.60</td>
</tr>
<tr>
<td>$0-5</td>
<td>Reactor 50 HY at 1 mili. D.C. 3000 ohms D.C. Res.</td>
<td>+ 20 V.U.</td>
<td>100000</td>
<td>5.10</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$0-6</td>
<td>Output</td>
<td>+ 20 V.U.</td>
<td>100000</td>
<td>5 mili</td>
<td>60</td>
<td>3250</td>
<td>3.8</td>
<td>$5.60</td>
</tr>
</tbody>
</table>

*Impedance ratio is fixed, 1250:1 for $0-1, 1:50 for $0-3. Any impedance between the values shown may be employed.

SUB-SUBONCER UNITS

FOR HEARING AIDS AND ULTRA-MINIATURE EQUIPMENT

UTC Sub-Sub-Oncser units have exceptionally high efficiency and frequency range in their ultra-miniature units. The design has been improved through the use of specially selected high-fidelity core material and special winding methods. The constructional details are identical to those of the Sub- ouner units described above. The curves below show actual characteristics under typical conditions of application.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>$50-1</td>
<td>Input</td>
<td>+ 4 V.U.</td>
<td>200</td>
<td>0</td>
<td>2500</td>
<td>13.5</td>
<td>3700</td>
<td>$5.60</td>
</tr>
<tr>
<td>$50-2</td>
<td>Interstage/3:1</td>
<td>+ 4 V.U.</td>
<td>10000</td>
<td>0</td>
<td>90000</td>
<td>750</td>
<td>3250</td>
<td>$5.60</td>
</tr>
<tr>
<td>$50-3</td>
<td>Plate to Line</td>
<td>+ 20 V.U.</td>
<td>10000</td>
<td>1 mili</td>
<td>200</td>
<td>2700</td>
<td>35</td>
<td>$5.60</td>
</tr>
<tr>
<td>$50-4</td>
<td>Output</td>
<td>+ 20 V.U.</td>
<td>30000</td>
<td>1.0 mili</td>
<td>50</td>
<td>1875</td>
<td>4.6</td>
<td>$5.60</td>
</tr>
<tr>
<td>$50-5</td>
<td>Reactor 50 HY at 1 mili. D.C. 4400 ohms D.C. Res.</td>
<td>+ 20 V.U.</td>
<td>100000</td>
<td>5.10</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$50-6</td>
<td>Output</td>
<td>+ 20 V.U.</td>
<td>100000</td>
<td>5 mili</td>
<td>60</td>
<td>4700</td>
<td>3.3</td>
<td>$5.60</td>
</tr>
</tbody>
</table>

*Impedance ratio is fixed, 1250:1 for $50-1, 1:50 for $50-3. Any impedance between the values shown may be employed.

SUBONCER UNIT
Dimensions...9/16" x 5/8" x 7/8"  Weight...0.03 lb.

SUB-SUBONCER UNIT
Dimensions...7/16" x 3/4" x 5/8"  Weight...0.09 lb.
Announcing

THE EDISON RADIO AMATEUR AWARD

To gain greater recognition for the many vital and humane public services performed by radio amateurs, G. E. offers the Edison Radio Amateur Award for 1952.

Who is eligible for the Edison Radio Amateur Award? Radio amateurs eligible for nomination will be those men and women who, during 1952, have performed a meritorious public service on behalf of an individual or a group, in a disaster area, in civil defense, or in similar situations.

Nominations may be made by any amateur, club, association, or individual familiar with the service performed.

Winner of the award will receive the Edison Radio Amateur trophy in a public ceremony in a centrally located metropolitan city. National recognition will be accorded the winner of the award, and as a token of appreciation for his service, General Electric will present him with a 24-hour watch to clock DX accurately.

How to nominate a candidate: To nominate a candidate for the award, you need only submit his name, address, call letters, and a description of the service performed.

Entries will be reviewed by a distinguished group of impartial judges, and the decisions of the judges will be based on (1) the greatest benefit to the individual or group (2) the greatest amount of ingenuity and sacrifice displayed in performance of the service.

Your candidate must hold a radio amateur's license issued by the F. C. C., Washington, D. C., and the service must have been performed while he was pursuing his hobby as an amateur within the continental limits of the United States.

Your letter must be postmarked not later than December 31, 1952.

Judges who will decide which candidate's achievement is most worthy of the award, are:

Mr. E. R. Harriman, President, The American Red Cross.

Mr. G. E. Sterling, Commissioner, Federal Communications Commission.

Mr. G. L. Dosland, President, American Radio Relay League.

Winner will be announced on or before March 1, 1953, and the award will be publicly bestowed soon thereafter.

Employees of the General Electric Company may nominate candidates for the Edison Radio Amateur Award, but are not permitted to receive the award.

Choose your candidate . . . prepare your letter of nomination . . . and mail to Edison Award Committee, Tube Dept., General Electric Co., Schenectady 5, N. Y.
LINEAR CALIBRATION DIAL:
All divisions are same width. On the 160, 80, 40, 20 and 15 meter bands, each division equals 1 kc. The dial is accurate within 1 kc to 21.8 mc, and 2 kc between 26 and 30 mc after calibration. This all adds up to exceptional band spread and accurate dial setting.

NOISE LIMITERS:
The phone limiter is a series diode type that automatically adjusts the threshold of limiting to signal level for optimum performance. Can be turned on or off by front panel controls. The cw limiter is a shunt diode type following the first audio amplifier. Provides front panel control of limiting level. Limits both negative and positive peaks.

CRYSTAL FILTER:
Factory adjusted. Selectivity is variable in five steps from 4 kc at 6 db down to about 12 kc at 60 db down with selectivity knob at zero—crystal filter out. With selectivity knob at 4, bandwidth is approximately 200 cps at 6 db down and 6.5 kc at 60 db down.

WITH the Collins 75A-2 you'll pick out signals you've never been able to hear before. Two noise limiters, one for cw and one for phone, hold interference to below signal level. Nerve-wearing noise is reduced, and by clipping interference the limiters help you identify and copy otherwise unreadable signals.

For cw reception, highly stable BFO injection and an effective crystal filter give pinpoint selectivity with only slight loss in gain. Linear dial calibration, exclusive in the 75A-2, provides easy "resetability." These satisfying features have been designed with the respected Collins skill, and form part of the receiver that has friends throughout the world.

FOR THE BEST IN AMATEUR RADIO, IT'S . . .

COLLINS RADIO COMPANY, Cedar Rapids, Iowa
11 W. 42nd St., NEW YORK 18 1937 Irving Blvd., DALLAS 2 2700 W. Olive Ave., BURBANK
PUBLISHED, MONTHLY, AS ITS OFFICIAL ORGAN, BY THE AMERICAN RADIO RELAY LEAGUE, INC., AT WEST HARTFORD, CONN., U. S. A.; OFFICIAL ORGAN OF THE INTERNATIONAL AMATEUR RADIO UNION

STAFF
Editorial
A. L. BUDLONG, W1BUD
Editor

HAROLD M. McKEAN, W1CEG
Managing Editor

GEORGE GRAMMER, W1DF
Technical Editor

DONALD H. Mox, W1TS
BYRON GOODMAN, W1DX
Assistant Technical Editors

EDWARD P. TILTON, W1HDQ
V.H.F. Editor

C. VERNON CHAMBERS, W1JEQ
Technical Assistant

ROD NEWKIRK, W1VMW
DX Editor

ELEANOR WILSON, W1WON
YL Editor

DOROTHY A. BUBB
Production Assistant

WALTER E. BRADLEY, W1DHK
Technical Information Service

Advertising
LORENZ A. MORROW, W1VG
Advertising Manager

EDGAR D. COLLINS
Advertising Assistant

CIRCULATION

DAVID H. HOUGHTON
Circulation Manager

HARRY PASTON, W1DV

HAROLD K. ISHAM, W1MFA
Assistant Circulation Managers

OFFICES
38 La Salle Road
West Hartford 7, Connecticut

Tel.: 5-0266
TWX: HF 88
Subscription rate in United States and Possessions, $4.00 per year, postpaid:
$6.00 in all other countries. Single copies, 40 cents. Foreign remittances
should be by international postal or express money order or bank draft
negotiable in the U. S., and for an equivalent amount in U. S. funds.
Entered as second-class matter May 29, 1919, at the post office at Hartford,
Connecticut, under the Act of March 3, 1879. Acceptance for mailing at
special rate of postage provided for in section 1102, Act of October 3, 1917,
authorized February 21, 1920, under the Act of February 5, 1925.
Copyright 1952 by the American Radio Relay League, Inc. Title registered
at U. S. Patent Office. International copyright secured. All rights reserved.
Quoted reservations exist in some countries.

INDEXED BY
INDUSTRIAL ARTS INDEX

CONTENTS

TECHNICAL
Pi-Network Tonk Circuits for High Power
George Grammer, W1DF 11
The Shunt Selectoject Oswald G. Villard, jr., W6QYT, and José Miguel Díaz, XE1RZ 18
What Price Precision? — Part II
George X. M. Collier, W0EG 26
Coden Elimination of Intersignal Noise. Ronald L. Ives 36
Sugar-Coated Single Sideband
Richard B. Blanchard, W6UYG 38
A Broad-Band 40-Meter Vertical
James A. Friend, W6ECJ 45
An Antenna Coupler for 50 Mc. .......................... 53

MOBILE
A B.F.O. for Your Mobile........... John Hantoon, W1LVQ 24

NOVICE
A Novice-Built Test Meter... John P. Ramsey, W1NIUG 34
How Rectifiers Work... Gabriel P. Rumble, ex-W5BBB 42

OPERATING
Announcement, 19th ARRL Sweepstakes............. 10
Sweepstakes Trade Secrets
Richard L. Baldwin, W1IKE 17
Amateurs Provide Communications for Women's Transcontinental Air Race......................... 40
Results, 18th Annual ARRL DX Test.................... 47
Announcement, Annual Simulated Emergency Test...... 54

GENERAL
"It Seems to Us " .......................... 9 Silent Keys ....................... 48
Hamfest Calendar ................................ 10 ARRL QSL Bureau .............. 54
ARRL Roanoke Division Convention................... 10 How's DX? ..................... 58
Quiz Quiz .................................. 10 The World Above 50 Mc 59
Happenings of the Month ...................... 31 Correspondence from Members 62
YL News and Views ........................... 41 Hints and Kinks .................. 63
United States Naval Reserve ................... 44 Operating News 64
In QST 26 Years Ago ................... 46 With the AREC 66
6

8
Accepted and praised expert in the

A Ham's Dream—Communications Receiver SX-71 double conversion set, NBFM limiter stage. 538 kc to 34 mc. in 5 bands. Plus A 46 to 55 mc band. Temperature comp.; voltage regulator. 1 r-f, 2 converters. 3 i-f stages. Xtal. filter, 3-position selectivity. 115 V AC, 11 tubes, regulator, rectifier . . . . $199.50

Precise Selectivity—The S-76—Double conversion with 50 kc 2nd i-f. 4-in. "S" meter. 540-1580 kc, 1.72-32 mc in 4 bands. 1 r-f, 2 converters, 2 i-f stages. 5-position selectivity. Phono input jack, 3 watt output. 115 V AC, 9 tubes, regulator, rectifier . . . . $169.50

Low Price—High Performance!—540B—540 kc to 43 mc in 4 bands. Electrical band spread. Temperature compensated. 1 r-f, 2 i-f. 3 watt output. Built-in speaker. 115 V AC only, 7 tubes, plus rectifier. (S-77—same as S-40B, for 115 V AC or DC) . . . . . . . . $99.95

The Finest Buy in SW!—The S-38C—Best performance per dollar! 540 kc to 32 mc in 4 bands. Maximum sensitivity per tube—far outperforms ordinary sets. Built-in speaker. 115 V AC or DC. 4 tubes plus rectifier . . . . $49.50
by the most critical world...

The American Amateur Radio Operator

Hallicrafters

The first Hallicrafters radio was built specifically for the ham operator more than twenty years ago. Today, Hallicrafters sell more communications sets to the armed forces, professionals and hams, than all other manufacturers combined. Yet today, these Hallicrafters sets are still designed specifically for the most critical expert in the world—the American amateur operator. There is no higher standard... in the world!

Hallicrafters
"The Radio Man's Radio"

WORLD'S LEADING MANUFACTURER OF PRECISION RADIO AND TELEVISION • CHICAGO 24, ILLINOIS
### 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 SCM. The administrative ARRL official elected by the members in each Section. Radio Club reports are also desired by SCM for inclusion in OST. All ARRL Field Organization appointments are made by the SCM, where these include ORS, OES, OPS, OSF, and these appointments include SCM's desire applications for SEC, EC, RM, and PAM. In addition to station and leadership appointments for Members, all amateurs in the United States and Canada are invited to join the Amateur Radio Emergency Corps (ask form for 7).

<table>
<thead>
<tr>
<th>Division</th>
<th>State/Province</th>
<th>SCM Name</th>
<th>Address</th>
<th>City</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ATLANTIC DIVISION</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eastern Pennsylvania</td>
<td>W1BKE</td>
<td>John H. Pulley</td>
<td>2219 Rutherford St.</td>
<td>Philadelphia</td>
</tr>
<tr>
<td>Maryland, Delaware, D.C.</td>
<td>W3GMM</td>
<td>James A. Hamilton</td>
<td>29 Fawcett St.</td>
<td>Kennettsville</td>
</tr>
<tr>
<td>New Jersey</td>
<td>W3OB</td>
<td>Lloyd L. G. Inman</td>
<td>1116 Grove St.</td>
<td>Plainfield</td>
</tr>
<tr>
<td>Western Pennsylvania</td>
<td>W3JQ</td>
<td>Edward J. Gray</td>
<td>81 King St.</td>
<td>Baltimore</td>
</tr>
<tr>
<td><strong>CENTRAL DIVISION</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Illinois, Indiana</td>
<td>W9QDL</td>
<td>Howard L. Latham</td>
<td>600 Broadmeadow Ave.</td>
<td>Joliet</td>
</tr>
<tr>
<td>Wisconsin</td>
<td>W9QRM</td>
<td>Edward T. Nelson</td>
<td>1470 N. 14th St.</td>
<td>Milwaukee</td>
</tr>
<tr>
<td><strong>DOKAOTA DIVISION</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>North Dakota</td>
<td>W8KVP</td>
<td>Everett E. Hill</td>
<td>5707 Fifth Ave., S.D.</td>
<td>Fargo</td>
</tr>
<tr>
<td>South Dakota</td>
<td>W8LBN</td>
<td>J. W. Sierkowski</td>
<td>900 South Menlo Ave.</td>
<td>Sioux Falls</td>
</tr>
<tr>
<td>Minnesota</td>
<td>W8XMC</td>
<td>Charles R. Price</td>
<td>1013 95 E. Lake St.</td>
<td>Minneapolis</td>
</tr>
<tr>
<td><strong>DELTA DIVISION</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arkansas</td>
<td>W4LUX</td>
<td>Fred Ward</td>
<td>520 South Maple St.</td>
<td>Harrison</td>
</tr>
<tr>
<td>Louisiana</td>
<td>W4LWH</td>
<td>Robert R. Barr</td>
<td>8006 Ceder Lane, Box 449</td>
<td>Springtime</td>
</tr>
<tr>
<td>Mississippi</td>
<td>W4SIS</td>
<td>Norman B. Freeman</td>
<td>P.O. Box 901</td>
<td>Gulfport</td>
</tr>
<tr>
<td>Tennessee</td>
<td>W4TXX</td>
<td>Mark A. Boland</td>
<td>P.O. Box 165</td>
<td>Oak Ridge</td>
</tr>
<tr>
<td><strong>GREAT LAKES DIVISION</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kentucky</td>
<td>W4KEG</td>
<td>J. W. Lyle</td>
<td>1340 Giddings, S.E.</td>
<td>Stephentown</td>
</tr>
<tr>
<td>Michigan</td>
<td>W4WDL</td>
<td>Norman C. MacPhail</td>
<td>2572 Clague Rd.</td>
<td>Saginaw</td>
</tr>
<tr>
<td><strong>HUDSON DIVISION</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eastern New York</td>
<td>W2L1L</td>
<td>Stephen J. Howland</td>
<td>704 River St.</td>
<td>Troy</td>
</tr>
<tr>
<td>N. Y. C. &amp; Long Island</td>
<td>W2VOR</td>
<td>George V. Cooke</td>
<td>380 E. 41st St.</td>
<td>Bethel, L. I.</td>
</tr>
<tr>
<td>Northern New Jersey</td>
<td>W2VOR</td>
<td>Lloyd H. Manahan</td>
<td>4104 Fifth Ave.</td>
<td>Asbury Park</td>
</tr>
<tr>
<td><strong>MIDWEST DIVISION</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Iowa</td>
<td>W4P0</td>
<td>William L. Davis</td>
<td>322 Shell Rd.</td>
<td>Middletown</td>
</tr>
<tr>
<td>Kansas</td>
<td>W9PWC</td>
<td>Earl N. Johnston</td>
<td>624 Roosevelt</td>
<td>Topeka</td>
</tr>
<tr>
<td>Minnesota</td>
<td>W9WCV</td>
<td>Earle E. Leuthold</td>
<td>1040 National Avenue</td>
<td>St Paul</td>
</tr>
<tr>
<td>Nebraska</td>
<td>W9WCI</td>
<td>Lloyd V. Campbell</td>
<td>203 W. 8th St.</td>
<td>North Platte</td>
</tr>
<tr>
<td><strong>NEW ENGLAND DIVISION</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Connecticut</td>
<td>W1HYR</td>
<td>Roger R. Mebane</td>
<td>RFD 4</td>
<td>Ridgefield</td>
</tr>
<tr>
<td>Maine</td>
<td>W1PTL</td>
<td>George R. Brackett</td>
<td>Goodrich St.</td>
<td>Hingham</td>
</tr>
<tr>
<td>Massachusetts</td>
<td>W1VRB</td>
<td>Frank L. Atkinson</td>
<td>91 Atlantic Ave.</td>
<td>North Quincy 71</td>
</tr>
<tr>
<td>Rhode Island</td>
<td>W1VCH</td>
<td>Victor W. Papenoff</td>
<td>702 Rogers Ave.</td>
<td>West Springfield</td>
</tr>
<tr>
<td>Vermont</td>
<td>W1WPS</td>
<td>Carroll A. Carrier</td>
<td>1360 Belmont St.</td>
<td>Warren</td>
</tr>
<tr>
<td><strong>NORTHERN DIVISION</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alaska</td>
<td>W1JNT</td>
<td>Alan M. Jeffers</td>
<td>938 70th Ave.</td>
<td>Anchorage</td>
</tr>
<tr>
<td>Idaho</td>
<td>W7MV</td>
<td>Albert K. Ross</td>
<td>201 Irene St.</td>
<td>Boise</td>
</tr>
<tr>
<td>Montana</td>
<td>W7KGJ</td>
<td>Edward G. Brown</td>
<td>421 Yellowstone Ave.</td>
<td>Billings</td>
</tr>
<tr>
<td>Oregon</td>
<td>W7WMO</td>
<td>J. E. Roden</td>
<td>527 N.W. Ninth Ave.</td>
<td>Pendleton</td>
</tr>
<tr>
<td>Washington</td>
<td>W7CZV</td>
<td>Laurence Seeling</td>
<td>Route 2, Box 384</td>
<td>Everett</td>
</tr>
<tr>
<td><strong>PACIFIC DIVISION</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hawaii</td>
<td>W4HOR</td>
<td>John R. Sanders</td>
<td>6/0 Mackay Radio &amp; Telecomm. Co., Inc., Box 229-3</td>
<td>Honolulu</td>
</tr>
<tr>
<td>Nevada</td>
<td>W7JU</td>
<td>Ray T. Warner</td>
<td>505 Birch St.</td>
<td>Boulder City</td>
</tr>
<tr>
<td>Santa Clara Valley</td>
<td>W7ZL</td>
<td>Roy C. Uman</td>
<td>10653 Ingleswood Ave.</td>
<td>Los Vegas</td>
</tr>
<tr>
<td>San Francisco</td>
<td>W6ATO</td>
<td>Ray H. Howell</td>
<td>6601 Lake Ave.</td>
<td>Santa Monica</td>
</tr>
<tr>
<td>Sacramento Valley</td>
<td>W6AYA</td>
<td>R. F. Carwick</td>
<td>243 Colon Ave.</td>
<td>Los Angeles</td>
</tr>
<tr>
<td>San Joaquin Valley</td>
<td>W6YMV</td>
<td>Willy van den Kandoo</td>
<td>R.D. 1, Box 492A</td>
<td>Turlock</td>
</tr>
<tr>
<td><strong>ROCKY MOUNTAIN DIVISION</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>North Carolina</td>
<td>W4DLX</td>
<td>J. C. Greenstein</td>
<td>1832 Logan Ave.</td>
<td>Charlotte</td>
</tr>
<tr>
<td>South Carolina</td>
<td>W4FX</td>
<td>Hunter W. Dulin</td>
<td>1702 North 7th Ave.</td>
<td>North Charleston</td>
</tr>
<tr>
<td>Texas</td>
<td>W4WFF</td>
<td>J. D. Linderau</td>
<td>Route 1, Box 431</td>
<td>Milburn</td>
</tr>
<tr>
<td><strong>SOUTHWEST DIVISION</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arizona</td>
<td>W7CZZ</td>
<td>Everett R. Kimmel</td>
<td>Box 264</td>
<td>Denver 7</td>
</tr>
<tr>
<td>California</td>
<td>W6XEU</td>
<td>M. W. Mitchell</td>
<td>1559 Uinta St.</td>
<td>Dadeville</td>
</tr>
<tr>
<td>Colorado</td>
<td>W7GOZ</td>
<td>Floyd L. Fidler</td>
<td>165 East 4th St.</td>
<td>Denver</td>
</tr>
<tr>
<td>Idaho</td>
<td>W7HNM</td>
<td>A. D. Sadd</td>
<td>P.O. Box 286</td>
<td>Gillette</td>
</tr>
<tr>
<td><strong>SOUTHEAST DIVISION</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alabama</td>
<td>W4JW</td>
<td>Dr. Arthur W. Woods</td>
<td>111 Woodworth Blvd.</td>
<td>Birmingham</td>
</tr>
<tr>
<td>Florida</td>
<td>W4QML</td>
<td>John W. Holister</td>
<td>2008 Springdell Blvd.</td>
<td>Jacksonville</td>
</tr>
<tr>
<td>Georgia</td>
<td>W4ZPD</td>
<td>Edward J. Collins</td>
<td>1804 E. Blount St.</td>
<td>Atlanta</td>
</tr>
<tr>
<td>Georgia</td>
<td>W4ZPD</td>
<td>James P. Both, Jr.</td>
<td>25 First Ave., N.E.</td>
<td>Peachtree</td>
</tr>
<tr>
<td>West Indies</td>
<td>W4JPS</td>
<td>William Werner</td>
<td>361 Ramon Loiwe</td>
<td>Tampa</td>
</tr>
<tr>
<td><strong>MARITIME DIVISION</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Connecticut</td>
<td>W1KMN</td>
<td>Gordon A. Lyon</td>
<td>Box 264</td>
<td>Ste. Genevieve de Portneuf, P. Q.</td>
</tr>
<tr>
<td><strong>ONTARIO DIVISION</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quebec</td>
<td>W2QGL</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td><strong>VANALTA DIVISION</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alberta</td>
<td>W8EMJ</td>
<td>Sydney T. Jones</td>
<td>10706-47th Ave.</td>
<td>Edmonton, Alta</td>
</tr>
<tr>
<td>British Columbia</td>
<td>W8EMR</td>
<td>Bill Morehouse</td>
<td>174 Regina Ave.</td>
<td>Lake Island</td>
</tr>
<tr>
<td>Yukon</td>
<td>W8KEN</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td><strong>PRAIRIE DIVISION</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manitoba</td>
<td>W8AMJ</td>
<td>A. W. Morley</td>
<td>26 Lemon Ave.</td>
<td>St. Vital</td>
</tr>
<tr>
<td>Saskatchewan</td>
<td>W8MIR</td>
<td>Harold R. Horn</td>
<td>1044 King Ave.</td>
<td>Saskatoon</td>
</tr>
</tbody>
</table>
Unconditionally Guaranteed
... the Mark of the Maker's Confidence in His Product

PRs are built to PERFORM ... under good conditions and bad. They have that extra measure of stability and dependability BUILT-IN ... that plus of rugged precision that guarantees years of unfailing service. Thousands of prewar PRs are still performing ... still right on the kilocycle! No wonder PRs can be UNCONDITIONALLY GUARANTEED.

- 20 METERS, Type Z-3, $3.75  
- 40, 80 & 160 METERS, Type Z-2, $2.75

PR Crystals

USE PR AND KNOW WHERE YOU ARE

PETERSEN RADIO COMPANY, INC.
2800 W. BROADWAY • COUNCIL BLUFFS, IOWA
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 fraternality 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 has no one commercially engaged in the manufacture, sale or rental of radio apparatus eligible to membership on its board.

"Of, by and for the amateur," it numbers within its ranks practically every worth-while amateur in the nation and has a history of glorious achievement as the standard-bearer-in amateur affairs. Inquiries regarding membership are solicited. A bona fide interest in amateur radio is the only essential qualification; ownership of a transmitting station and knowledge of the code are not prerequisite, although full voting membership is granted only to licensed amateurs.

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

Past Presidents
HIRAM PERCY MAXIM, W1AW, 1914-1936
EUGENE C. WOODRUFF, WB8CMP, 1936-1940
GEORGE W. BAILEY, W2KH, 1940-1952

Directors
Canada
ALEX REID ............... VE2BE
246 Logan Ave., St. Lambert, P. Q.
Vice-Director: William W. Butcher, VE1QLQ
10740 107th St., Edmonton, Alta.

Atlantic Division
ALFRED C. HICK ...... W3GEG
135 Cedar Ave., Sharon, Pa.
Vice-Director: Charles O. Baudot, W3LVP
725 Garden Road, Greenside, Pa.

Central Division
WESLEY E. MARRINER ... W9AND
844 N. Gale Ave., Dixon 7, Ill.
Vice-Director: Charles F. Reberg, W9MZY
3980 W. 18th Ave., Gary, Ind.

Dakota Division
ALFRED M. GOWAN .... W5PHR
325 S. Mentor Ave., Sioux Falls, S. D.
Vice-Director:

Delta Division
JAMES W. WATKINS .... W4PLS
223 N. Howell Ave., Chattanooga, Tenn.
Vice-Director: George S. Acton, WB8MM
Plain Dealing, La.

Great Lakes Division
JOHN H. BRAB .... W8SPP
Vice-Director: Harold E. Stetner, WS8Z
247 W. 5th St., Marysville, Ohio

Hudson Division
JOSEPH M. JOHNSTON .... W20X
123 Marmouth Ave., Jamaica Plains, N. Y.
Vice-Director: George V. Cooke, Jr., W30BU
58-31 239th St., Bellerose 6, L. I., N. Y.

Midwest Division
WILLIAM J. SCHMIDT .... W6OZV
508 E. Vassar, Wichita, Kansas
Vice-Director: James E. McKenney, WB7MV
1404 S. Teeth, Salina, Kansas

New England Division
PERCY C. NOBLE .... W1BVR
37 Broad st., Westfield, Mass.
Vice-Director: Frank L. Basler, Jr., W1ALP
91 Atlantic Rd., North Quabbin 71, Mass.

Northwestern Division
R. R. ROBERTS .... W7CPY
837 Park Hill Drive, Millings, Mont.
Vice-Director: Karl W. Weinbrenner, W7BG
3219 N. 24th St., Tacoma 7, Wash.

Pacific Division
KENNETH E. HUGHES .... W9GCS
810 W. Orange Ave., San Francisco, Calif.
Vice-Director: Richard E. Oelkner, W8TCT
234 Colon Ave., San Francisco 12, Calif.

Hawaii Division
WILLIAM H. JACOBS .... W4CVO
Route 6, Inglewood, Calif.
Vice-Director: Max E. Browning, W4RPD
153 Broughton St., E. H., Orangeburg, S. C.

Rocky Mountain Division
FRANKLIN K. MATSUKA .... W9DD
P. O. Box 212, Estes Park, Colo.
Vice-Director: Ranson R. Walker, WB9VPW
P. O. Box X, Brush, Colo.

Southeastern Division
LAMAR HILL .... W4BOL
104 Myrtle, Covington, Ga.
Vice-Director: Ernest W. Brarr, WA5GMR
411 Rosemary Ave., SW, Atlanta, Ga.

Western Division
JOHN R. CRAWFORD .... W6KW
10820 Don Pedro Rd., Redford, Spring Valley, Calif.
Vice-Director: Walter R. Jones, W6REK
1315 N. Overhill Drive, Inglewood 3, Calif.

West Gulf Division
A. DAVID MIDDLETON .... W5CA
2644 N. 37th St., Dallas, Tex.
Vice-Director: Frank E. Fisher, W5AHY/AST
104 E. 11th, Pawhuska, Okla.
“It Seems to Us…”

IT’S FALL—LET’S GO!

Here in New England, it’s Fall again. The foliage is a burst of color. Every Sunday after-noon the front yards of the cider mills are packed with customers. Unfortunately, Fall in New England doesn’t last long enough. Soon, now, the autumn foliage will have flut-tered to the ground, the cider mills will have closed again, and winter will be upon us.

Fall, to amateur radio, means the beginning of another operating season, of week ends crowded with contests and on-the-air get-togethers of one sort or another. It’s time, too, for that last “final” rearrangement of the operating room, that last check on the antenna halyards (we’re positively going to check ours this week end), that perennial promise to the family not to spend too much time on the air this year.

To many of us, this will be our first year in amateur radio; we’ll be especially eager to participate in ham activities to the utmost. But whether this be a first year, or a twentieth, the wonderful thing about it is that everyone will be equally full of enthusiasm. It’s that fact that makes ham radio a dynamic hobby, one that is continually growing. Why a person becomes a ham is something no one has ever answered satisfactorily. But last year, some 14,000 more citizens of the U.S. got their tickets as amateurs.

Did someone wonder if ham radio were slowing down? Just mull over that figure a bit. Fourteen thousand potential members of the AREC! Fourteen thousand possible members of DXCC! We’d say 14,000 potential members of the League, too, were it not that many thousands of them are already members. But no matter how you look at it, 14,000 new hams shows that ham radio is a strong, growing institution.

It also means 14,000 potential participants in the many organized activities of the League. For those in the new group — and many of the old-timers, too — who haven’t given serious thought to horning in on these activities, we’d like to have a special word. Sure, ham radio is fun in any of its aspects, and just to work other stations is pretty exciting for quite a while, whether it’s a Novice learning the ropes on 3.5 mc. or a new General Class ham spreading his wings and learning the thrill of foreign DX. To many, the organized activities, the contests of various sorts, are something for the other fellow — especially contests. Forget it; come on in, the water’s fine!

First, we want to urge every amateur, whether Novice or higher class, League member or not, to enroll in the Amateur Radio Emergency Corps. Apply to your Section Emergency Coordinator (see the list on page 97 of this QST) or to your SCM (page 6 of every issue). Whether you thereafter participate regularly in the emergency tests in your area, or whether you can get in on them only occasionally, this is one activity every amateur should embrace. While you’re about it, too, send for the League’s pamphlet “Emergency Communications”; it’s free.

Next, are the many operating appointments that the League makes available — Official Relay Station, Official Phone Station, Official Bulletin Station, and others. You can learn about them from another booklet you can have for the asking, “Operating an Amateur Radio Station.” You may find, as thousands have, that one or more of these appointments and the type of operating activity involved, is just what the doctor ordered for you.

And now to contests:

Understandably, it usually takes a little time and some pushing to get most new hams to enter a contest, unless it be one aimed deliberately at the beginner. We know how it is ourselves, having sat around for years reading contest announcements and scores, but somehow figuring this was for only the hot operators, all of whom (we were sure) knew each other and would immediately spot us as a rank newcomer. And we still remember the first time, on a rainy Saturday afternoon, we heard a Sweepstakes going full blast and, being a little bored, thought it wouldn’t do any harm to see if we could work one, or maybe two. So, despite the fact we had only one crystal and 40 watts behind it, we tried a couple of calls. Whooeee! Four hours later we had filled several pages of the log with calls (an amazing number being contacts), were calling to the XYL to please bring our supper on a plate to the operating table, and were at it hammer and tongs. True, we never did send in that first score but score was secondary; we’d got more action than we’d dreamt of, and that was enough in itself. We also found that the bug once having bitten, the bite stays bit.

(Continued on page 104)
19th ARRL Sweepstakes—
Nov. 15th-16th and 22nd-23rd

How many ARRL sections and how many stations in those sections can you work in two weeks? If you are located anywhere in the League's field-organization territory (see page 6), you are cordially invited to partake in this popular annual operating activity. Any amateur band, 'phone or c.w., may be used. The total operating time allowed each contestant is 40 hours. The Sweepstakes comprises seventy-two c.w. and seventy-two 'phone contests! 'Phone entries are compared only with other 'phone entries—c.w. scores only with other c.w. scores—in your particular section, in the competition for awards. The week-end periods starting Saturday afternoon (1500 PST or 1800 EST) on the 15th and 22nd of November mark the open season for SS contacts.

A complete announcement of the contest, including the rules governing participation, will appear in November QST. The rules will be the same as those of the 1951 SS. Amateurs in remote ARRL sections who do not receive the November issue before the Sweepstakes may refer to November, 1951, QST for contest details.

Contest reporting forms will be sent to all amateurs who request them by mail or radiogram. It is not necessary to make advance entry or to use these forms, if the report form prescribed in November 1951 or in the next issue of QST is followed.

A.R.R.L. ROANOKE DIVISION
CONVENTION

The ARRL Roanoke Division Convention, sponsored by the Richmond Amateur Radio Club, will be held at the Hotel Jefferson, Richmond, Virginia, on October 11th and 12th. Informal "get-acquainted" parties will be held Friday night for the early arrivals. Registration starts Saturday the 11th at 9 A.M. with the general and technical sessions beginning at 10. An historical bus tour has been arranged for the ladies. Banquet at 7 P.M. followed by caberet-style dance with Burt Reipke's orchestra until 1 A.M. "Dutch" breakfasts Sunday followed by mobile judging at Bryan Park.

The Richmond Club has planned the finest in programs, food and entertainment for this first Roanoke Division convention in eleven years. Advance reservations should be made to P. O. Box 1885, Richmond, Virginia, to insure that a place is available for everyone. Send hotel reservations direct to the Jefferson, mentioning the RARC, to take advantage of the special block of rooms that has been set aside. Registration fee $6.50, including banquet and dance.

Strays

An Associated Press item, called to our attention by W2MMW, points out that there really is a town named Podunk—Podunk, Mass., to be precise—and the folks there are not too appreciative of the way its good name has been bandied about in jocular vein. Future QST Field Day covers take note!

Excerpt from a newspaper advertisement clipping furnished by W5DRW:

... Beautiful hair beyond your wildest dreams can be yours with the sensational new method of permanent waving—Television Control Waving. $10.50 up. ... Which TVI pattern gives the Toni?

W1FWH, of ARRL's Technical Information desk, was surprised to receive a request from a newcomer amateur for permission to build a simple item described in the Handbook. The lad referred to the fine print in the volume which reads, in part, "No part of this work may be reproduced in any form except by written permission of the publisher."

One of the causes of fading in radio communications, a wind phenomenon in the ionosphere closely resembling surface winds, is being investigated by the National Bureau of Standards. Observations on a regular monthly schedule are coordinated with similar observations made by scientists in Great Britain and Canada. Varying in complex fashion hourly and seasonally, the wind speeds average 160 miles per hour and have been "clocked" at velocities as high as 860 miles per hour.

HAMFEST CALENDAR

OHIO — Saturday, October 4th, at Gray's Armory, E. 14 and Bolivar in downtown Cleveland — the Cleveland Ham-fest for '52, sponsored by the Cleveland Area Council of Amateur Radio Clubs. Plenty of excellent hamfest attractions, including an auction (bring any gear you want to sell). The program starts at noon and will end about midnight. The preregistration price is $3.50, or $4.10 at the door. Contact Julius Mosones, W8PT2M, 7715 Newport Ave., Parma 9, Ohio.

Quis-Quiz

A ham plans to patent a narrow-band 'phone system using f.m. with limited swing. By restricting the frequency swing to only a few hundred cycles, and by using highly-selective receivers, he contemplates amateur bands where 'phones can work as close to each other without interference as c.w. stations can. Why shouldn't we all immediately use his system?

(Please turn to page 183 for the answer)
Pi-Network Tank Circuits for High Power

Using Available Components in Compact, Well-Shielded Construction

BY GEORGE GRAMMER,* WIDF

Since publication of the article on applying the pi-network tank circuit in TVI harmonic reduction,¹ there has been a steady flow of requests for specific information on using the same principles with high power. The chief problem is one of components. To use the methods outlined in January QST it has been necessary to adapt parts designed for quite different applications, and to use them under conditions where no appropriate ratings are available.

The amplifier shown in the accompanying photographs was built early this year for laboratory use in making checks on TV receivers, where low harmonic radiation obviously is required. We needed a rig that would run in the vicinity of 500 watts input, and since the amplifier was going to have to be pretty well boxed up, a tube with ample plate dissipation and the ability to take the input at moderate plate voltage was indicated. The 4-250A looked like the best choice because its ratings were in the right region and its physical dimensions lent themselves well to compact construction. Building and using the amplifier offered the opportunity to find out something about how components stand up in a pi-network tank circuit.

In many respects the amplifier has, like Topsy, "just grew." Our original idea of boxing up a fairly large tube and running it below ratings, with the object of not having to make special provisions for ventilation and thus simplifying the shielding, did not work out. The filament heat alone, inside a tightly closed box, was enough to raise the filament transformer temperature to the point where the insulation started to smell. So a fan had to be added, together with appropriate holes in the shielding to allow air to circulate. This, fortunately, did not impair the effectiveness of the shielding, and had the further benefit that the unit could be operated at a full kilowatt input without excessive heating.

The MB-40L grid circuit, which is convenient because it permits operation on all bands from 3.5 through 30 Mc., was not originally planned to be part of the unit but was incorporated when it was discovered, after a satisfactory plate-circuit layout had been worked out, that there was just exactly enough chassis space left for mounting it in a separately shielded compartment. It saved the work that otherwise would have gone into designing and constructing a special grid coupling circuit but, like every circuit we have ever seen that attempts to cover a wide frequency range with a single fixed link coil,

* Technical Editor, QST.

The amplifier that supplied the basis for this article has been in use in the ARRL laboratory since early this year, and considerable interest in it has been shown by the many visitors to Headquarters who have seen it. Although it should be possible to duplicate the unit without undue difficulty, the primary purpose of the article is to discuss some of the problems of adapting components to the pi-network tank circuit and the necessary precautions in their use, rather than to give a bolt-by-bolt description of the construction. The actual layout used in an amplifier can be varied over a considerable range to suit the builder's taste, provided some important principles are observed.
does not maintain anything like uniform loading on the driver stage through a coax line. However, we had far more than enough driving power available and as a result found it possible to feed sufficient driving power through a 75-ohm line about 2½ feet long by using the whole link coil on the MB-407. It would have been inconvenient to put in a switch to change the link tap on different bands, although this is advantageous in some cases. On some bands the problem is overcoupling rather than the reverse, and the grid current has to be kept down to the operating value by detuning. Aside from the coupling variations, the only other point to which anyone might object is that the tuning is quite critical, which is to be expected in such a wide-range device, and a reduction-type dial is an operating necessity. Although other types of grid circuits can of course be used, the convenience and compactness


of this tuner are more than enough to outweigh the disadvantages mentioned.

Originally the 4-250A was not neutralized, although with the background thought that if neutralization turned out to be necessary the circuit arrangement was such that capacity-bridge neutralization could be added without much difficulty. Actually, the amplifier is stable enough without neutralizing since it will not oscillate under our customary method of testing, which is to use a screen-dropping resistor of the normal value from the plate supply and then increase the plate voltage, with zero control-grid voltage, until the plate dissipation is up to the rated maximum value, no load being connected to the output circuit. Neither has it ever shown any tendency to "take off" in regular operation. However, without neutralization there is some feed-back through the grid-plate capacitance of the tube, evidenced by a considerable change in grid current, at high frequencies, when the plate circuit is tuned through resonance.

Inside the plate section. This shows the method of constructing the shield, which is made of ½-inch aluminum. Screws and nuts are used to hold the sections together everywhere except on the top, where the metal is threaded so the cover can be readily taken off and replaced.

The overall dimensions of the plate compartment are 11½ inches wide, 7½ inches high, and 10 inches deep. The grid compartment is 3½ inches wide, 5 inches high and 7 inches deep.

The neutralizing condenser is mounted on the righthand wall above the filament transformer, where a lead from one plate goes through the shield between the grid and plate sections to the condenser frame in the multi-hand unit. Connections from this condenser to the tube plate, and from the r.f. choke to the tube plate, are made with ½-inch-wide copper strap, carefully fitted so there is no strain on the plate cap of the tube.

The small panel at the lower left mounts the output connector and the series-resonated output condenser (C₇) so that these units need not be disturbed when removing the rear section of the shielding. A flexible strip is used to connect the coax socket to the variable inductor, since the terminal on the latter wobbles slightly as the coil is rotated. The "safety" choke, R₂C₅, is between the left wall and the coil and cannot be seen in this photograph.

Each shielded wire leaving this compartment is soldered to a ground lug where it passes through the chassis.

12 QST for
D.c. and a.c. leads come out in shielded wire, using disc ceramic by-passes mounted on the ends except for the high voltage plate lead, which is by-passed with TV filter capacitors. The leads are intentionally made to follow long paths around the edge of the chassis to provide additional harmonic attenuation, and the shield braid is grounded at frequent intervals by soldering tags that also serve as hold-downs.

The two-terminal tie point at the left was provided for mounting a grid-leak resistor in case one was to be used. The blower is mounted on a bracket formed from a strip of aluminum, and forces air through a set of holes that duplicate, in size and arrangement, the ventilating holes in the 4-250A socket. The filament transformer terminals project through the chassis just left of center at the top in this picture.

while the amplifier is running at normal input. After some months of use without neutralizing, the neutralizing condenser was installed principally for the purpose of seeing how much difference it would make. It does represent an improvement in that the variation in grid current under the same conditions is now negligible. The neutralizing circuit adds something to the plate-to-ground capacitance, but not enough to have any important effect on the way the amplifier works at the intended operating frequencies. However, it also affects the v.h.f. resonances in the plate circuit, and this aspect should be watched when installing such a circuit.

**Tank Components**

One of the principal questions was whether mica condensers of the type used almost exclusively for by-passing would stand up in the output position in the network. It was pointed out in January QST that the voltage ratings were ample for working into flat 52- or 75-ohm lines, a conclusion based on the r.f. voltages developed across such lines in comparison with the d.c. ratings of the condensers. Experience has shown that the mica dielectric does indeed stand up satisfactorily — there have been no voltage breakdowns to date. However, little was known about the current-carrying capacity of these condensers, and the current may get up to several amperes in a single unit at the higher frequencies.

It seems to be easy to get into trouble in this respect, although under proper operating conditions we have had no failures. But in early testing using incandescent lamps as a load at the end of a short piece of coaxial line, two 100-µfd. units behaved abnormally with the amplifier operating on 28 Mc. Checking them on a Q meter showed that they had lost the larger part of their original capacitance and had very low Q. The condensers showed no external signs of failure, but on taking them apart to see what had happened it was found that some of the foil, which is very thin, had melted to form a sort of mosaic with poor or no contact between the small pieces. Since then we have been careful always to work into a properly matched load, and in the succeeding months there have been no failures, running at a plate input of 600 to 750 watts. Based on this experience, it seems that the foil will carry about three amperes with good reliability. This represents the current that will flow through a single 100-µfd. unit connected across a 52-ohm resistive load carrying 500 watts of r.f. at ten meters. Hence for this power level and frequency each unit should have no more than 100-µfd. capacitance, and if more is required for proper tube loading, as is usually the case, it should be built up to the necessary value by using two or more 100-µfd. units in parallel. Since the condenser reactance increases with decreasing frequency, larger units can be used on the lower-frequency bands. At 7 Mc., for example, a 400-µfd. unit will carry the same current as is carried by a 100-µfd. unit at 28 Mc., if the power and impedance levels are the same in both cases.

To our minds an outstanding advantage of the pi-network over the conventional plate tank is that it permits the use of a single adjustable inductance to cover the 3.5-30 Mc. range and thus makes possible a com-

---

**Fig. 1 — The R-175 choke as modified to work on all amateur bands in the 3.5- to 30-Mc. range, including 21 Mc.**
pact, completely enclosed layout that does not require access for band changing. However, there was some question as to whether the available variable-inductance coils would stand up. We had selected a Barker & Williamson 15-uh. unit as being about right for this amplifier, a coil having a nominal rating of 500 watts. The question of its use (or abuse) worried representatives of Barker & Williamson more than it did us, because our earlier experience with the variable inductance from the antenna circuit of the BC-375B had shown that the latter coil ran quite cool with several hundred watts input. Naturally enough, the Barker & Williamson people were concerned about the possibility of failure in the event of mishandling, an anxiety that is well founded in view of every manufacturer's experience with what happens to his product when it

gets into the hands of an overoptimistic ham. It must be understood that the danger of damage is real, and that if one is to use such a coil successfully he must be willing to use it properly. In particular the coil should be adjusted, to vary the loading, only with the plate voltage off or at very low power. Arcing at the roller contact will wreck both the roller and the coil itself in a short time. And again, the load on the amplifier should be a properly-matched coax line; otherwise there is no telling what values the circulating current in the tank may reach. In fact, if you are not willing to take the pains necessary to get the coax line flat — that means, without exception, adjustment with an s.w.r. bridge and may mean, in many cases, that a coax-coupled antenna tuner is a necessity — you would be better advised to forget about a pi-network output circuit and stick to something that is more easily replaced when it burns up. Much the same applies to the low-pass filter that is a part of a complete installation.

Blocking and by-pass condensers constitute a third problem in any high-power amplifier. The only conventional types that are much good as by-passes for TV harmonics are the small molded micas, but these can be found in the catalogs only in ratings up to 2500 volts working. They might stand more, since they are tested at 5000 volts, but it is taking chances. Such a rating puts a fairly severe restriction on the plate voltage that can be used with plate modulation. The condensers originally installed in this amplifier were 2500-volt micas, with the thought that the plate voltage would be limited to 1500 for plate modulation. Quite recently they were replaced with 10,000-volt units of the type used in TV receiver power supplies. These are small and of excellent construction for our purpose, but use a ceramic dielectric about whose r.f. characteristics we know very little. So far, though, they have proved to be quite satisfactory. It was anticipated that the plate blocking condenser might give some trouble with drift in tuning, since the high-K ceramics are notorious for poor temperature coefficient, but the capacitance is large enough compared with the tank-condenser capacitance so that variations so far have proved to be unobservable. Nevertheless, we can only tentatively recommend the condensers on the basis of rather limited experience, and only more extensive use can show whether they are really as much the answer to a prayer as their ratings, size, construction, and price would indicate them to be.

The fourth item is the all-important r.f. choke, since parallel feed is the only practicable method and, with a good choke, by far the most desirable. The only serious candidate known to us for high-voltage operation is the National R-175. However, this choke was designed long before there was any thought of a 21-Mc. band, and several samples we have tested had “holes” (there always have to be some in a choke working over such a wide frequency range) in or too close to 21 Mc. By cut-and-try the choke in this amplifier was modified as shown in Fig. 1, and now gives equally good performance on all amateur frequencies included in the 3.5-29.7 Mc. range. By checking both during and after modification, it was found that the effectiveness of a choke can be determined by a fairly simple method. As shown in Fig. 2, the ends of the choke are short-circuited and then the resonant frequencies are measured with a grid-dip meter. If the meter dips at a frequency in or close to a ham band, the choke will be poor on that band. Moving the grid-dip meter along the choke will show the sections that are “hottest” at a particular frequency, by the extent of the dip in grid current. Taking off a few turns in the “hot” region will move the resonance point, and it can easily be placed where it will do no harm. However, in moving the resonance out of one band a new one may appear in another, so it is necessary to check through the entire family of bands each time a change is made. Of the modifications shown in Fig. 1, the first one tried fixed up 21 Mc. satisfactorily, but the others had to be made to keep the remaining bands up to par after 21 Mc. was OK.
Fig. 3 — Circuit diagram of the amplifier. The broken line separates the above- and below-chassis wiring.

C₁ — 220-μfd. mica.
C₂ — Disc-type neutralizing condenser, approx. 2 μfd., with at least ½-inch spacing (National NG-7202 and NG-72-702 fan).
C₃ — 150-μfd. variable, 6000 volts, 0.171-inch spacing (National TMA-150A).
C₄, C₅, C₆ — 100-μfd. mica, 2500 volts.
C₇, C₈ — 220-μfd. mica, 2500 volts.
C₉, C₁₀ — 4700-μfd. mica, 2500 volts.
C₁₁ to C₁₃, inc. — 0.001-μfd. disc ceramic, 600 volts.
C₁₄, C₁₅, C₁₆ — 0.05-μfd. disc ceramic, 600 volts.
C₁₇, C₁₈, C₁₉ — 500-μfd. ceramic, 10,000 volts (Centralab TV-35D).
R₁ — Five 680-ohm 1-watt carbon resistors in parallel.
L₁ — Parasitic coil, 5½ turns No. 14, ½-inch diam.
L₁ tapped across 3 turns.
L₂ — 5 turns No. 10, 2½ inches long, 1½-inch diam.
L₃ — Variable inductor, 15 μh. max. (B & W 3852).
L₄ — To series resonate with C₄ at desired TV frequency.
R₁ — Power and motor, 115 v. a.c. (available from Allied Radio, Chicago, catalog No. 72-702 or 72-703 fan).
J₁, J₂ — Coaxial connectors, chassis-mounting type.
MA₁ — 0-50 ma. d.c. milliammeter.
RFC₃, RFC₄, RFC₅ — 2.5-mh. r.f. choke (Note: RFC₃ is not supplied with the National MB-40L multiband unit).
RFC₆ — National type R-175 choke modified as shown in Fig. 1.
RFC₇, RFC₈ — 2-μh. r.f. choke, 500 ma. (National R-60).
S₁ — Single-circuit 7-position ceramic switch, progressive shorting (Centralab type P-1-5 water).
T₁ — Filament transformer, 5v. 13 amp. (UTC S-59).

Checking the choke with its terminals shorted approximates the conditions under which it actually works (it is shunted by the relatively low reactance of the plate tank condenser in the actual circuit) and shows up the “series” resonances. Resonance points that are indicated with the choke terminals open are “parallel” resonances and represent the frequencies at which the choke works best. It is a good idea to make a check after the choke is installed in its operating position, since proximity to shielding and other components may alter some of the resonance points.

The Circuit

The basic considerations entering into the selection of component values in the circuit of Fig. 3 have already been covered in detail. Some compromises are always necessary when selecting actual parts. We wanted to keep the tank Q in the vicinity of 10 but practical considerations did not allow getting it that low at the ten-meter end of the range. Although the output capacitance of the 4-250A is quite low, the minimum capacitance of the plate tank condenser is necessarily rather high, in any unit having enough maximum capacitance to tune to 3.5 Mc. with a 15-μh. coil. A larger coil, on the other hand, would not be desirable because it would undoubtedly show self-resonances in some amateur band.

Since it takes about 150 μfd. to tune to 3.5 Mc. with 15 μh., there was no alternative but to take whatever tank Q was workable at the ends of the range. The Q is fairly high on ten meters, but not so high as to have an appreciable effect on the overall efficiency. In fact, one of the pleasing things about this unit, and one which confirms the 4-250A as a happy choice, is that the efficiency as determined both by measurement of power input and output and by observation of plate temperature is exactly the same on all bands covered, within the limits of accuracy of measurement and observation. The measured over-all efficiency, d.c. plate input compared with r.f. output into a 52-ohm load, is 70 per cent, and

October 1952
the plate temperature indicates a tube efficiency of about 75 per cent.

An important part of the tank circuit is the supplementary tank coil $L_2$. This is the principal tank inductance at ten meters and should be adjusted so that there is just enough inductance left in the variable coil (a turn or less) to permit the loading to be adjusted under regular operating conditions. It is used not because it is any more efficient than the variable coil, but because its installation between the plate tank condenser and the variable coil puts the shunt capacitance of the latter on the output side of the network, instead of in parallel with the plate tank condenser. Since this shunt capacitance will average in the vicinity of 20 $\mu$fd., it is imperative to prevent its being added to the input capacitance of the network and thus greatly increasing the $Q$ at the high-frequency end of the range. It is also worth while to give some thought to mounting the tank condenser in such a way that its minimum capacitance is not increased — that is to say, the stator plates should be arranged to be as far as possible from the chassis and shielding metalwork.

The output condensers of the network are arranged in a stack close to the output terminal, with the exception of a single 100-$\mu$fd. unit which is mounted right at the terminal end. In this case, series-resonated at 84 Mc., to reduce harmonic output in Channel 6, the only channel regularly receivable in the Hartford region at present. A better mechanical arrangement of the output-condenser stack would result if the CM-45 case style were used, but the CM-55 was the only kind we had at the time. The switch used with these condensers is the type that progressively connects all circuits in parallel, so that the capacitances are additive.

There is one safety precaution that should never be omitted with a pi-network output circuit, and that is to provide a d.c. path across the output connector. Although the antenna system may provide such a path, it is only common sense to make sure that it is built into the amplifier itself. Without it, the plate blocking condenser can break down and short-circuit, putting the full d.c. voltage on the hot r.f. output terminal, with any visible or audible evidence that anything has gone wrong. In this case a 2.5-mh. choke, RFC6, serves the purpose. Since the r.f. voltage is comparatively low, the choke has no effect on the regular operation of the amplifier. However, should the blocking condenser fail the plate supply will be short-circuited through the choke, and the operator can hardly fail to be aware that something unusual has happened.

Like practically all amplifiers we have built and used with beam tetrodes, this one had a v.h.f. parasitic oscillation at the beginning. The parasitic-suppression circuit used here was recently discussed in QST. It uses a small coil, $L_1$, and loading resistor, $R_1$, and resonates the plate-to-cathode circuit at about 110 Mc. with the plate tank condenser near minimum capacitance. The resonant frequency drops to about 100 Mc. with $C_3$ at maximum. The five one-watt resistors in parallel have sufficient wattage rating to carry the 28-Mc. current that necessarily flows through them. On the lower-frequency bands the dissipation is considerably less.

**TVI Measures**

Aside from using a series-resonated output condenser, $C_{4A}$, only negative measures were taken to reduce generated harmonics — that is, care was taken to see that harmonics in the TV range would not be built up by unwanted resonances, but there was otherwise no deliberate attempt to suppress harmonics by special circuits such as traps. The use of the MB-40L preclude using measures in the grid circuit such as were outlined in January QST. We planned to get adequate suppression through reducing radiation from the transmitter by good shielding and lead filtering, and by keeping the harmonics out of the antenna circuit by using a good low-pass filter.

This unit proved to be a good test of the efficacy of the by-passing and shielded-lead techniques described earlier. Every lead (with the exception of the high-voltage lead) was provided with a 0.001-$\mu$fd. disc ceramic condenser at each end. The tube socket is mounted just far enough above the chassis so that the ends of the shielded wire with its condenser spans the distance between the socket prong and a ground lug mounted on the chassis directly below the prong. The filament and screen leads are by-passed in this fashion, the shielded wires then running directly through small holes in the chassis to the underside. The disc condensers thus serve the double purpose of by-passing harmonics before they get into the shielded lead, and as normal circuit by-passes for the filament and screen. Below chassis, fairly long shielded leads are used to give additional attenuation of v.h.f. harmonics. The filament transformer terminals project through the chassis, and the leads to the primary are given the same treatment. The circuit diagram and bottom-view photograph show the details of the below-chassis wiring.

We have long since learned that this method of wiring, if it is backed up by adequate shielding of the r.f. circuits, will reduce harmonic currents on the external supply leads to such a low level that it is not worth while to bother with such devices as wavemeters for checking. The only useful check is with a TV receiver tuned to a signal harmonically related to the transmitter's

---

*Another common-sense precaution is to use a high-voltage fuse in the positive d.c. output lead, especially when the plate meter is installed in that lead. If the meter is connected in the filament center tap, it cannot be damaged by a short circuit on the plate supply, but of course in order to determine the plate input it will be necessary to measure the grid and screen currents separately.


(Continued on page 109)
Sweepstakes Trade Secrets

How the Champs Do It

BY RICHARD L. BALDWIN.* WI1KE

• With the Sweepstakes almost upon us again, you'll be interested in knowing how the winners do it. We asked several of them for the inside dope, and here's how they answered our questions.

What do you consider essential in the way of equipment?

A good stable receiver with plenty of bandwidth was considered a must, although there was some disagreement on the use of high selectivity. Some c.w. operators feel that too much selectivity causes them to miss calls that might otherwise result in points, while others feel that the higher selectivity more than makes up for possible missed calls by the elimination of repeats. It was felt that a calibrated receiver dial was a distinct operating aid. The transmitter should preferably be bandswitching and should require a minimum of retuning within the limits of each band. Some form of break-in operation was considered a must by all the c.w. operators, although one of them also favored the use of the transmitting antenna for receiving, with a manually-operated switch which could rapidly shift the antenna from transmit to receive.

What sort of an antenna system do you favor?

First choice appeared to be stacked rotary rhombics but since few of the fellows were able to arrange for such antennas, they settled for the best antennas that their locations would permit. The type of antenna depended on the location.

In the middle of the country simple long wires were favored, with high-angle radiation and not too much directivity. On the coasts, beams were the choice for 20 and 10 meters, with doublets or long wires high and in the clear for 80 and 40. As several of the fellows emphasized, the antenna system is mighty important, and it pays to have spent plenty of time in working out a good antenna system that will give you a consistent signal throughout the country.

Do you suggest any particular physical preparation so far as the operator is concerned?

Here's where there was the greatest divergence of opinion. Some intimated that the only thing they did in preparation was to stay sober the night before the contest. Others made a deliberate effort to exhaust themselves in the days prior to the contest, so that they would be able to sleep late the day of the contest and thus go into it refreshed and rested. Others suggest regular hours during the week preceding the contest. Nearly all emphasized that excessive eating and/or smoking will slow you down. Although the methods differed, the goal was the same in each case — to be rested and ready for action when the starting time of the contest rolled around.

What about operating aids, such as check-off lists, desk arrangement, log keeping?

In general, the high-scoring fellows were in favor of using some sort of a check-off list to reduce the possibility of "repeat" QSOs — many of them utilizing ARRL operating aid No. 6. Some of them used manila folders, ruled off in an appropriate number of columns for the various W, VE, and K call areas. Others used an indexed address book. Only one operator claimed that he didn't bother with a check-off list. Most of the fellows used the ARRL SS log sheets, keeping carbon copies for their own files. A neat operating position with plenty of elbow room, together with a comfortable chair and suitable lighting, was considered essential. The idea, of course, is to reduce fatigue as much as possible.

Do you concentrate on any particular band? How do you split your operating time?

Almost without exception the fellows favored working against an "average," with the idea being that whenever their QSOs-per-hour dropped below the goal they had set for themselves they'd either shift to another band or QRT until activity picked up a bit. The choice of bands to be used was determined largely by local conditions. One fellow reported that he monitored the bands regul-

*Assistant Secretary, ARRL

(Continued on page 114)
The Shunt “Selectoject”

Simplified Connection to the Communications Receiver

BY OSWALD G. VILLARD, JR.,* W6QYT, AND JOSÉ MIGUEL DÍAZ,** XEIRZ

This article describes a new and improved version of the “Selectoject,” differing from the original in that only one connecting lead to the associated receiver or audio amplifier is necessary to achieve either amplification or rejection of a particular audio frequency. Connection to the amplifier is made by wrapping a wire around the plate pin of a low-level stage, and by providing a common ground. No modification whatever of the wiring of the amplifier is required. Thus this model of the SOJ may be quickly connected to any existing unit — receiver, tape recorder, p.a. amplifier, or the like — without circuit change of any kind.

Here is the answer for those who had trouble connecting the original SOJ in series with the audio system of their Super Hlooper Mark VIII, with its special “infinite series” noise clipper circuits following the second detector. Here, too, is the answer for the man who dares not lower the resale value of his $500 receiver by chopping into its wiring.

The new SOJ also features “constant absolute bandwidth” operation in its boost position, which is desirable in order to minimize ringing when receiving c.w. In the reject position, use is made of “constant percentage bandwidth” operation which is desirable for rejecting heterodynes or beat notes in ‘phone reception because this method provides the narrowest obtainable “notch” and thereby removes as little of the desired intelligence as possible.

*Trutect, W6QYT; Department of Electrical Engineering, Stanford University, Stanford, Calif.
**Museo No. 10 — Colonia Chapultepec Polanco, Mexico 5, D. F.
3 O. G. Villard, Jr., “Independent Control of Selectivity and Bandwidth,” Electronics, April 1951, p. 121.
4 O. G. Villard, Jr., “The C. W. Man’s Selectoject,” QST, May 1951, p. 84.

Principles of Operation

The basic idea behind the operation of the shunt SOJ will be briefly set forth. Those interested in design information and further details will find a complete story in reference 5. Fig. 1 shows an ordinary one-stage R-C audio amplifier, which could be the first audio stage of a communications receiver, across whose output terminals the shunt SOJ is connected.

![Fig. 1 — Block diagram, showing how shunt SOJ is connected to existing low-level audio amplifier.](image)

Now it is well known that such an R-C amplifier can be represented, insofar as a.c. quantities are concerned, by the equivalent circuit shown in the left-hand half of Fig. 2. The input, in reality connected to a high-impedance grid and therefore essentially floating above ground, is shown in the diagram as a wire terminated in midair. The action of the amplifier may be explained in terms of an equivalent generator acting in series with an equivalent plate circuit resistance. (The voltage of this generator is, of course, directly related to the voltage applied to the grid of the tube.)

The new Selectoject requires no modifications whatever in the wiring of the receiver to which it is connected. This model, built in a small sloping-panel cabinet, features constant absolute bandwidth in the boost position for c.w. selectivity, and constant percentage bandwidth in the reject position for eliminating an interfering heterodyne.

QST for
The shunt SOJ essentially consists of another one-stage audio amplifier connected in parallel with the first, as shown in the right-hand half of Fig. 2. This SOJ amplifier may be represented by the same equivalent circuit. For the moment, the question of where the SOJ amplifier’s grid signal comes from will be ignored. Let it be assumed that the SOJ’s equivalent generator has a voltage of the same (or the opposite) phase as that of the amplifier’s equivalent generator. These two situations happen to be the ones which are of importance in practice. The alternating voltages in the circuit can then be replaced for the sake of convenience by d.c. voltages, and the generators assigned polarities just as if they were d.c. generators.

Suppose further that the equivalent voltages $e_1$ and $e_2$ are equal, and that the equivalent resistances $R_1$ and $R_2$ are equal. (This can always be arranged, if desired.) If the generator polarities are opposite, as indicated in the figure, a little thought will show that the output voltage $e$ will then be zero. The generators are in series, and a current will be flowing through the resistors, but the two resistors taken together form a voltage divider, and their midpoint is at ground potential. Since there is no voltage across the amplifier’s output terminals, they could be short-circuited without changing currents or voltages in any way. So far as the amplifier can tell, connection of the SOJ disposed as shown is the equivalent of placing a short circuit across the amplifier’s output terminals.

If the resistors $R_1$ and $R_2$ are not equal, it is still possible to cause the net output voltage to be zero, by adjusting the relative magnitude of the two generator voltages. Thus if $R_2$ were twice $R_1$, the output null could be restored by making $e_2$ twice as large as $e_1$.

Fig. 3 shows the opposite situation, where the two generators are in phase with each other. If both generators and resistances are equal, the output voltage will be the same whether the SOJ is connected or not. However, if the resistances are equal and $e_2$ is made much larger than $e_1$, the output voltage will be greater than what would exist if the SOJ were not connected.

Now comes the question of providing the SOJ tube’s grid with a suitable input voltage, so that the right-hand equivalent generator of Fig. 2 will have a voltage of the correct magnitude and phase to cause a null or boost. It might at first seem hard to find a usable voltage when a null is to be produced, since the object is to cause the amplifier’s output voltage $e$ to disappear. Fortunately, even when $e$ disappears there is still a current flowing around the loop, and a voltage proportional to this current ($e_K$) can be developed across resistor $R_3$ in Fig. 4. Note that $e_K$ is available inside the SOJ. This voltage, properly amplified, given the correct phase, and fed back to the...
SOJ tube's grid, will serve to make the equivalent generator voltage \( e_2 \) have just the right value to cause \( e \) to disappear and thus produce a null. Furthermore, by a simple circuit change we can make \( e_2 \) of the same phase as \( e_1 \), as in Fig. 3, thus making possible a "boost."

**Practical Circuits**

Fig. 5 shows how the SOJ's tube (V1) is connected to the amplifier in practice. To produce a null, the cathode voltage \( e_2 \) in Figs. 4 and 5 is amplified without phase change and applied between the grid of V2 and ground. This grid-to-ground voltage will be called \( e_a \).

Since it is desired that the null occur at only one frequency, the amplifier connecting \( e_2 \) and \( e_a \) must be frequency-sensitive. It is convenient to make the frequency-sensitive portion of this circuit a variable all-pass R-C phase-shifter as in the original Selectoject. Fig. 6 shows the preferred arrangement. A complete schematic of the SOJ so connected as to produce a null is shown in Fig. 7. V1 in this circuit provides isolation and phase reversal.

When the SOJ is used to produce a null, an important point is to keep its insertion loss low. This is done by making the plate resistance of V1 in Fig. 5 high, and likewise \( R_L \). Connecting the SOJ then affects the gain of V1 only to a minor extent, at frequencies far from that at which the null occurs.

In order to produce a boost, the frequency-sensitive amplifier connecting \( e_k \) and \( e_\alpha \) in Fig. 5 may be reconnected as in Fig. 8. This amplifier must now produce a 180-degree phase shift at the boost frequency; \( V_2 \) is then regenerative. A tube such as V2, having a selective, regenerative feed-back circuit, will impart its selective characteristic to another amplifier when connected in shunt with it as shown in Fig. 8. Only two connections need be changed to transfer from the circuit of Fig. 7, which gives a null, to that of Fig. 9, which gives a boost. The gain-controlling potentiometer changes from a "null depth" control to a "peak height" control.

A preferred circuit combining these functions, and incorporating two gain-controlling potentiometers for convenience, is shown in Fig. 10. The actual phase-shifting arrangements are not shown, because a choice is available depending on the desired function, cost considerations, etc.
Three possible choices are shown in Figs. 11, 12, and 13. In each of the three alternatives, the appropriate terminals are labeled so as to correspond to the letter terminal designations in Fig. 10.

Fig. 11 shows the simplest phase-shift circuit, using ganged 5-megohm linear potentiometers as the frequency-controlling elements. The 120K resistor is provided to limit the highest "resonant" frequency to 6600 cycles. The over-all characteristic of the shunt SOJ using this phase-shift circuit will be of the constant- percentage-bandwidth type, for both boost and reject positions. The low-frequency limit of response is 100 cycles.

When using the shunt SOJ for heterodyne elimination, a null circuit having constant percentage bandwidth is best because it takes the smallest slice out of the speech spectrum in the process of eliminating a given tone. A c.w. signal, however, has a definite bandwidth which must be passed as in ordinary s.m.m. if the keying intelligence is to be preserved. In boost operation, with a constant percentage bandwidth, it is found that at the lower audio frequencies (below 1000 c.p.s) the effective bandwidth is too narrow to pass the c.w. sidebands when the selectivity is made reasonably high. Hence it is desirable to use the constant-absolute-bandwidth circuit for c.w. This circuit makes possible a considerable increase in the effective selectivity obtainable for a given amount of ringing. This method of operation is provided for in Figs. 12 and 13; by opening or closing the switches, either type of bandwidth may be had. Note that these switches may conveniently be ganged with the boost-reject switch.

Fig. 12 uses readily-available parts throughout. Closing the switches gives constant-absolute-bandwidth operation. The frequency range obtainable is then slightly reduced, being 300-6000 c.p.s. These values were arbitrarily chosen, on the theory that audio tones lower than 300 c.p.s are seldom used for c.w. reception. The constant percentage bandwidth (switches open) frequency range is identical to that of Fig. 11, namely 160-6600 c.p.s.

The use of linear potentiometers introduces some crowding at the high-frequency end of the frequency scale. This comes about because resistance is directly proportional to rotation, and frequency in turn (for constant percentage bandwidth operation) is inversely proportional to resistance. At the high end, then, a small change in resistance brings about a large change in frequency and crowding occurs. This situation can be greatly improved by the use of standard audio taper potentiometers whose resistance variation is roughly inversely proportional to rotation. The highest-resistance dual potentiometer having this taper that the authors could locate (3 megohms) is made by IRC and is available from the factory on two-weeks delivery. This potentiometer gives perhaps the most satisfactory over-all performance of all. It is incorporated in Fig. 13 which is otherwise similar to Fig. 12. The frequency range is now 300 to 6000 c.p.s for constant absolute bandwidth, and 100 to 6000 c.p.s for constant percentage bandwidth.

The frequency range covered by each circuit depends on the element values and may be readily altered if desired.

In the circuit of Fig. 10, the component values are not critical with the exception of the 4K and 8K resistor pairs, which should be matched as

![Fig. 9 — Actual circuit of shunt SOJ for boost operation.](image)

![Fig. 10 — Complete schematic, shunt SOJ (see Figs. 11, 12, and 13 for choice of phase-shift circuits).](image)

October 1952

21
closely as possible. The 1K resistor in series with the cathode resistor of $V_A$ has been found to improve the constancy of gain at the higher frequencies. It is needed only for boost operation and for the circuits of Figs. 12 and 13.

Performance of Model

An experimental model was built using the phase-shift circuit of Fig. 13 and the amplifier circuit of Fig. 10. For convenience, a separate selenium-rectifier power supply (see Fig. 14) was incorporated. The shunt SOJ draws approximately 7 ma at 150 to 200 volts, so can be powered from an existing receiver or amplifier, if desired. Whatever power supply is used must have a large (order of 20 µF) filter condenser directly across its output terminals. This is important.

The performance of this model is illustrated in Figs. 15 and 16. The equivalent internal resistance of the amplifier across which the SOJ was connected was 110,000 ohms. In Fig. 16, at the particular setting of the gain control shown, the response at the resonance peak remained constant to within 0.5 db, as the resonant frequency was varied through the 300-6000 c.p.s range. The shunt SOJ can be made to provide extra gain in the boost position, though its use on a zero-insertion-loss basis is satisfactory.

The reject position, with this circuit, entails an insertion loss of about 5 db. This loss can always be compensated for by increasing slightly the gain of the audio system of the receiver or amplifier.

The performance of the shunt SOJ will vary slightly depending on the internal impedance of the circuit to which it is connected. In the case of a typical communications receiver such as the NC-57, the equivalent internal impedance at the plate pin of the first audio tube (a 6SL7) is of the order of 82K. For most receivers this impedance will vary from 50K to about 200K. The model of Fig. 10 will give satisfactory performance, on both boost and reject, over this range of impedances.

The boost curves of Fig. 16 illustrate the fact that the absolute bandwidth of the boost characteristic is substantially constant with frequency.

---

**Fig. 11** — Simplest phase-shift circuit (constant percentage bandwidth, for both null and boost).

**Fig. 12** — Phase-shift circuit giving choice of constant percentage and constant absolute bandwidth operation.

**Fig. 13** — Same as Fig. 12, but using R-RC standard audio-taper dual potentiometers. This gives less crowding of the frequency scale at the high end.

**Fig. 14** — Compact power supply suitable for circuit of Fig. 10.
Fig. 15 — Frequency response of amplifier with shunt SOJ, for three different settings of the null frequency. Equivalent internal resistance of source, 0.11 megohm; null depth control set for best rejection at 4000 c.p.s.

Fig. 16 — Frequency response of amplifier with shunt SOJ, for three different settings of the boost frequency. Conditions same as in Fig. 15.

Should a narrower passband be desired, it can be obtained by increasing the boost gain. Excessive gain will, of course, produce oscillation. However, a gain of some 20 db over the response with the SOJ disconnected can be obtained.

The reject gain control is located at the back of the chassis, and can be adjusted for best rejection at some convenient audio frequency with a screwdriver when the shunt SOJ is first connected to an amplifier or communications receiver. It will normally not require any further adjustment.

The boost gain is located on the front panel together with the ganged tuning potentiometers, and so can be readily adjusted to any desired value of gain and selectivity.

The switches of Fig. 13 have been incorporated in the boost-reject switch.

In constructing the unit no special precautions are necessary other than to minimize hum, both from the power supply and by direct pick-up from the filament leads, as much as possible. It is suggested that the tube types and component values shown in Figs. 10, 11, 12, and 13 be adhered to as closely as possible. It is desirable to provide good filtering in the B supply and to twist the filament leads and place them close to the chassis. When these precautions are observed, the noise and hum voltage at the plate of $V_2$ (see Fig. 10) of the model illustrated is in the order of 0.05 volt. With a signal voltage of 1.0 volt (which is close to the maximum that can be handled by the unit), the signal-to-noise ratio is 26 db., which is quite sufficient for ordinary purposes.

The underside view of the chassis shows that the wiring is not very complicated. The potentiometer mounted on the upper wall of the chassis is the "reject" gain control, which needs to be set only once.

October 1952
A B.F.O. for Your Mobile

Extending the Capabilities of a Converter Receiving Installation

BY JOHN HUNTOON,* WILVQ

When a fellow goes mobile these days, for receiving purposes the custom seems to be purchase or construction of a converter that covers one, two, maybe three bands. Frequency coverage of the boughten jobs is obviously based on voice work, which is sound enough with perhaps 99 44/100% of mobile operation taking place in the 'phone bands. However, most converters cover the entire 20- and 10-meter bands, and some even include the whole 3500-ke. band, instead of just the 'phone segments. But the non-voice coverage doesn't do any good because the trouble is there ain't no b.f.o. Fortunately, it's a mighty simple job to add one to your installation. All you need is a small oscillator at the automobile radio intermediate frequency, which will be around 260 or 265 kc. Such a unit is described herein.

A first idea to use pies from r.f. chokes for the inductances was discarded when thumbing through a parts catalog disclosed a b.f.o. unit which seemed to be ideal for the purpose, requiring only a bit of capacity added to bring the frequency down to that desired. It consists of the two necessary coils for an oscillator with a tickler circuit, a frequency-setting padder, and a small-capacity vernier control with knob, the whole thing in a medium-sized shield can. A miniature triode such as the 6C4, a switch, and a couple of condensers and resistors complete the job.

Building a suitable sub-base assembly was the subject of several sheets of pencil doodles until the obvious answer dawned — let the shield can be the chassis. By cutting down the length of the wood-dowel support for the pie-wound coils and mounting most of the miscellaneous components on the tie points for the coils, there is room for the tube socket at the lower end of the shield. The whole job can then be mounted right on the case of the automobile receiver, as the picture shows. The fixed and variable plate resistors are mounted separately on a small bracket which can be screwed to the dash or converter case for convenience in control.

Gain Control

The variable plate resistor works — like a charm — as an r.f. gain control. Normally there would be difficulty in reception of c.w. signals because the usual converter-auto receiver system runs with the front end wide open and the a.v.c. would kick the gain of the system all over the place in accordance with the keyed characters, especially on stronger signals. Of course, feeding the 202-ke. signal from the oscillator into the diode detector causes, like any other signal, a rise in the a.v.c. voltage and a consequent reduction in gain. So the variable plate resistor, by controlling delivery of oscillator power, acts as a gain control for the receiver. On weak signals the control is turned to maximum resistance, producing minimum oscillator power and minimum a.v.c. action, so that the gain of the receiving system is high; at the same time, b.f.o. injection is low. Cutting down the resistance produces more power, more a.v.c. action, and thus a reduction in gain, which is ideal for stronger signals. Only a slight change in beat note occurs over the range of the variable resistor.

Construction

The circuit is standard. The photograph shows essentials of layout and wiring. To reduce the size of the coil mounting, remove the assembly from the can and the wood dowel from the ceramic mounting for the padders. Then remove the mounting bolt from the dowel; this is done by a

QST for
pair of long-nosed pliers turning against the beads on the threaded shaft, in this case a left-hand thread. Use a coping saw to cut off approximately 9/16 inch of dowel; then drill the hole a bit deeper to reinsert the threaded bolt as if it were a self-tapping screw (left-hand thread, remember!). In all this operation be careful not to break the fine wire of the coil leads. After reassembly, check the travel of the screw on the end of the trimmer shaft to make certain it doesn’t strike the pie- windings when turned fully in; if it does, simply snip off the end with a pair of side cutters—it’s too long anyway.

The grid resistor and all condensers except that for coupling are mounted on the cut-down coil assembly. Use shielded wire for the output; soldering the end of the braid to a suitable ground point in the can provides adequate support for one end of the coupling condenser—the other of course going to the plate pin of the tube. To ensure good contact with the auto receiver case for heater power, put a soldering lug on one of the can mounting bolts and solder it to the grounded heater pin.

**Frequency Adjustment**

The catalogs and data sheet on the b.f.o. coil say the range is 200–650 kc. Don’t you believe it! By the grace of the grid-cathode capacity of a 6C4 and the trimmer condensers screwed down tight, the lowest this one could be made to reach was 410 kc. It’s a simple matter, of course, to bring the frequency down by hanging across the grid circuit coil a fixed condenser of suitable capacity. It ought to be the same (330 μfd.) on any unit, but it would be worth while to check before buttoning up the job completely. After you complete the coil assembly, wire it with temporary long leads to the tube socket so you can make frequency checks with the coils inside the can but without having to mount the tube socket. The simplest measuring system is to listen for harmonics of the unit on a communica-

tions receiver covering the broadcast band, with its b.f.o. on.

By the way, at one point in the range of the unit you’ll hit the i.f. of your communications receiver, but that is easily identifiable since it is not tunable at the receiver.

Feed the unit’s output, through C₅, to the antenna post of the receiver. Tuning the receiver dial will take you through a number of birdsies, some loud and some weak; those weak ones are odd beats and should be disregarded. The genuine harmonics will have several times the volume of the miscellaneous birdsies; the S-meter will show them up plainly. Log two adjacent loud beats; the difference in kilocycles on the b.c. receiver dial will be the fundamental frequency of the unit. Adjust the trimmer on the b.f.o. unit until the difference is 262 kc., more or less. If tightening the screw all the way down won’t reach that low a frequency, of course you’ll have to add a larger capacity to your grid circuit.

**Installation**

Installation is comparatively simple. This version used one of the numerous ventilation holes in the automobile radio case as one mounting, requiring the drilling of only one new hole. If you’re lucky, you may not have to drill any new ones. Before you pick a location on the case, however, make certain you have inside access to the point where you have to apply the washers and nuts, and check clearances under the dash to make sure you can get the auto radio back in again!

Be especially careful in wiring the b.f.o. unit into the automobile radio. Routine methods are okay for the heater and power leads, but take care where you run the shielded wire for the output;

(Continued on page 116)

The innards, ready for temporary connection to the tube and power leads for a frequency check, which should be made with the coils in the shield can. When this is completed, the tube socket is mounted and wired. The coupling condenser and its shielded lead await their turn, last in the assembly process. The control unit is shown at the left.
What Price Precision?

The Economics of Frequency Standards
In Two Parts—Part II

BY GEORGE X. M. COLLIER,* WA8EG

This section describes the development of a standard to end all standards, and deals with the trials and tribulations encountered in getting the thing built and operating properly. The work was casually accomplished over the past three years, and the instrument produced, while composed of commercial components, is capable of day in and day out stability equal to that of WWV as received. It was felt that such a unit was worth the effort since it more or less eliminated the necessity for continuous checks against WWV— which frequently is unusable for days at a time,—and allowed a degree of independence not heretofore realized. Further, even since the author tied for second place in the first ARRL Frequency Measuring Test, way back in 1931, he has been slightly "touched" on

100 kc. to between 0.08 and 0.35 part per hundred million per day, at the end of a year's operation. Also contained in this bulletin was a bibliography giving a list of publications (mostly I.R.E. Proceedings) dealing with the basic design of the unit. Further, along about this time, General Radio came out with a frequency standard capable of one part per hundred million, and gave fundamental information concerning it in the General Radio Experimenter for April, 1944 (J. K. Clapp, "A Bridge-Controlled Oscillator".).

Naturally, the possibility of such accuracy couldn't be ignored, so a campaign of investigation was immediately inaugurated. The local Graybar representative advised he would be delighted to furnish the Western Electric unit at about $1700 a throw, and how many were wanted? After a hefty double take, he was advised that this ham station couldn't afford no such item, but how much "costum" just the rock? He advised the rock wasn't for sale sans standard.

General Radio was next interrogated relative price, and they quoted in the neighborhood of $900 for their unit, but would consent to part with a crystal, a second-harmonic X-cut bar, at about $200 per each— not too bad for a really precise item, but still well beyond the pocketbook here. Billey also came out with a good standard about this time, but they apparently were not interested in selling the crystal as a separate item either.

It therefore looked as though it would be necessary to build a standard using available components, and see how it came out. A goal of one part per ten million was set as adequate, and this figure has been exceeded considerably.

The Meacham Oscillator

Perusal of available literature showed the basic circuit work as being accomplished by Meacham in 1933, for a GT-cut crystal, then recently developed by Bell Telephone Laboratories. A block diagram of this circuit is shown in Fig. 4, and all recent frequency standards

* 1816 Third Ave., South, Anoka, Minn.

2 Now available only as a component of the General Radio primary frequency standard.


Fig. 5 — Circuit diagram of the W6EG 100-kc. frequency standard using the Meacham oscillator circuit.

C₁ — 1-mfd. paper in metal can, 600 volts.
C₂, C₇ — 0.5-mfd. paper in metal can, 600 volts.
C₃ — 250-mfd. variable.
C₄ — 300-mfd. silver mica, 5 per cent tolerance.
C₅, C₆ — 0.02-mfd. mica.
C₇, C₈ — 0.01-mfd. mica.
C₉, C₁₀ — 0.5-mfd. paper tubular, molded case.
C₁₁ — See Note 1 below.
C₁₂ — 10-mfd. oil-filled paper, 450 volts.
C₁₃ — 50-mfd. electrolytic, 50 volts.
R₁ — 220 ohms, 2 watts.
R₂ — 47,000 ohms, 2 watts.
R₃, R₁₀ — 390 ohms, 2 watts.
R₄ — 1 megohm, 2 watts.
R₅ — 560 ohms, 2 watts.
R₆ — 2,000 ohms, 2 watts.
R₇, R₈ — 2700 ohms, 2 watts.
R₉ — 680 ohms (see text).
R₁₀ — 2500-ohm carbon potentiometer (see text).
R₁₁ — 370 ohms (see text).
R₁₂, R₁₃ — 4700 ohms, 2 watts.
R₁₄ — 15,000 ohms, 2 watts.
R₁₅, R₁₆ — 5000 ohms, 25 watts.
R₁₇ — 100 ohms, 2 watts.
R₁₈ — 400 ohms (oven heater).
R₁₉ — 10,000 ohms (see Note 3 below).
L₁ — 0.4-mh. iron-core choke.
L₂ — 6-mh. air-core choke (see text).
L₃, L₄ — 10 henrys, 200 ma.
D₁, D₂ — Copper-oxide instrument rectifier.
F₁, F₂ — 1-amp. 250-volt fuse.
L₅, L₆, L₇ — Neon bulb, Type NE51.
K₁, K₂ — 60-degree mercury thermostat.
K₃, K₄ — Single-pole normally-closed relay, 1000-ohm 1-ma. coil.
Lamp — 115-volt 6-watt lamp.
M₁ — 0—200 d.c. microammeter.
Rect. — Copper-oxide bridge.
RFC — 63-mh. r.f. choke.
S₁, S₂, S₃ — Double-pole single-throw toggle.
T₁ — Power transformer, 600 v. o.t., 100 ma; 5 v., 2 amperes; 0.3 v., 2 amperes.
T₂ — Film transformer, 5.4 v., 0.25 amp.

Note 1 — C₉ composed of ten 100-mufld. silver-mica condensers with a shorting switch that progressively connects them in parallel.
Note 2 — All resistor tolerances 10 per cent.
Note 3 — Crystal chamber heater; 2000 ohms on chamber proper, with 10,000-ohm slider-type resistor, adjusted to 8000 ohms, in series, mounted externally on back of oven.

utilize variations of it. The circuit works as follows:
The tube is operated as a Class A amplifier with a voltage gain of about 1000. This amplifier must be stable, and show no tendency to self-oscillation. The crystal forms one leg of a Wheatstone bridge, and operates at series resonance. The lamp forming the fourth leg of the bridge is a temperature-sensitive device, giving substantial variations in resistance as the filament temperature varies. The entire bridge is so proportioned that with 1.23 volts applied between B and D, it comes almost, but not quite, to balance.

Now, if the output of the amplifier is applied to corners B and D to drive the bridge and the input is connected to corners A and C as the bridge detector, and the phasing of these connections arranged so the amplifier will be regenerative, the thing will oscillate crystal-controlled, and the bridge will limit the amplitude of oscillation. If the resistance of the lamp becomes equal to R₂, when the circuit is oscillating, oscillation will cease because the bridge will come to balance and no excitation will be applied to the grid of the tube. However, if R₂ is made about 2 per cent higher than the resistance of the lamp, the unit
will continue to oscillate in good shape. $R_4$ is made equal to the series resistance ($R_s$) of the crystal, and its value is something of a joke. It can be determined, however.

**Crystal and Circuit Considerations**

To utilize the circuit fully, it becomes necessary to go back to crystal cuts and the behavior of crystals in general. As we all know, a crystal approximates a very good tank circuit, how good being determined by the $Q$ of each individual rock. Further, as in the case of tank circuits, a crystal possesses points of both parallel and series resonance. Most power oscillators with which amateurs are familiar operate the crystal at parallel resonance, and utilize the point of maximum impedance. The Meacham circuit, however, operates the crystal at series resonance and uses the point of lowest impedance. Parallel and series resonance in a crystal do not occur at the same frequency, so it becomes apparent that a rock for use in a Meacham circuit must be ground to give 100 kc. at the series-resonant point.

Further, at series resonance, the effective resistance, $R_{eq}$, in series with the crystal reactance, can lie in a wide range of values, depending on the crystal cut, but in each case it also depends on the crystal mounting. In GT-cut crystals this $R_{eq}$ can run as low as 25 or 30 ohms, in a crystal having a $Q$ of 500,000, to 400 ohms or so in lower-quality units. DT-cut crystals don’t run so low, their series $R_{eq}$ usually falling between 500 and 3000 ohms. The $Q$ of DTs, even the best units, is not so high as that of GT cuts either. The $R_{eq}$ of AT-cut crystals at 1 Mc. appears to run so low that building a bridge for them is impractical, hence we stick to the lower frequencies for Meacham circuits.\(^2\) From the above, it would appear that a special crystal is needed for a Meacham circuit. This is so, but crystal manufacturers produce lots of series-resonant rocks and will supply them if asked.

In getting to the practical aspects of this situation, the designer of a Meacham standard

\(^2\) Another consideration is that stray reactances become increasingly important as the frequency is raised, and it does not appear practical to build a bridge in which all arms are truly resistive at frequencies as high as 1000 kc.

will first have to determine the crystal cut he is going to use, and choose his circuit variation accordingly. Fig. 5 shows a very satisfactory circuit which, while best suited to DT-cut units, can be utilized with all but the best GTs provided a 6B4G or some other low-impedance tube is used as a phase inverter. Further, with GT cuts the lamp must be of quite low resistance. The standard Western Electric type A2 or K1 tungsten-filament telephone-switchboard lamps are possibilities. Also, the resistor $R_{33}$ (corresponding to $R_3$ in Fig. 4) will have to be proportioned to the resistance of the lamp with approximately 0.75 volt on its filament. Assuming the lamp resistance to be 100 ohms at this point, $R_1$ will of course then come out at 102 ohms. In any case, the resistance of the lamp with 0.75 volt on its filament should be equal to or less than the series $R_3$ of the crystal.

The transformers shown in Fig. 4 are a bit tricky to make, and should not be attempted unless one is content to experiment.

Regardless of the circuit used, it is imperative that stray capacities to ground be kept to a minimum, as phase displacement through the amplifier must be kept down if satisfactory operation is to result. Further, the plate tank circuit should be pretty good, with a low resistance coil being used for $L_4$.

**The W0EG Standard**

The W0EG standard was developed from the article in the *General Radio Experimenter* and uses the circuit shown in Fig. 5. The 6AG7 tube operates Class A. One half of the 6SN7 is a phase inverter for driving the bridge, the other half being a cathode follower isolating the output of the oscillator from its load. The 6H6 operates in conjunction with meter $M_1$ as a rudimentary vacuum-tube voltmeter used to indicate oscillation and output. This meter is necessary because no plate current variation occurs when oscillation takes place.

The bridge is composed of $R_{1a}$, $R_4$ and $R_{1b}$, the lamp, the crystal, and its associated frequency-correcting circuit $L_2$, $C_3$, and $C_4$. The amplifier plate voltage is regulated by VR tubes, and the phase inverter and cathode follower are supplied
from separate regulator tubes. The rectifier and relay set-up, supplied from $T_2$, are the control relays and thermostats associated with the oven, and will be discussed later.

All r.f. resistors, except $R_5$, $R_9$ and $R_{10}$, are Ohmite 2-watt Little Devils. $R_5$ and $R_9$ are temporary, and used to determine the series $R_n$ of the crystal. Once the proper value has been found they may be replaced with fixed wire-wound units. $R_9$ is an Ohmite type $AB$ 2500-ohm potentiometer, and $R_8$, temporarily, can be another Little Devil.

$R_{11}$ is a bifilar wire-wound bobbin, built from low-temperature-coefficient wire. A good cracked carbon resistor could be used here, if the proper value is available. Further, any good non-inductive wire-wound resistor of 370 ohms plus or minus 1 per cent will work. Physically this resistor should be as small as practical, and possessed of a low temperature coefficient. It carries very little current, so a one-watt unit is more than ample. This resistor and the lamp are the ratio arms of the bridge, and it is important that $R_n$ be stable over a wide temperature range. The lamp is a standard 6-watt 115-volt tungsten-filament candelabra-base pilot light, soldered into the circuit to eliminate the possibility of high-resistance contacts.

It is important that very good condensers be used for $C_1$ and $C_{10}$, as these units feed r.f. to be bridge, and also block plate voltage from ground. They should not be metal cased, nor should they be mounted close to a chassis. Sangamo Redskin 0.5-µfd. 600-volt units have worked out very well.

The final value of $C_4$ will be determined by the actual frequency of the crystal used. $C_4$ can be replaced by silver-mica fixed values, once the proper amount of capacity has been determined.

**R.F. Coils**

While comparatively few r.f. coils are used, they play an important part in proper operation of the unit. RFC1 is an ordinary universal-wound 65-millihenry choke, the value of which is not too critical. Most any air-ooed unit of 40 to 70 millihenrys will work.

$L_1$, the tank coil for the amplifier, is the most important item, and it is essential that the $Q$ of this unit be as high as is practical. The coil used in the W6BG standard was pie-wound on a four-section wood bobbin, with 7-38 Litz wire. 383 turns of which were evenly distributed among the four winding slots in the bobbin. The bobbin was then mounted in a Lenkurt Electric type P1750-12A powdered iron core, which completely encloses the winding and produces a coil having an unloaded $Q$ of about 300 at 100 kc.

It is believed that the r.f. chokes contained in the low-frequency tuning units for BC-375 transmitters would be satisfactory as a substitute for the powdered-iron coil. These r.f. chokes have an inductance of 6 millihenrys, are approximately 1½ inches in diameter and ½ of an inch thick. They are wound with No. 30 B & S gauge cotton covered wire, and should have a $Q$ of approximately 75 at 100 kc. If this coil is used, appropriate increases in $C_1$ will be necessary to tune it to 100 kc. It is doubtful if the small pie-wound chokes will be good enough for use at $L_1$, but 6-4. mh. units with iron dust cores might be satisfactory.

$L_4$ is one of the before-mentioned 6-mh. r.f. chokes, and a pie-wound unit probably will work here.

**Assembly Notes**

Beyond the above, nothing unusual entered the construction picture. The entire circuit was assembled on an aluminum plate 5 inches wide and 10 inches long. All resistors and condensers were mounted on lug strips placed at right angles to the plate, and all components in the amplifier and phase inverter clear all chassis metal by at least ½ inch. Condensers $C_7$ and $C_{13}$ are mounted in holes bored through one of the lug strips and are sealed to it with polystyrene cement. They clear all chassis metal by at least ½ inch. No special precautions were taken with the bypass condensers $C_9$, $C_{12}$ and $C_{17}$, except to see that their metal containers were well grounded.

As in all high-gain amplifiers, considerable care was taken in the separation of input and output circuits. Even so, one crystal was wrecked by self-oscillation of the amplifier, and some juggling of components and lead placement was necessary before it became completely clean. All filament and plate leads were run in shielded wire, with the shield well bonded to the mounting plate, and extending to near the cold end of the

---

**October 1952**
first r.f. component. The 6AC7, it must be remembered, is highly power-sensitive, and it doesn't take much skullduggery at its grid to produce quite a rumple at the plate. As originally set up, \( R_3 \) was fastened directly to the mounting plate, which procedure was a major contribution to self-oscillation. Insulating this unit from ground eliminated the last vestige of self-oscillation. At first glance it would seem that a clean amplifier, operating at 100 kc., would be a cinch. However, when one considers the excellent efficiency realized at this frequency, it isn't too hard to see where difficulties may arise. They did!

The crystal and its frequency correcting circuit, \( LC_6C_{10} \), were all mounted in the temperature chamber. Connections to the 6AC7 grid and to \( C_{10} \) were made through leads approximately 6 inches long, spaced well away from ground and from all plate-circuit components. The vacuum-tube voltmeter, since it tells so much about the operation of the unit, was included as a permanent part of the assembly.

### Adjusting the Oscillator

To set the circuit into operation, assuming everything is ready to go, the amplifier clean, and the crystal at proper operating temperature, proceed as follows:

1. Short-circuit the assembly \( LC_6C_{10} \), thus running the crystal directly to the 6AC7 grid.
2. Set \( R_3 \) at the minimum-resistance position.
3. Set \( C_5 \) at approximately half scale.
4. Turn on the filaments and observe \( M_1 \), which should soon show the contact-potential current in the 6H6, and read around 10 microamperes.
5. When the filaments are hot, turn on the plates, observing \( M_1 \) as you do. If \( M_1 \) jumps off scale and stays there, cut the plate quick. Then reduce the value of \( R_3 \) by 50 per cent and try it again. Such a jump is hardly likely with DT-cut crystals, but it can happen. If \( M_1 \) jumps off scale, fails to near minimum, and then starts to pump, waving between minimum and 150 microamperes or so, it shows intermittent oscillation, with the bridge coming to balance, starving the 6AC7 grid. If nothing happens in \( M_1 \), everything is still normal.
6. The pumping described above is a normal function, and shows everything to be almost, but not quite, right. When it occurs, rotate \( C_5 \) slowly in both directions, looking for a setting at which the pumping is minimum. If such a setting cannot be found, increase \( R_3 \) slightly and keep rotating \( C_5 \). Eventually proper settings of \( C_5 \) and \( R_3 \) will be found, and \( M_1 \) will come to rest at around 80 microamperes. When this condition is reached, leave \( R_3 \) alone and rotate \( C_5 \) in either direction until \( M_1 \) indicates unstable operation. Record this dial reading and repeat the process in the opposite direction. Then set \( C_5 \) midway between the two observed readings. Now, decrease \( R_3 \) till pumping barely starts, then increase its value till pumping just stops. At this point, the sum of \( R_3 \) and \( R_4 \) approximates the series \( R_4 \) of the rock. Increase \( R_4 \) till \( M_1 \) reads 85 to 95 microamperes. If pumping won't stop at 80 to 90 microamperes, keep increasing \( R_4 \) until it does stop. \( R_4 \) controls the drive to the crystal. If \( M_1 \) won't stop pumping until it reads 160 microamperes or so, a weak crystal or a defective 6AC7 or 6SN7 is indicated. If the crystal is weak, it may not be possible to go below this high-output value and still get stable operation. One rock at W9EG stopped off at 180 microamperes, and operated okay for about a year. It then gave up the ghost.

7. If, in Step 5, there is no change in \( M_1 \), the value of \( R_3 \) and \( R_4 \) is so low that oscillation can't start. The procedure is to keep rotating \( C_5 \) as \( R_3 \) is increased. If this is done, pumping of \( M_1 \) will soon start, and adjustment is then the same as (6) above.

8. If full-scale deflection of \( M_1 \) can't be eliminated by adjustments of \( R_3 \) and \( R_4 \), self-oscillation is indicated, and the crystal is taking an awful beating.

9. Now cut plate voltages. \( M_1 \) should drop to the contact-potential current value. Reapply plate voltage and observe \( M_1 \), which should first jump off scale, and then fall to near the operating value, where it will pump slightly and at a decreasing rate until the bridge reaches equilibrium, and \( M_1 \) stands still.

That's all there is to it. Let the thing run for about a month, adjusting \( R_3 \) to produce the selected operating value of \( M_1 \) as it falls off or increases due to aging of the crystal and circuit. If operation at the selected reading of \( M_1 \) becomes unstable, increase \( R_3 \) until stable operation, no pumping, again occurs. The series \( R_4 \) of the rock usually increases as it ages in.

As a check on proper operation, put the output of the standard, which is about 2 3/4 volts, into the Y-axis amplifier of a good scope, and adjust the X-axis sweep to 25-35 kc. With this set-up a direct view of the output is obtained, and it should be a perfect sine wave. If anything else shows up, the amplifier is taking off on its own. Slight irregularities can sometimes be eliminated by adjustment of \( C_5 \) for the best waveform, disregarding the previous setting.

Now, it seems that everything good must have some drawback, and we find the biggest one in this lark-up to be lack of harmonics. If the oscillator is properly adjusted, the harmonic content of the output voltage is so low that difficulty will be experienced in hearing even the third harmonic. Since this is so, it becomes necessary to feed the standard into some kind of a harmonic generator, if it is to be used for frequency-checking purposes. This is a must.

### Adjusting to Frequency

When a proper comparison between the standard and WWV can be made, proceed as follows with frequency adjustment:

1. Remove the jumper across \( L_9/C_6 \), and re-establish the selected value of \( M_1 \), with \( R_4 \).

(Continued on page 167)
REGULATIONS CHANGES

The FCC has modified § 12.91(b) of the regulations so that it will be in accord with the recent treaty, which provides for reciprocal operating privileges between the United States and Canada. This is accomplished by changing the first sentence of § 12.91(b) to read as follows, "... only in the amateur band 28.0 to 29.7 Mc., except that within areas under the jurisdiction of a foreign government, operation is controlled by the laws of that government and the terms of any applicable treaty. (See Appendix 4 for such treaties or agreements as are in force and the pertinent terms thereof.)" Appendix 4 now contains Article III of the recent treaty.

Refer to the article on page 50 of September QST for complete details of the interpretation of this regulations change.

A.R.R.L. FILES ON DOCKET 10237

For the information of members, we publish herewith the text of filing by the American Radio Relay League of a comment on FCC proposals in Docket 10237 for revision of the emergency provisions now in Rule 12.156 and for a new Rule 12.112 to create calling segments in each of the principal amateur bands.

FEDERAL COMMUNICATIONS COMMISSION

In the Matter of

Amendment of Part 12 of

the Commission's Rules and

Regulations to designate speci-

fic amateur calling, answering

and emergency communications

frequency bands

DOCKET 10237

COMMENTS OF THE AMERICAN RADIO RELAY LEAGUE, INC.


These comments were formulated after completion and analysis of an extensive study of the postwar history of practical amateur emergency communications accomplishments, a study ordered by the President of the League for consideration by its Executive Committee.

Practical Effects of the Proposals

The proposed amendment of Section 12.156 retains the principles stated in the present language concerning emergency communications operation, but greatly expands them. It is proposed to extend to all amateur bands below 420 Mc. (except that at 21 Mc.) the reservation of amateur bands or segments of bands to be restricted to emergency communications when the Commission finds and declares that a state of emergency exists. Further, the effect of the proposed language is to restrict the use of such segments on a nationwide basis, regardless of the location and size of the affected area, rather than limiting the restriction to the affected or declared area as is done in the present language. It is now

* Not reproduced here because of space limitations.—Ed.

October 1952
judgment of the SEC, into smaller areas of jurisdiction administered by an Emergency Coordinator (EC) appointed by the SEC. Individual amateur operators must register with the local Emergency Coordinator their availability, operating skills, and station equipment. There are approximately 10,000 amateurs presently enrolled in the Corps. Amateurs, under the guidance of their Emergency Coordinators, establish spot-frequency networks. Approximately 10,000 amateurs possess or have access to portable power sources independent of commercial mains. Some 10,000 amateurs use, or have access to, radio equipment. This organization is maintained at peak efficiency by periodic drills and tests, some local in scope, others nationwide. In practically every case, communications are conducted on one “spot” frequency chosen for the area concerned.

The record of performance of the amateur service in time of disaster, documented in “QST” and in the files of the Commission and the League, is convincing evidence of the effectiveness of this organized planning.

Practical Operating Considerations

In considering the applicability of the proposed rules, it is especially important to note that in all 158 emergency networks of record since the close of World War II, the above-described organization functioned admirably without regulatory intervention, except for two instances where the Commission believed it desirable. Yet the proposed changes and expansion in Section 12.156 contrast the practical operating experience of amateurs in past emergencies, and are not in conformity with the Commission’s own minimum actions during such times of distress. It is the view of the League that the performance of organized amateur emergency communications facilities in such areas as fire, defense, medical care, and news gathering could not be matched by any notice under the rules. It is the League’s opinion that the Commission should not undertake to regulate emergency communications procedures. Rather, it is the view of the League that the Commission should provide itself with broad authority to declare a state of emergency as necessary, in its discretion, and specifically at that time outline temporary regulatory provisions to expedite the public interest and to ensure that emergency communications, parting notice requires. Such a plan would be in consonance both with amateur operating practices, and with the customary practice of the Commission in past actions under Section 12.156.

The proposed rule indicates specific frequency band segments, in all amateur bands up through 225 Mc. (except 21 Mc.), which would be reserved exclusively for emergency communications when the Commission so declares. This restriction would become operational only in those areas where emergency communication was being conducted on those band segments. It would, for example, limit the specified portions of the 144-Mc. band throughout the country, so that communications of fire and defense importance in the rest of the country would still have to observe the restricted segments even though it is obvious no interference would be possible, or useful communications would be provided, at a distance of several hundred miles from the area. This same reasoning applies to all frequencies of short-distance effect. On the frequencies of long-distance effect, such as the segment proposed at 14 Mc., the practical advantage of “spot” channels can be completely negated by interference from foreign stations not under the jurisdiction of the Commission. The principle of attempting, in advance, to specify band segments for emergency communication is therefore unrealistic.

More to the point, does not recognize the practical operating procedures used by amateurs in emergency as well as routine organized communications. Nearly all organized amateur communication activities are built around networks of stations operating in a single “spot” frequency, and there are hundreds of these communications networks around the country. A list of those on record with the American Radio Relay League is shown in Appendix B. It is these organized networks that provide the effective tools for disaster communication, and which have been the basis for practically all amateur emergency communications work in recent years.

A time of emergency or impending emergency, amateurs in any one state or local area automatically converge to the spot frequencies long-established as the focal points of area communications. Amateurs listen on a single frequency, and operate on a single frequency, in a given area or net. Liaison stations provide intercommunication between networks as necessary. For example, stations in war-proficiency conditions in front of arriving emergency news. Therefore, in consequence of the proposals made by the Commission, in most emergency situations those amateur bands might well go unheeded, since nearly all amateur receivers would be tuned to network frequencies. Thus, again the proposal is shown to be unfeasible in not taking in account practical amateur procedures.

In this connection, it is worthy of note that first calls from a disaster area are usually made on area network frequencies rather than in any emergency calling bands.

The proposal specifies a 3-minute emergency period at the start of each hour. This provision is also in the present regulation. To the best of the League’s knowledge, this provision has never been observed by amateurs, simply because it is not in consonance with more effective amateur procedures. Amateur stations active but not transmitting, in effect observe 60-minute listening periods each hour, since on networks for every station transmitting at a given moment, there are dozens or hundreds of “ears” monitoring those frequency bands. Disruption of smooth-flowing procedures in emergency networks even for five minutes would, it is believed, have more disadvantages in overall performance than any questionable advantage of monitoring separate “orphan” segments of the band for improbable “first calls.”

Alternative Proposal

It is the alternative proposal of the League, therefore, that amendment of Section 12.156 be made to provide basic amendments for the latter intervention, as occasionally it might be desirable so to do, with specific and temporary regulatory provisions. This authority should be written in consonance with practical amateur operating procedures. Its implementation would coincide exactly with the effective practical procedures used by the Corps. Regulations are not to approve those which do not now affect, nor do not now affect normal amateur communications in unaffected areas or in the affected area when conducted on frequencies not designated for emergency operation.

All transmissions within any designated amateur emergency communication bands other than communications relating directly to relief work, emergency service, or the establishment and maintenance of efficient amateur radio networks for the handling of such communications, shall be terminated. Incidental calling, answering, testing or working (including casual conversation, remarks or messages) not pertinent to constructive handling of the emergency situation shall be prohibited within those bands.

The Commission may designate certain amateur stations to assist in the promulgation of information relating to the declaration of a general state of communications emergency, to monitor the designated amateur emergency communications bands, and to observe and report transmission. Such bands, when so designated, may transmit for that purpose on any frequency or frequencies authorized to be used by that station, provided such transmissions are not more frequent or of shorter duration than those occurring in essential emergency communications in progress; however, such transmissions shall preferably be made on authorized frequencies immediately adjacent to those segments of the amateur bands being cleared for the emergency. Individual transmissions for the purpose of observing the existence of the communications emergency shall refer to this section by number (§ 12.150) and shall specify, briefly
and concisely, the date of the Commission's declaration, the area and nature of the emergency, and the amateur frequency band or bands to which such stations are to contribute the amateur emergency communications bands at the time.

The designated stations shall not enter into discussions with other stations beyond furnishing essential facts relative to the emergency, or setting as advisors to stations desiring to assist in the emergency, and the operators of such designated stations shall report fully to the Commission the identity of any stations failing to comply after notice, with any of the provisions of this section.

(c) The special conditions imposed under the provisions of this section shall cease to apply only after the Commission, or its authorized representative, shall have declared such general state of communications emergency to be terminated; however, the above provisions shall be deemed to prevent the Commission from modifying the terms of its declaration from time to time as may be necessary during the period of a communications emergency, or from removing those conditions with respect to any amateur frequency band or segment of such band which no longer appears essential to the conduct of the emergency communications.

Calling and Answering Frequencies

The proposed new Section 12.112 reserves segments of each amateur band up through 225 Mc. (except 21 Mc.) exclusively for calling and answering purposes, and specifies detailed procedures for their employment.

This is an entirely new concept in the conduct of amateur communications and needs careful examination.

In an example case, it is contemplated that an amateur station in one of the named segments would initiate a general call, CQ, not more than the specified length. A second station, hearing the initial call and desiring to establish communication, would respond on or near the same frequency, again observing the limits as to length of call. Assuming contact established, the two stations would then negotiate for a mutually satisfactory frequency or frequencies in the unrestricted portions of the band on which to continue and complete the contact. Each station would then shift frequency, re-establish contact, and continue the communication.

A careful examination of the practical application of this procedure, in the light of established amateur operating practices, shows the proposal to be unrealistic, inefficient, and wasteful of precious frequencies.

In the example case, the amateurs concerned would be plagued with difficulty right from the start. First, they must agree on a working frequency or frequencies. This discussion might take several forms, depending upon whether each station was crystal-controlled, with a selection of several specific frequencies, or whether it was operable in any part of the band. Once these differences in station capabilities were ironed out, probably along with differences of opinion on a suitable working frequency, the stations could then attempt the frequency change.

The agreed frequencies would of necessity be chosen on speculation. The operators would have no way of knowing, short of having a second communications receiver in operations, what conditions of interference existed on the chosen working frequency or frequencies. Occupancy of the frequency by others might make contact impossible, thus completely wasting the time and frequencies in the calling band.

The proposal assumes ability of every amateur to set his transmitting or receiving frequency at will within very close tolerances, an ability which does not exist in most cases because there has been no necessity for it. Equipment capable of the amateur service simply is not built within such tolerances for the most part; the cost would be prohibitive. Thus even if there were agreement on choice of working frequency, there would probably be time expended in multiple calling until the chosen frequencies, or their approximations, were logged.

Even granting, for purposes of the example, ability to set frequency closely, in order to re-establish contact the stations must repeat all working frequencies exactly the same calling and answering procedures they used in the restricted band segments. Obviously, this is sheer waste of frequencies, not to mention time, since the calling and answering procedure is duplicated on the working frequency.

Moreover, there is a practical engineering problem in frequency shifts of any magnitude. Changing to a working frequency within the remainder of the band would in many cases require retuning of the amateur transmitter, taking more time and effort and reducing efficiency. More important, since, from a practical standpoint, tuning would be done under key-down conditions, it would increase interference to other stations. The combined effects of this problem, plus that of frequency-setting, would be to require of amateur the purchase or construction of elaborate and precise receiving and transmitting equipment, with costs which would be prohibitive.

Additionally, an impossible situation would be created in the many bands of international usage. It is virtually certain that few, if any, foreign stations would understand what was being attempted by the U.S. amateurs in a frequency shift, and sufficient confusion would result that the band segments would have no practical purposes be rendered useless to American amateurs.

It is recognized that an objective of the proposal is to assist operation in emergencies, especially for "first calls." But under the conditions imposed there is only one conceivable result—U.S. amateurs simply would not use the impractical procedures specified, in their day-to-day operations, so that the frequencies would not be in general use. The emergency-use potentialities of the band segments would therefore not be enhanced, not enhanced. Also, foreign stations not under the jurisdiction of the Commission would have free access to such channels and, once becoming aware of their being cleared by American amateurs, would flock to use the restricted segments, further decreasing their potential emergency effectiveness. Even were the plan workable in other respects, international coordination would be required to make it a success.

The net effect of the proposal would be, in the League's view, to withdraw from domestic amateur use the frequency segments listed in the proposal, and would be a far greater loss to the amateur service than any recent international radio conference has imposed in its allocation table.

The League does not believe that such a result is in accord with the Commission's usual policy of fostering the amateur service, and urges the deletion of the proposed Section 12.112.

THE AMERICAN RADIO RELAY LEAGUE, INC.

By: PAUL M. SIEGEL
General Counsel

A. L. BUDERSON
General Manager

A.R.R.L. ACTIVITIES CALENDAR

Oct. 4th: CP Qualifying Run — W6OWP
Oct. 11th-12th: Simulated Emergency Test
Oct. 15th: CP Qualifying Run — W1AW
Oct. 18th-19th: CD QSO Party (c.w.)
Oct. 25th-26th: CD QSO Party (phone)
Nov. 9th: CP Qualifying Run — W6OWP
Nov. 15th: CP Qualifying Run — W1AW
Nov. 15th-16th, 22nd-23rd: Sweepstakes
Dec. 5th: CP Qualifying Run — W6OWP
Dec. 5th-7th, 12th-14th: 100-Meter W1AW Party
Dec. 19th: CP Qualifying Run — W1AW
Jan. 3rd: CP Qualifying Run — W6OWP
Jan. 10th-11th: V.H.F. Sweepstakes
Jan. 10th-25th: Novice Round-up
Jan. 17th-18th: CD QSO Party (c.w.)
Jan. 19th: CP Qualifying Run — W1AW
Jan. 24th-25th: CD QSO Party (phone)

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.
A volt-ohm-milliammeter built in a plastic case. Terminal pin jacks across the bottom from left to right are: common, volts, milliamperes, ohms. The zero-adjust rheostat, polarity-reversing switch and battery terminals are on the side.

A Novice-Built Test Meter

BY JOHN P. RAMSEY, W11UVG

There are two instruments that should be in the shack of every Novice who plans to stay within FCC regulations. One of these—some means, independent of the transmitter, for checking the frequency of the emitted signal—is specifically required. The other is a meter for checking the power input to the final stage of the transmitter. A volt-ohm-milliammeter is very useful for many other purposes and is almost essential for tuning up the home-grown rig.

The unit shown in the photographs is based primarily on the one described in the last several editions of The Radio Amateur’s Handbook. The somewhat modified circuit is shown in Fig. 1. Having seen the pretty smoke that rises when an ammeter is inadvertently hooked up as a voltmeter, I decided to use separate terminals for each of the three functions of the meter—volts, ohms and milliamperes. This, I thought, might at least minimize the possibility of having to buy a new meter as a result of trying to read voltage with the switch set in the milliammeter position.

When the rotary switch is set at the low-resistance position, there is a constant drain of 1 mA on the battery. Of course an oldtimer would never go off and leave the meter switched to this position. But a Novice might not be so careful and a constant drain of even 1 mA would run the battery down in a short time. With the battery on leads outside the case, he is more likely to disconnect it before putting the instrument away, thus perhaps saving the cost of a new battery.

Switching from one range to another is accomplished by the two-gang rotary switch, $S_1$. However, in switching between high- and low-resistance ranges, it is necessary to reverse the polarity of the battery. While this could be done by adding another washer to the rotary switch, I preferred to use a separate toggle switch, $S_2$, for the purpose. $R_8$ is for adjusting the meter to zero-resistance reading with the test prods shorted, prior to making resistance measurements.

**Fig. 1 — Circuit of the simple test meter.**

- $R_1$ = 0.9 megohm, 1/2 watt, 5% or less.
- $R_2$ = 90,000 ohms, 1/2 watt, 5% or less.
- $R_3$ = 10,000 ohms, 1/2 watt, 5% or less.
- $R_4$, $R_5$, $R_6$ = Copper-wire shunts (see text).
- $R_7$ = 3300 ohms, 1/2 watt.
- $R_8$ = 2000 ohms, wire-wound (Claroject 13-2000 or equivalent).
- $J_1$, $J_2$, $J_3$, $J_4$, $J_5$ = Phone-tip jack.
- MA = 0–1 milliammeter.
- $S_1$ = 2-gang 9-position rotary switch (Mallory 1321L or equivalent).
- $S_2$ = D.p.d.t. toggle.
**Construction**

While the case might be made out of almost any material available, it happens that W2KDH gave me a sheet of 3/4-inch lucite at about the time I was getting ready to build the unit. It is easy to work and makes a very attractive-looking job. The front and back are pieces 4 inches wide and 61/2 inches high. The sides are 21/2 inches wide and 61/4 inches high, while the top and bottom are pieces 2 1/2 by 31/2 inches. The pieces are assembled with 6-32 machine screws by drilling and tapping holes in the edges of the material. Lucite splits or chips quite easily, so care should be used in this operation. Use a No. 28 drill for clearance holes and No. 34 for the tapped holes. Wet the end of the drill frequently with water to reduce heating that tends to soften the lucite. Don’t try to drill the holes too close to the corners, I kept them 1 1/2 inches away. Get a square-end tap if possible, and back it up whenever it shows a tendency to stick. If a regular tapered tap is used the holes must be deep enough so the screw will not hit the taper. Use water as a lubricant.

The large hole for the meter in front should be cut so that the flange of the meter comes about 31/4 inch below the top edge. A circle cutter is used to make the hole. Be sure to adjust the cutter carefully so that you will end up with a hole that fits the meter nicely. Try the cutter first on a piece of 1/4-inch scrap wood. It is better to cut halfway from one side and then turn the piece over and finish from the other side. As a matter of fact, it is advisable to follow this procedure in drilling any of the holes.

The center of the rotary-switch shaft comes 1 1/2 inches up from the bottom edge and the four output terminals are lined up across the bottom 1 inch apart, center to center, and 31/8 inch up.

On the left side, the shaft of the zero-adjust rheostat, \( R_s \), is level with the rotary-switch shaft. If the back end of the rheostat comes too close to the switch, the switch can be turned slightly to give more room. The polarity-reversing switch, \( S_2 \), should be placed above the rheostat in a position that clears the case of the meter. The two battery-terminal jacks are mounted below. Be sure to mount the one toward the front so that it will not interfere with the adjacent one in the front panel.

---

**Multiplier Resistors**

Before wiring the unit up, the various multiplying resistors should be adjusted following the suggestions given in the *Handbook*. The current shunts, \( R_6, R_5 \) and \( R_4 \), are made of copper wire as described there. The resistance values should be \( \frac{1}{5}, \frac{1}{5} \) and \( \frac{1}{5} \) respectively, of the meter resistance.

![Fig. 2 — Test circuit for checking meter resistance.](image)

- \( R_7, R_6 \) — See Fig. 1.
- \( R_5 \) — 100 ohms (see text).
- \( MA \) — See Fig. 1.

If you don’t know the resistance of your meter and can’t find it out from a catalog, its approximate value can be determined by connecting the 4.5-volt battery, the fixed 3300-ohm resistor, \( R_7 \), the 2000-ohm zero-set rheostat, \( R_6 \), and the meter in series, as shown in Fig. 2. Adjust the rheostat until the meter reads full scale (1 ma.). Then connect a 100-ohm resistor across the terminals of the meter. The meter reading will fall to a new value. The meter resistance can then be calculated by

\[
R_m = 100 \frac{1 - I}{I}
\]

where \( I \) is the new meter reading. For instance, if the new reading is 0.75 ma., then the meter resistance is

(Continued on page 124)
Codan Elimination of Intersignal Noise

An Outboard "Squelch" System for Communication Receivers

BY RONALD L. IVES *

The background noise produced by a modern "high-powered" communications receiver, when no signal is tuned in, may be almost as loud as the preferred listening volume. This unwanted noise causes auditory and other fatigue to the operator, and sundry objections from others in the vicinity of the receiver. In a well-designed and properly maintained receiver, much of this noise is caused by electron motion within the input circuits; most of the remainder is static of various sorts.

Almost a generation ago, equipment for silencing a receiver when no signal was incoming was developed and put into commercial operation by various communications companies. This device, usually known as a "codan" (carrier-operated device, anti-noise), takes many forms, but is basically a switch which cuts off the a.f. channel when no a.v.c. voltage is applied to the receiver.1, 2 One of the simplest forms, consisting of a pentode-controlled triode amplifier, is shown in Fig. 1, complete with its own power supply. The basic circuit is not new, and is not original with this writer, but it is one of the smoothest-operating of a large number of codans tested.

Circuit Operation

Operation of this codan is quite simple and straightforward. When the a.v.c. voltage is low or zero, the pentode draws plate current. Voltage drop across the plate load resistor, \( R_p \), biases the triode to and beyond cut-off, so that it will not pass signals. When the a.v.c. voltage rises to the cut-off value for the pentode, it no longer draws plate current, and the bias on the triode grid is now only the operating bias, supplied by the cathode resistor. The triode now functions as an ordinary amplifier, passing signals. By varying the screen voltage of the pentode, its cut-off voltage can also be varied, so that the relation between a.v.c. voltage and signal cut-off point of the amplifier is adjustable. Alternatively, the a.v.c. voltage could be varied manually, by use of a potentiometer across the a.v.c. input to the pentode. This attains the same result, but loads the a.v.c. system in the process.

Using this circuit, a codan suitable for use by the average amateur or short-wave listener can be constructed easily, at low cost and in small bulk. Because of lack of unused space inside the average communications receiver cabinet, the design is "outboard." Since the accessory socket on most receivers may already be occupied by a Selectocjet or other auxiliary device, this codan contains its own power supply. As shown in Fig. 1, connections to the receiver consist of two a.f. lines (which should be shielded), an a.v.c. line, and ground. The codan is normally inserted between detector output and the audio volume control in the receiver.

Using standard tubes, with careful planning, this codan can be built on a 7 X 7 X 2-inch chassis without crowding. Layout and constructional features are shown in the photographs. The vertical shield partition of steel confines the leakage field of the power transformer to the power side of the chassis. A similar shield under the chassis protects the signal circuits from the

---

* Although squelch circuits have been commonplace for a long time in military and commercial equipment, they are not so familiar to hams. This article describes a simple codan unit that can be connected to almost any existing communications or other short-wave receiver to suppress background noise in the absence of a signal.
Fig. 1 — Circuit of the outboard squelch unit.

C1, C6 = 0.1-μfd. paper.
C2 = 0.01-μfd. paper.
C3 = 0.25-μfd. paper.
C4, C5 = 20-μfd. electrolytic.
C6, C7 = 30- to 40-μfd. electrolytic (dual unit used).
C8, C9 = 40-μfd. electrolytic.
R1 = 1 megohm, 1/2 watt.
R2 = 0.47 megohm, 1/2 watt.
R3, R4 = 47,000 ohms, 1 watt.
R5 = 1000 ohms, 1 watt.
R6 = 22,000 ohms, 1 watt.
R7 = 10,000 ohm potentiometer.
R8 = 50-ohm potentiometer.
R9 = 10,000 ohms, 5 watts.
L1, L2 = 8-hy. filter choke.
I1 = 6.3-volt panel indicator lamp.
J1, J2 = Shielded microphone connector.
S1 = 65-ma. 130-volt selenium rectifier.
T1 = Half-wave power transformer: 120 volts, 50 ma.; 6.3 volts, 1.5 amp. (Mercer P-3045).

leakage field of the filter chokes. Component values are not critical; a ten per cent deviation from those given makes no difference in circuit operation. In contrast, arrangement of components is quite critical, or the codan will act as a hum injector. Hum-producing components must be kept as far as possible from signal components, and shielded from them. For this reason, the triode is placed at the rear of the chassis, permitting very short leads to the input and output connectors at the rear.

The power supply is a more-or-less conventional voltage doubler, with considerably more than average filtering of the B supply. The resistor R8, between transformer and condenser interconnection, is to protect the rectifiers and filter condensers from warm-up surges. This may be omitted, giving a plate-supply potential of about 20 more volts, saving about 20 cents, and reducing the life of the rectifiers and condensers by a factor of more than two. If no protective cover is placed over the chassis, an insulated cover should be put over the "hot" condenser, C9, of the voltage doubler, to prevent shocks from inadvertent contact. The case of this condenser is about 130 volts above ground.

Adjustment

To put the codan into operation, after all internal connections are made and checked and tubes inserted in the proper sockets, connect the a.c. and let the filaments warm up. Connect the input terminal to the detector output, and the output terminal to the "high" side of the volume control ahead of the first a.f. tube. Turn the level control on the codan to maximum (maximum voltage on screen of 6SJ7). The codan should now pass no signal. Note, or preferably measure, the hum level in this condition.

Now connect about 20 volts d.c. between the a.v.c. input terminal and ground, with the a.v.c. terminal negative. This should cut off the pentode, so that the triode will pass signals. Tune to a "dead" part of the band, and note the hum level. This will be somewhat higher than the first value noted, since all hum produced ahead of the codan is amplified by the triode.

Now adjust the filament potentiometer for minimum hum. Usually a zone of apparently minimum hum will be found. Set the potentiometer arm at the center of this zone. Use of an oscilloscope will permit a more accurate setting. When hum is minimized, turn the bottom on the chassis. If the bottom plate does not have "anti-scutch" impressions, use small rubber bumpers under the bottom-plate screws.

Now connect ground of the codan to ground (Continued on page 130)

Bottom view of the codan unit. The filter chokes in the upper left-hand corner are shielded from the audio circuit by a small baffle shield. C4 and C5 are at the bottom and R6, mounted on a bracket, is at the top. Audio and power connectors are at the rear of the chassis.

October 1952
Sugar-Coated Single Sideband

(S.S.S.S.† or A.M. I Blue?)

BY RICHARD B. BLANCHARD,* W6UYG, EX-WILDI, EX-W2OIQ

Phone operation as we have known it is NOT on the way out. It is already out, if you will take the word of literally hundreds of hams the world over who have had the chance to see for themselves the relative merits of single sideband. With that flat statement, let us now take a short ride through this mysterious subject and break it down into everyday ham lingo. We promise you there will be not one formula . . . not one — j factor, whatever that is . . . nothing mysterious at all.

The first thing you run into in s.s.b. articles is a new language, composed mostly of words like “balanced modulator,” “phase-shift network,” “carrier suppression,” and so on. These words are the ones that cause a majority of hams to pass up “sideband,” as we call it for simplicity.

* 816 Kathryn Ave., San Mateo, Calif.
† Single Sideband Subtly Simplified.

The Balanced Modulator

Let us therefore take a few of these and translate them into ham talk. “Balanced Modulator,” . . . now there is a wicked-sounding device. What is it? Ever hear of a push-push stage? (See Fig. 1, if your memory needs refreshing.) Good doubler, isn’t it? But it won’t work on the fundamental. Well, just for fun, let’s book it up “straight-through” anyway and see what happens. Well, well, what do you know? No carrier!!! OK, add some modulation to the push-push stage and you wind up with modulated output, but no carrier. However, at this point we still have two sidebands. Even so, we have a far more efficient system of communication than standard horse-drawn a.m. ’phone.

In the push-push amplifier we have just mentioned, the r.f. is fed to the grids in push-pull, and the plates are connected in parallel. This, of course, causes the output at the fundamental frequency to cancel out. If the audio is applied to the screens of the stage in push-pull, it upset the balance at the audio rate and the sidebands (products of modulation) appear in the output. See how simple it is. Carrier cancels out . . . sidebands come through. At this point, we have a double-sideband suppressed-carrier signal. All your power in the amplifier is going into talk power, or sidebands. This amplifier, with 300 watts peak output, puts a signal in the other fellow’s receiver equivalent to an 800- to 900-watt input carrier-type rig. Notice we didn’t say “A 900-watt a.m. rig.” Single or double sideband, carrier or not, it is still a.m. So we’ll call it “carrier-type.”

Now then, let’s review this as far as we’ve gone. We have built a push-push amplifier, applied some push-pull audio to modulate the screens, and have the thing putting out a pretty efficient signal with two sidebands, and no carrier.

Sidebands

So, the next step. We have an effective 900-watt signal split into two parts, or sidebands. Why not put it all in one part? The guy with the distant receiver can’t tell the difference. He can copy one sideband as easily as two.

One thing, though — how do we get rid of that other sideband? We agree that killing the carrier wasn’t hard at all, but this audio business is getting rough. After all, we have never messed around with “phase-shift” networks before. And here enters the villain of the entire plot.

One way to eliminate the other sideband is...

Another type of balanced modulator, seen in many of the rig described in QST and elsewhere, connects the r.f. excitation in parallel and the r.f. output and audio in push-pull. It works the same way, but it is a less familiar connection than the push-push doubler.

Fig. 1 — The familiar push-push doubler is shown at A — the plate circuit is tuned to twice the excitation frequency for useful output, because the excitation frequency is cancelled out in the plate circuit.

By modulating the tubes in push-pull and tuning the output circuit to the excitation frequency, as at B, a “balanced modulator” is obtained.

38 QST for
to shift the r.f. phase through one phase shift network, and shift the audio through another. Now don't go 'way. Here is where most of the articles get rough. What actually happens is that the audio is split into two parts, 90 degrees apart in phase, and the same with the r.f. However, we will not go into that now. Just accept that as fact, and let's consider "How to do it?"

The Millen Company has solved the most difficult part of our problem with their No. 70152 Audio Phase-Shift Network. This unit looks like an r.f. can and contains the entire phase-shift network for the audio. It is all aligned and tuned at the factory, and can be just wired into your rig, and "presto"...there's your phase shift.

The r.f. phase shift is very easy. You just follow the simple directions in the Handbook s.s.b. exciter.

Now, you remember we mentioned this push-push amplifier to cancel out the carrier. Well, now we have the entire signal split into four parts, two parts of r.f. and two parts of audio. Therefore, we need a different kind of amplifier to mix all this stuff up and get out a single-sideband signal. To make a long story short, we merely wind up with four tubes connected in push-pull parallel. This is the "balanced modulator" of the ARRL Handbook rig. "Balanced modulator" sounds tough, doesn't it? But when you call it "push-pull parallel" it brings it down to earth. Now, with the four tubes in p.p.-parallel, we have four grids to drive with the r.f. And we have two chunks of r.f., 90 degrees out of phase with each other. So we connect two grids together and feed in one half the r.f., and the other half into the other two grids in parallel. Likewise, we feed in half the audio to two of the tubes, and the other half to the other two.

Now, by properly connecting the plates of the four tubes in pairs to a common tank circuit, we finally have the thing set up to cancel the carrier out, and also shift one sideband over to the other side of where the carrier would be, if there were one.

Then a few controls, to balance everything up, which are explained in various articles, and you are ready for action.

In this article, we have tried to leave out all the theory which many hams are not interested in. However, there is one point on which it is necessary to get down to details, in order that your sideband rig will work. That is the use of the Millen Audio Phase-Shift Network in the Handbook rig.

The diagram of Fig. 2 shows the necessary changes to make use of this unit. Incidentally, the unit is so modestly priced as to be almost as cheap as the parts alone purchased separately. The changes shown allow for the feeding of more voltage into one half of the network than the other side gets.

By using 6V6s as modulator tubes—and there we mean regular modulators—we get sufficient audio to kick up easily the 6L6 balanced modulators in the push-pull parallel stage. The 6L6s should easily kick any pair of triodes in a Class B linear to 1-kw. input.

Tuning

After the rig is made up, using the changes shown, the tuning-up process begins. This process, in most articles in the past, has been made to look laborious, if not impossible, to the average ham. However, if two pieces of equipment are available, the process shouldn't take more than a few minutes.

First, tune up the audio. Connect the horizontal plates of a 'scope to the output of one modulation transformer, and the vertical plates to the other transformer. Adjust the phasing trimmer, $R_1$ in Fig. 2, to form a circle—a perfect circle in the 'scope when a tone is fed to the microphone input. After that, you can forget the phase shift indefinitely.

Now, connect the vertical plates to one pair of r.f. grids on the 6L6s and the horizontal plates to the other pair of grids. Apply r.f. excitation, and tune the r.f. phase-shift network for a circle. I have never seen this procedure described in any article, but it is as simple as this writer has yet been shown. Then apply an audio tone to the microphone input, and with r.f. excitation on, trim all controls for minimum ripple on the band which should appear on the 'scope. At this point

(Continued on page 189)
Amateurs Provide Communications for Women's Transcontinental Air Race

E
day this year, Marjorie B. Davis, East Coast chairman of the Sixth Annual Women's Transcontinental Air Race, contacted ARRL for assistance in providing a cross-country communications net to report the progress of the famed "Ninety-Nines" flyers. Race headquarters and terminus being in New York City, the League turned the project over to SCM W2OBG, who recruited the services of W2JZX and W2YBT in formulating plans for a net covering the stopover cities. Tentatively, W2JZX was to operate 75-meter 'phone and W2YBT 40-meter c.w. to accept incoming traffic for QSP by landline to Race headquarters. Daisy Coleman, XYL of W2YBT, handled all secretarial duties incidental to making preliminary arrangements with radio clubs in the stopover cities. As a trial run, test messages were sent to W2JZX and W2YBT on June 28th, a week before the start of the race. Conditions were poor, however, and delivery did not materialize. It then became evident that it would be desirable to line up a net consisting of stations who were heard operating on the air regularly. With the assistance of members of the Transcontinental 'Phone Net (TCPN) and others a working team was set up.

Monitoring was started on July 4th at 6 P.M., W2YBT on 40 meters and W2JZX on 75. Conditions were poor on 40 but excellent on 75. The 3980-ke. net met on schedule at 9 P.M. and first reports came through in good order from W5BKIL. He later reported a crash of one of the contesting planes, stating that the pilots had been shaken up and were hospitalized. By 11 P.M. we were able to advise Race HQ, that all planes were accounted for. This first night's operation moved reports several hours ahead of the commercial services.

Each evening thereafter complete bulletins came in on the 9 P.M. schedule on 3980 ke. (after the first evening of monitoring on 40 meters that band was given up). Traffic was thorough and accurate, containing the following information: (1) assigned number of the contestant; (2) names of pilot and co-pilot; (3) time of arrival at evening stopover; (4) weather report for the following morning; (5) estimated time of departure next morning. For the duration of the competition reports continued to arrive hours ahead of the commercial lines.

This operation was not without human interest and anxious moments. We were all most concerned when we heard of the first mishap on July 4th. That same night three other planes had to drop out because of engine difficulties. During the race two important 'phone calls came to New York for the pilots in planes Nos. 4 and 22. One plane was located in Vandalia, Ohio, and our outlet there, W8HIB, contacted the pilot with the information (the other plane had already arrived at New York). On July 8th a great number of planes were grounded at Wheeling, W. Va. Weather was bad, but two planes thought they could make Harrisburg, Penna., by nightfall and in the attempt were lost. Our net got busy and every station near an airport called that airport to endeavor to locate the missing craft. By 11:15 P.M. the two planes were located back at Wheeling, safe and sound. We called Race HQ, and then went to sleep, very much relieved.

It was a real privilege to serve the "Ninety-Nines" in their annual race. Their words of commendation for ham radio were many, and the contestants told of their feeling of security as a result of our communications effort.

Stations in the net were always prompt and dependable, many putting in long hours at their rigs. The roster of those participating includes W1s EMF LBI HNQ ODW PU QON SJ0E RS; W2s ABT AAE AD BTB CLG DYP EEO GNP GIC I5T QXS TPN VEP YOU YBT WFY ZOL ZQC; W3s BFK BRC CTN CVT GQX JX0 NXU PYF QKPV VRZ; W4PPF; W5s BKH GIZK PA SLS; W6s HB KII OAT PHY ZGT; W9s EDQ LRT OSO/5 ZHL; K9FAE; W6s EXN HUI MXI; and Daisy Coleman.

-- W2JZX
BY ELEANOR WILSON, WQON

There are some very young Y.Ls on the bands these days. We know about the following girls who are sixteen or under, but we wonder how many others there are. (Only ages we're sure of are given.)

W1UUBL — Doris Newcomb, 14
W2KAE — Lynne Lyza, 15 (licensed when 14)
W2TF — Jean Hudson (licensed when 9)
W3OVV — Jane Beberman (licensed when 10)
W4TAY — Susan Martin, 13
W4UNO — Jane Hunt, 15
W6GPI — Margaret Martley, 12 (licensed when 10)
WTPEF — Clio Marie Hood, 14 (licensed when younger)
W9PFL — Nancy Durst, 9
W9BOC — Sandra Jakus, 13
K25QO — Carol Combs, 13
K3GJ — Barbara Jordan, 14 (of GGFYN-G2ATM)
V6AYL — Juanita Wood, 15 (licensed when 12)
W1NF7A — Judy Volpe, 9
W1WDX — Nancy Lillypopp, 13
W3TMTR — Eileen Joanic, 13
W3NQCG — Helen Martin, 9
W5TWQX — Mary Klock, 12
W7NQWY — Cheri Ann Westcott, 10
W7RFRM — Janet Poulson
W7TFAQ — Ann Blackburn, 10
W9HF9P — Betsa Bryan, 13
W9BU9D — Joanne Schacht, 9
W9UD9H — Marie Rantanan, 10
W9UDJG — Elmarne Schain, 13
W9UE9W — Mary Milbauer, 11

*YL Editor, QST. Please send all contributions to WQON's home QTH: 618 Fisher St., Walpole, Mass.

W6 YLs who attended the June installation meeting of the Los Angeles YLRG are shown below. (Seated, l. to r.): May England, ex-V63OL; Mildred, W6GJU; Vada, W6CEV; Beulah, W6UPJ; Mary, W6VJF; Gideon WAKER; Beulah's daughter Margaret is peeking through the center. (Standing) Founder and past-President Clara, W6TDI; Betty, W6NGCA; Vada's niece, Donna; Joyce, XYL of W6HTT; Annie, W7RBA; Else, W6NOEC; Dorothy, W6QODG; past-President Evelyn, W6NZP; Vici, W6JBB; Ruby, W6WHT; Mary Kay, W6JMC; Luella, W6JMS; Joan, W6NOB; Ann, W6MFP; Barbara Dolson, sister of W6OJB and daughter of W6GCG; Lillian, XYL of W6KVR; May, W6CQV; and past-President Maxine, W6UIA. Outgoing officers were W6CER, Pres.; W6AVF, Secy.; ex-V63OL, Treas. Officers installed were W6NLIM, Pres.; W6KER, Secy.; and W6FJU, Treas. W7RBA is the XYL of JA2OL and awaits word call to join him.

One way of insuring that traffic is delivered directly and promptly to a relative is to make said relative a ham himself. And that briefly is the tale of the two sisters shown above. June Fischesser, W1NTFO (left), of Montgomery, Alabama, now has a consistent traffic outlet in her old home town. Lexington, Kentucky, in her sister, Betty Peters, WN4WFK (right). Betty passed the Novice exam after three weeks of coaching while she visited June and her OM Charlie, W4FMW.

Keeping Up with the Girls

Of the 199 countries W1MCW has worked, 183 are confirmed. Among Lou's latest QSLs are W1MY (Yemen) and F6SMY (Djibouti, Fr. Somaliland). . . . W4TX made perfect copy of the Armed Forces Day Message. Louise now has all three certificates which have been issued. W1 YLs who attended the Portland, Maine, hamfest were pleased to meet W2OWL, Ruth; W3QQF, Barbie; W4UDI, Lenette; W4UDQ, Dorothy; and KH8TI, Dell. W3QQF, OM W3MAX and jr. op visited a number of YLs between Maryland and Canada while on their vacation. Several W6 YLs handled traffic in emergency nets set up following the Tabachepi earthquake. . . . Sorry to report the passing of the OM of W8UDA, Dottie. W1UFT, Marsha, has been licensed for a comparatively short time, but she is NCS for the Vh. SS Net, ground operator for the CAP, Secy. of the Rutland C.W. Club and is registered with the Vt. State CD and RACES . . . YLs who attended the Corpus Christi ARRL Convention (Continued on page 118)
How Rectifiers Work

Simple Theory for the Novice

BY GABRIEL P. RUMBLE,* EX-W5BBB

BY broad definition, an electric rectifier is a circuit device that conducts better in one direction than in the other. Such a device makes it possible to "change" alternating current to direct current; that is, to obtain unidirectional current from an alternating source. The ideal rectifier, of course, would be one having zero resistance in the conducting direction and constituting an open circuit in the nonconducting direction.

Most rectifiers in current use in amateur radio fall into one of two general classes. In one group are the mineral rectifiers, such as the selenium, copper-oxide and crystal rectifiers. Those in the second group are the vacuum-tube rectifiers. The principal difference between the two is that the operation of the latter type usually depends upon a heated filament, or cathode. While the mineral rectifier requires no such heated element, the voltage that it will stand without breaking down when in the nonconducting state is limited.

Fig. 1 shows standard circuit symbols for the two types of rectifiers. The arrow in the case of (A), and the line in the case of (B) are usually called the anode or plate, while the other element is termed the cathode. The diagrams also indicate the relative polarity of the applied voltage that must exist for current to flow through the rectifier. When this polarity is reversed, the rectifier does not conduct. In other words, in order to conduct, the anode must always have a potential more positive than the cathode.

Half-Wave Rectifier Circuit

Fig. 2A shows the elements of a half-wave rectifier circuit. At (B) are graphic pictures of the a.c. input voltage and the rectified voltage appearing across the load resistance. (This load resistance represents any equipment that may be operated from the supply.) Current flows through the load resistance only during the time that the polarity of the a.c. input voltage corresponds to the rectifier polarity shown in the diagram. When the polarity of the input voltage reverses on the other half of the cycle, the circuit is open and no current flows. If the connections to the rectifier were to be reversed, then conduction would take place on the opposite half of the cycle and the polarity of the voltage across the load would be reversed.

Bridge Rectifier Circuit

From the half-wave rectifier, a logical step forward is a circuit that makes use of both halves of the cycle to fill in the gaps between the d.c. pulses in the rectified output of Fig. 2B. A circuit that does this is shown in Fig. 3A. It is known as the full-wave bridge-type rectifier. On the first half of the input cycle shown, D1 and D2 conduct, while D3 and D4 conduct on the other half of the cycle. The resulting voltage across the load is represented in Fig. 3B. It is seen that the gaps between the pulses of Fig. 2B have been filled in. Because of this the average d.c. voltage output of the full-wave rectifier will be twice that of the half-wave rectifier for the same value of a.c. input voltage.

Simple Full-Wave Rectifier Circuit

Only half the number of rectifiers used in the bridge circuit are required if two of them are replaced by resistances of equal value, as shown in Fig. 4A. Although full-wave rectification is retained, the maximum no-load voltage obtainable is only half the maximum provided by the bridge circuit, because the source voltage applied to the conducting rectifier and load is halved by the voltage divider formed by the two resistors shunting the source. The circuit as shown in Fig. 4A is impractical because of the d.c. voltage drop and a.c. power loss in the resistors. If the two shunting resistances are of low value, the d.c. voltage drop across them is reduced, but the a.c. power loss is increased. Increasing the resistances has the opposite effect.

Most of these losses can be eliminated by substituting chokes of large inductance and low d.c. resistance for the resistors, as shown in Fig. 4B. The reactance of the choke windings minimizes the a.c. power loss, while the low d.c. resistance eliminates most of the d.c. voltage drop. The a.c. input voltage to the rectifier, however, is still only half of the source voltage.

If an increase of input voltage is desired, a step-up transformer may be substituted for the chokes, as shown in Fig. 5. The input voltage is half the total secondary voltage of the transformer. The use of the transformer has the further advantage that the d.c. load circuit is isolated from the a.c. line so that either side of the load may be grounded irrespective of the primary grounding. A transformer may, of course, be used similarly with the bridge circuit. In this case, the input voltage is the same as the secondary voltage, rather than half.

Vacuum-Type Rectifiers

Vacuum-tube rectifiers are made in both full-wave and half-wave types. The full-wave

(Continued on page 185)
Fig. 1 — Standard rectifier symbols. (A) — Mineral rectifier. (B) — Vacuum-tube rectifier. The signs indicate the polarities that must exist for the rectifier to conduct.

Fig. 2 — Simple half-wave rectifier circuit and graph showing comparison between applied a.c. voltage and the rectified voltage appearing across the load resistance.

Fig. 3 — Full-wave bridge rectifier circuit. (B) shows that the gaps of Fig 2B have been filled in.

Fig. 4 — Circuits illustrating the development of the simple full-wave rectifier circuit. These circuits are seldom used in practice, as explained in the text.

Fig. 5 — Usual form of simple full-wave rectifier circuit. The transformer, T1, usually has a step-up ratio, primary to secondary, to obtain higher voltage than that obtainable from the line.

Fig. 6 — Full-wave rectifier circuits using vacuum-tube rectifiers. Half-wave rectifier tubes with a separate filament transformer are used in (A). In the circuit of (B) the rectifier is the full-wave type with its filament supplied from an additional step-down winding on the transformer.
Earthquake

Following the earthquake at Tehachapi, Calif., in July, the Naval Reserve Training Center, Fresno, Calif., of the Twelfth Naval District, assisted in providing emergency communications to the quake-stricken town. At the request of the American Red Cross Kern County Disaster Relief Chairman, the Training Center dispatched an SCR-299 mobile radio station, complete with gasoline generator, to the scene 145 miles away. The station (see photo below) used the call K6NBZ/6 and was the main link between Tehachapi and northern California. Numerous messages for injured residents of the community were handled. Operations were carried on with the assistance of the American Legion Amateur Radio Network and W6OT, the Red Cross station in Oakland.

ARRL Field Day

Naval Reserve activities of the Eighth Naval District took a very active part in the annual ARRL Field Day, June 21st-22nd. In some locations, Reserve activities combined operations with local amateur organizations. The following stations participated:

Call     Location     Operators
K6NAW New Orleans, La. W4ABB, W6 BHK EQ, W6STO
K5MBL Camden, Ark. W5A CPY DWJ ICE PZC TIL XVY YUV
K6NBW Beaumont, Texas W5A BRR GRY LQQ MCB PYU RLY STP VBIY VFF
K6NBD Dallas, Texas W5A KJG ORV OTH RKB TUE VLK
K5NBB El Paso, Texas W6A GJH HZ SYE
K6NRU Oklahoma City, Okla. W6A CL
K6NRU Stillwater, Okla. W6A MGK
K5NRS Shreveport, La. W5A DMR JTR KGZ MJC NEL NFT XNM OMG PYR QCI QNB SWB SUM
K5NMR
K6NPR
W5HTK Enid, Okla. W5A KEH KFX NGO REC SNU UCE UCO VBQ
W6IAS Tulsa, Okla. W6MFB and local club

K6NBZ, mobile radio unit from the Naval Reserve Training Center, Fresno, Calif., at Tehachapi, L. to R.: R. M. Engleman, BM1, USNR (W6IQS); H. Carl Holli, RM2, USNR (W6UVN); and W. E. Hower, ET2, USN (W6ZYM).
Perhaps the title of this article doesn't do justice to the subject, for not only does the antenna work like a charm across the whole band but is by far the best for 7 Mc. I have ever had. Although there is nothing original in it, it is a very interesting and efficient version of the time-honored Marconi.

The evolution of the broad-band vertical began when I was fortunate enough to fall heir to what I thought was enough 1-inch 24ST aluminum tubing for a 3-element 20-meter beam. To my dismay, I lacked one length of having enough. However, this small setback, coupled with a few conditions announced by the XYL in the esthetic defense of our new home, instigated one of the most satisfying pieces of ham gear I have ever built.

The first thought was to construct a simple vertical fed with RG-8/U coaxial cable, but this was discarded through lack of sufficient cable to reach the rear of my 140-foot lot. After glancing through the Handbook, it appeared that a 3-wire vertical might be the solution, since it could be fed with the less-expensive 300-ohm Twin-Lead. Accordingly, and after a few false starts, a supporting structure was built and the tubing mounted on it, spaced 15 inches on centers. The top was bolted together with a 1-inch strip of aluminum and, with the help of W6YMH, the antenna went up.

The antenna had been cut to length as per the formula found in the Handbook. When the 300-ohm feed line and the final amplifier were connected, a few tests indicated that something was very wrong.

Upon investigation with a grid-dip meter, the resonant frequency of the antenna was found to be around 6.4 Mc. After figuring roughly how much of the antenna should be removed to bring the frequency to 7.1 Mc., a hacksaw was used in one hand and the fingers were crossed in the other. The resultant length was 30 feet 4 inches and, lo and behold, the grid-dip meter showed 7.1 Mc.!

With high hopes, the line and final were again connected, but something was still wrong. After a little investigation with an r.f. ammeter in either side of the line, it was found that there was a current imbalance in the feeders, and this was attributed to insufficient or poor ground. A conference with the XYL developed the mandate that any radials associated with this antenna were going to be buried radials, and so buried they were. Four 35-foot radials were sunk one foot deep, in the form of an "X," and soldered at the cross-over to the ground rod.

Once again the final was coupled, and this time there was joy in the shack at W6ECJ. The antenna loaded nicely, and the line was well balanced. Measurement with a Micromatch showed the s.w.r. to be less than 1.5 everywhere in the entire 7-Mc. band, and considerably lower over the major portion.

From the above measurements, and subsequent on-the-air usage, there is only one conclusion that can be reached: here is a really good antenna, a vertical that "gets out" and has complete coverage of the 7 Mc. band. Running 600 watts to the final, signal reports are as good as anyone is getting and in most cases they are considerably better. Needless to say, I'm sold.

After tests and measurements were concluded, the Twin-Lead feeder was inserted in a length of old garden hose and that, too, was buried with no change in any of the characteristics.

(Continued on page 150)
W3GH, assisted by W3s MFD and MLY, organized a team of twenty amateur mobiles for liaison communication in the July auto races held at Brynfin Tydlden course near Harvey's Lake, Penna. Hams participating were W3s CPL ETB E1UD CH IIPK HV1, IGW KFQ MFD MLY PHE PUFZ QOR WOD TCC TOD ZB and W2NM.

When normal telephone communications broke down this amateur radio network was heavily relied upon. It functioned so smoothly that the boys have a "command performance" request to be on hand for next year's races!

Brigadier General Ivan L. Farman, USAF, Deputy Director of Communications, USAF, has been elected chairman of the Military Amateur Radio System (MARS) Advisory Committee for a one-year term. The committee, at its quarterly meeting in the Pentagon, also named Colonel William D. Hamlin, Signal Corps, acting chief of the Army Communications Service Division, vice-chairman of the committee.

The MARS Advisory Committee is composed of military and civilian members representing the Armed Forces, Federal Civil Defense Administration, Federal Communications Commission, American National Red Cross, American Radio Relay League and others. Its chief duties are to advise the Chief Signal Officer, USA, and the Director of Communications, USAF, on MARS operations and to recommend policy pertaining to coordination of civilian and military amateur radio activities.

While the oil-laden Fort Mercer battled the seas off Cape Cod during a March, 1952, gale, Radio Officer John V. O'Reilly, Jr., W2CWV, set rescue operations in motion with an SOS. As the vessel split in two in the rising fury of the storm he was swept overboard to his death. O'Reilly had signed on the ship just eleven days earlier. W2CWV was a member of the Staten Island Amateur Radio Association and an on-the-air acquaintance of another intrepid mariner, Captain Henrik Kurt Carlisen.

We regretfully note the passing of old-time QST author James Cecil Johnson, W5LS, in August at his home in Bellaire, Texas.

Our pages were regularly brightened by the yarns of homespun flavor contributed by W5LS under the nom de plume "Felix" during the early Thirties. One, "Hams Are Born — Not Made," appeared in 1930's January QST. Another, "It's In the Blood!," graced the January, 1934, issue.

At the close of a colorful career, W5LS was Senior Research Physicist for the Humble Oil and Refining Company. A recent outlet for his spare time and energy was the promotion of the increasingly popular Little League baseball.

October 1927

... Preparations and studies for the forthcoming international radiotelegraph conferences are being accelerated in ARRL's effort to solidify the amateur position.

... Carefully adjusted regeneration in his final amplifier enables Ralph Pierce, IAXA, to crystal-control 300 watts of output with a minimum of components.

... That perennial problem — construction of effective radio-frequency choke coils — is discussed in the Experimenters' Section by F. A. Lidbury, 2BAG.

... Notes on experiments to secure maximum selectivity in receiver circuits using no more than three tubes are recorded by Allan T. Hanseom.

... Alexander Nyman contributes an article analyzing factors to be considered in the designing of fixed condensers for high-frequency applications.

... "Calibrating S/W Receivers and Waveformers from Broadcasting Stations." By F. S. Hulley, IIF-12B, makes clever use of a regenerative b.c. resonator's harmonics.

... Forges Sunshine McKeevors, 9DNG, summarizes international amateur radio's fast-moving last three years of progress in the field of DX communication.

... International Test results clearly indicate the 1927 DX hounds' high esteem for 40 meters — 78 per cent of all activity took place on that band.

... "An Arctic Adventure," tale of amateur radio and aviation in perilous Alaskan wilds, is recounted entertainingly by Howard F. Mason, 7BU.

... Amateur radio's effective participation in recent Atlantic Coast military maneuvers is detailed by Fred C. Best, 1BIG, famed traffic handler.

... A new line of 80-meter crystals is announced by General Radio Company of Cambridge, Mass., recommended for use in 20- and 8-meter transmitters.

... Crystal-controlled mutlic, L'Anse, Mich., station of Edward N. Fridgec, has several of its clean-out features described and illustrated.

Silent Keys

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

W1CEA, Arthur F. Heath, Hampton, N. H.
W2CWV, John V. O'Reilly, Jr., Staten Island, N. Y.
W2JLN, Joseph T. Michaels, Roselle Park, N. J.
W2UGQ, Herman L. Klingsenberg, Jackson Heights, N. Y.
W2UL, Harold E. Smith, New Milford, N. J.
W2UNG, Arthur A. Neher, Jackson Heights, N. Y.
W2FFLZ, Charles Marvin Batcher, Jackson, Miss.
W5LS, James C. Johnson, Bellair, Texas
W6GTFU, Donald C. Lynn, Compton, Calif.
W6OMO, John R. DeYoung, Los Angeles, Calif.
W6UVK, Ralph Redson, Los Angeles, Calif.
W7NIB, Jack D. Coynar, Phoenix, Ariz.
W8INL, Victor L. Roberts, Elyria, Ohio
W8STC, Stanley T. Kuduk, Youngstown, Ohio
W8YAL, Frederic D. Sands, University Heights, Ohio
ex-W9OES, Otto Kramer, Emporia, Kans.
W9OFR, R. Melvin Whitaker, New Lenox, Ill.
W8AED, Arthur E. Ryberg, Mitchellville, is.
VE8RI, S. J. Ellis, Toronto.
VS1AX, John Ford, Singapore
Lenov Hatzelaw (of VP4ZL staff), Trinidad
Results, 18th ARRL DX Contest

You can't keep a DX man down! After the contests held during the lush years of the sunspot cycle when propagation conditions were at their best and DX signals found their way around our globe with ease, the months of February and March seemed quite a letdown to participants in the 18th ARRL International DX Competition. Less hardy souls would have given up the ghost and settled down to local ragchewing. Not so with the DX brethren! In spite of relatively poor band conditions, with 10 and 11 meters useless at times for long-distance contacts, participants in the 1952 contest showed they could take the good with the bad and produced a crop of many noteworthy phone and c.w. scores.

Competition for awards was confined to participants within each ARRL mainland section and in each country outside the W/VE/VO area submitting qualifying entries. Special certificates are being awarded to 68 c.w. operators and 55 "phone" operators in the U.S.-Canada area. Outside W/VE/VO, 64 c.w. and 39 "phone" awards are being made. Three multiple-operator stations, all in the U.S. area, will also receive certificate awards. The calls of all winners are listed in the accompanying score tabulations. Heartiest congratulations to the victors!

The C.W. Section

For many years the top c.w. score reported in the W/VE area has come from an eastern U.S. station. From the first post-World War II contest in 1947 until 1951, the highest totals came from W2, W2, W8, W3 and W3, in that order. Ben Holloman, W5ENE, of Dallas, Texas, apparently set out in 1952 to show that it can be done from other areas. His multiplier of 202 and 422 contacts earned a final score of 255,752 points and a comfortable lead on the rest of the field. During 81 hours of contest operation, W5ENE worked 97 countries. Ben used the following array of gear: separate finals and 4027 buffers on each band, working out of an "HT-18 VFO, p.p. 250THs on 27, 28 and 14 Mc., single 450THs on 3.5 and 7 Mc. Antennas were three-element rotaries on 14, 27 and 28 Mc. and ground planes on 3.5 and 7 Mc. His receiver was an ERO.

Another contestant who has been chalking up some fancy scores in DX contests the last few years was next in line. Jim Ringland, W8JIN, tallied 410 contacts with 85 countries, a multiplier of 193 and 237,390 points in 84 hours of operation. His contest rig consisted of a 310-B exciter driving an 813 and p.p. 250THs. A plentiful assortment of antennas was used: wide-spaced rotary arrays, with three elements on 14 Mc. and four on 28 Mc., a ground plane and a doubler on 3.5 Mc., vertical 8JK beam and doublers on 7 Mc.

A total of 220,458 points, from 406 contacts and 181 multiplier, gave W3DHM the third highest c.w. score in the W/VE area. Credit for this fine performance goes to Mel Wardell, W3DGM, the operator of W3DHM during the contest. The transmitting layout at DIHM utilized p.p. 806s and three-element rotaries on 14, 27 and 28 Mc., p.p. 833A's and doublers on 3.5 and 7 Mc.


The following tabulation lists the high scorer in each U.S. and Canadian licensing area:

- W1LOP 123,954 W9DAE 110,970
- W2WZ 205,740 VE1FA 20,784
- W3DHM 220,458 VE2WW 88,898
- W4KFC 196,116 VE3ZW 80,678
- W5ENE 255,752 VE4RO 92,400
- W6MVQ 150,174 VE5GZ 10,200
- W7PCB 94,065 VE6MN 71,288
- W8JIN 237,390 VE7VQ 4,904
- W9LM 162,771 VO2G 64


Ben Holloman, W5ENE, walked off with top c.w. honors in the U.S.-Canada area and won the Northern Texas c.w. award for the fifth consecutive year.

October 1952
 Especially outstanding from the standpoint of contacts per hour was the contest performance of Gordon Fisher, KG4AF, second high scorer outside W/VE/VO. Gordon logged more contacts than any other participant: 2085, at the average rate of 32.8 per hour. A close contender for the top score, he tallied 518,833 points and a multiplier of 83. His station layout: 75A2 receiver; p.p. 4-250As on 3.5, 7 and 14 Mc; Johnson Viking for 27-28 Mc; and 160-element wide-spaced beam on 14 Mc., 250-foot center-fed for 3.5, 7, 14, 27, 28 Mc. and 160 meters.

Veteran DX contest participant Katachi Nose, KH6IJ, came through next in line with 333,918 points, 1427 QSos and 78 multiplier. If the number of 589 and 590 reports in Katachi’s log is any indication, KH6IJ was really jarring plenty of receivers in the U.S.-Canada area.

Other high scores outside W/VE/VO: KH6AEX 275,724, KHJ6MG 260,996, V7P7NM 193,546, CO2BC 177,954, ZL1MB 171,920, KP4KD 169,443, KV4AQ 141,375, XE2OK 131,-376, KH6PM 124,551, KH6DK 110,926, KZ5LY 108,918.

Outside the U.S.-Canada area, the top scorers in each continental area were: Africa — ZS6W 97,392; Asia — JA21M 6818; Europe — GW3ZV 77,996; North America — KV4AA 541,890; Oceania — KH6IJ 383,918; South America — PY1ADA 46,968.

Leaders in number of contacts: KG4AF 2085, KV4AA 2015, KH6IJ 1427, KH6AEX 1242, KH6MG 1228, VP9NM 1114, CO2BC 1043, ZL1MB 1028, KP4KD 843, GW3ZV 842, XE2OK 789, KH6WU 768, KH6DK 725, KV4AQ 725, FASBG 713.

Highest multipliers following KV4AA’s 90 were KG4AF 83, KH6IJ 78, KH6AEX 74, KH6MG 71, KP4KD 65, KV4AQ 65, KH6MP 63, XE1SA 63, VP9NM 58, CO2BC 57, KP4JE 57, XE2OK 56, ZL1MB 56, VK2RA 55, KZ5LY 54, VK2GW 52, KH6DK 51, ZL1MQ 50.

The Phone Section

Outstanding operator in the W/VE/VO phone category was Rush Drake, W4E8K, whose score of 149,517 points, obtained from 449 contacts and 111 multiplier, gave him a healthy lead on all other contestants. Push-pull 450TI’s, rotaries on 14, 27 and 28 Mc, and a ground plane on 3.85 Mc, pushed W4E8K’s signal to the far corners of the earth; a 75A-1 handled the receiving end.

Joe Johnson, W6NIG, finished up with 102,951 points and was the only other phone entrant to top the 100,000 mark. He talked his way through 370 contacts for a multiplier of 98. Equipment line-up at W6NIG: single 450TI’s on 14 and 28 Mc., 320TL on 3.85 Mc., 14-Mc. three-element rotary, 28-Mc. four-element rotary; 75A-1 receiver.
With a healthy lead on his competitors, Rush Drake, W4ESK, scored 149,517 points to take the top 'phone position in the W/VE/VO area.

Third-place 'phone participant was Don Phillips, W3LTU, with 86,940 points (315 QSOs, 92 multiplier), followed by W1AFZ 84,252, W9RBI 75,558, W8JIN 75,423, W8BH 49,922, W5JVF 45,975, W7DL 41,406, W7HIA 39,480, W3GHS 39,039, W3PWR 38,520, W4VAN 37,233, VE7VO 37,062, W6PYH 36,642, VE3AUJ 36,018, W5BG 35,112, W2APU 34,452, W1CND 33,055, VE4RO 31,212, W8LIO 30,888, W3GFB 30,690.

Top score in each U. S. and Canadian licensing area:

- W1AFZ 84,252 W8PRZ 58,400
- W2APU 34,452 VE1ICU 144
- W3LTU 86,940 VE2BD 3752
- W4ESK 149,517 VE3AUJ 36,018
- W5JVF 45,975 VE4RO 31,212
- W6NG 102,951 VE6CX 54
- W7DL -1,406 VE7VO 37,062
- W8JIN 75,423
- W9RBI 75,558

Leaders in number of 'phone contacts:

Top 'phone multiplier were those of W4ESK 111, W9RBI 98, W6NG 93, W8JIN 93, W3LTU 92, W995C 97, W1AFZ 84, W4OM 84, W4DQH 81, W8PRZ 80, W6AM 78, W3GHS 77, W3BHV 76, W5JVF 75, W8LIO 71, W7HIA 70, W4GBO 69, W6VBZ 69, VE3AUJ 69, VE4RO 68, WV7VL 67, W5BG 66, W4VAN 63, W3GFB 62, W3PYH 60.

The talents of Katashi Nose, KH6J, third highest c.w. entrant outside W/VE/VO, are not confined just to brassounding. A top-notch with a key, he also knows how to handle a mike, as attested by his 'phone log, which showed 1022 contacts, multiplier of 52, 159,432 points. On the air for only 44 hours during the contest, KH6J knocked off contacts at a merry clip, averaged 23.2 per hour.

Following KH6J's top score was that of Syd Lashley, VP6SD, 157,990 points, a result of 884 contacts and 61 multiplier. VP6SD ran 500 watts to an 813, used beams throughout, four elements on 27 and 28 Mc., three elements on 14 Mc. and a Veo on 3.5 Mc.

Another Hawaiian, KH6AEX, cinched third place with 135,576 points. Other high-scoring 'phones: KH6TG 120,612, XE2W 93,869, TG9AD 66,801, VP6WR 57,772, ZS6DW 51,948, KP4U 21,141, KV4AQ 20,352, T2TG 18,381, ILBDV 15,776, KG4AF 15,148, G2PU 15,000, ZL1HY 14,976, F8SK 14,841, ZL1MQ 11,625, PY2CK 10,780, KT1DD 10,556.

Top scorers in each continental area were:
- Asia — ZS6DW 51,948; JASAB 441
- Europe — ILBDV 15,776; North America — VP6SD 157,990; Oceania — KH6J 159,432; South America — PY2CK 10,780.

Leaders in number of W/VE/VO 'phone contacts:
- KH6J 1022, VP6SD 884, KH6AEX 807, KH6MG 708, XE2W 559, ZS6DW 481, VP6WR 448, TG9AD 393, KG4AF 364, ILBDV 311, F8SK 291, KT1DD 257, KP4U 243, KV4AQ 212, ZL1HY 208, G2PU 200.

High multipliers:
- VP6SD 61, XE2W 59, KH6MG 57, TG9AD 57, KH6AEX 56, KH6J 52, VP6WR 44, ZS6DW 36, T2TG 33, KV4AQ 32, KP4U 29, G2PU 25, ZL1MQ 25, KH6DK 24, ZL1HY 24, PY2CK 22.

**Club Scores**

As in the 17th ARRL DX Contest, the competition this year for the special gavel award, offered to the radio club whose members submitted the highest aggregate score, resulted in a close race between the Frankford Radio Club of Philadelphia and the Potomac Valley Radio Club. Frankford succeeded in gaining the lead and wins its fifth DX Contest club award. The Northern California DX Club, fifth in the previous affair, pulled up to third and will bear watching next year. A tabulation showing the scores of the twenty-nine other clubs that entered the competition accompanies this report. Special certificates are being awarded to the leading 'phone and c.w. operators in each club that submitted the minimum number of entries required by the rules for individual awards.

October 1952
"Conditions spotty — 7 Mc. wonderful on second week end — heard five continents rolling in at one time." — W3FBA. "Conditions were the worst yet since the war, but despite that and a power cut here the first week end it was another good contest with a high standard of operating on the part of the Ws and VEs. Many thanks for the party." — ZESFP. "Sure was a good contest. Got seven new ones with my 20/30 watts. Both 20 and 40 had good openings on at least one week end. Worked KG4AF and Kv4AA on three bands." — W8EXZ. "It was the first time I took part in the contest, even though I have been licensed for many years, but it will not be the last time." — OZ8P. "Had lots of fun as usual. It's still as big a thrill as ever and the best contest for my money." — W2JME. "I am always amazed at how the Ws and VEs pick out my 20-watt signal when conditions and QRM are so bad!" — H8OJI. "Many DX stations have better signals than they think. Matters could be speeded up considerably if they called and signed less. DX stations should always give W or VE a call for check after the serial number. Many times we can't hear the comeback in a heavy line-up until the QRM dies down. These contests get better every year." — V10DW. "I was certainly pleased at the way the W operators conducted themselves. Only at the beginning of the contest did I encounter any confusion, that is, stations calling me while I was transmitting to another station." — VP9AL. "Had fun. Bet I was the only participant running 40 watts input in the U.S. who called ZL1MB once, signed once, and worked him in a pile-up!" — W7CITV. "It was a fine contest. The low frequencies really came into their own this year." — W6GAL. "This annual event is certainly the tops so far as we are concerned and let us hope it will continue for many years to come." — V8SDT. "Lots of fun. Your choice of times and splitting the contest into consecutive week ends for 'phone and c.w. with time break between was FB." — W6PYH.

Disqualifications

The following entrants are deemed ineligible for contest listings or awards in the 18th ARRL International DX Competition. In each case disqualification is for off-frequency operation as confirmed by one or more FCC citations or ad-

visory notices or two accredited ARRL Official Observer measurements: C.w.: W4FBD, W4EOO, W4FKA, W6MUF, W6YRA, W6GIL, L4UCE, L4UZI, ZS6OS. 'Phone: W1ATE, W1JFG, W2SKK, W3DMM, W4KWW, W6CNY, W8YRA.

... The dates of the 19th ARRL International DX Competition will be announced in November QST. It isn't too early to start making your preparations for taking part. Get those antennas and rigs tuned up now! ...

SCORES

Eighteenth International DX Competition

Operator of the station first listed in each section and country is winner for that area, unless otherwise indicated. The multiplier used by each station in determining score is given with the score — in the case of U.S.—Canada this is the total of the countries worked on each frequency band used; in the case of non-W/VE/VQ entries it is the total of the U.S.—Canada districts worked on each band.

... The number of contacts established is next listed. The letters A, B, and C approximate the input to the final stage at each station; A indicates power up to and including 100 watts; B indicates over 100 watts, up to and including 500 watts; C indicates over 500 watts. The total operating time to the nearest hour is given for each station and is the last digit following the score. Example of listings: W3DMM, 220,485-181-405-C74, or final score 220,485; multiplier 181; 406 contacts; power over 500 watts; total operating time 74 hours. Stations manned by more than one operator are grouped in order of score following single-operator station listings in each section or country tabulation; calls of participants at multipactor stations are listed in parentheses. Where three or more multioperator entries are listed, the top-scoring station is being awarded a certificate. The scores of 'phone entrants whose work was exclusive in the 10- and/or 11-meter bands are listed with an asterisk.

C. W. SCORES

<table>
<thead>
<tr>
<th>ATLANTIC DIVISION</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>W2GSS,</td>
<td>46,201-174-52-D3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W2KSI,</td>
<td>21,246-64-190-C4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W3F,</td>
<td>94,536-76-164-C2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W3KJ,</td>
<td>25,886-64-138-B3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W3KTA,</td>
<td>25,764-92-414-C4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W3KJ,</td>
<td>29,432-192-545-C5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W3KJ,</td>
<td>19,640-92-307-C4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W3KJ,</td>
<td>39,940-92-245-C4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W3KJ,</td>
<td>29,540-92-245-C4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W3KJ,</td>
<td>19,640-92-245-C4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W3KJ,</td>
<td>39,940-92-245-C4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W3KJ,</td>
<td>29,540-92-245-C4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W3KJ,</td>
<td>19,640-92-245-C4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W3KJ,</td>
<td>39,940-92-245-C4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W3KJ,</td>
<td>29,540-92-245-C4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W3KJ,</td>
<td>19,640-92-245-C4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W3KJ,</td>
<td>39,940-92-245-C4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W3KJ,</td>
<td>29,540-92-245-C4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W3KJ,</td>
<td>19,640-92-245-C4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W3KJ,</td>
<td>39,940-92-245-C4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W3KJ,</td>
<td>29,540-92-245-C4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W3KJ,</td>
<td>19,640-92-245-C4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W3KJ,</td>
<td>39,940-92-245-C4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W3KJ,</td>
<td>29,540-92-245-C4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W3KJ,</td>
<td>19,640-92-245-C4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W3KJ,</td>
<td>39,940-92-245-C4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W3KJ,</td>
<td>29,540-92-245-C4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W3KJ,</td>
<td>19,640-92-245-C4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W3KJ,</td>
<td>39,940-92-245-C4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W3KJ,</td>
<td>29,540-92-245-C4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W3KJ,</td>
<td>19,640-92-245-C4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W3KJ,</td>
<td>39,940-92-245-C4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W3KJ,</td>
<td>29,540-92-245-C4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W3KJ,</td>
<td>19,640-92-245-C4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W3KJ,</td>
<td>39,940-92-245-C4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W3KJ,</td>
<td>29,540-92-245-C4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W3KJ,</td>
<td>19,640-92-245-C4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W3KJ,</td>
<td>39,940-92-245-C4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W3KJ,</td>
<td>29,540-92-245-C4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W3KJ,</td>
<td>19,640-92-245-C4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Country</td>
<td>Population</td>
<td>Year</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>------------</td>
<td>------------</td>
<td>------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Denmark</td>
<td>5,632,000</td>
<td>2021</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>England</td>
<td>68,563,000</td>
<td>2021</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Norway</td>
<td>5,392,000</td>
<td>2021</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The Netherlands</td>
<td>17,652,000</td>
<td>2021</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Japan</td>
<td>126,000,000</td>
<td>2021</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Atlantic Division, East Pennsylvania**

<table>
<thead>
<tr>
<th>State</th>
<th>Population</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>WLB</td>
<td>15,415,000</td>
<td>2021</td>
</tr>
<tr>
<td>WAC</td>
<td>39,348,000</td>
<td>2021</td>
</tr>
<tr>
<td>WAG</td>
<td>9,641,000</td>
<td>2021</td>
</tr>
<tr>
<td>WJR</td>
<td>12,473,000</td>
<td>2021</td>
</tr>
<tr>
<td>WWH</td>
<td>14,780,000</td>
<td>2021</td>
</tr>
<tr>
<td>WBI</td>
<td>23,754,000</td>
<td>2021</td>
</tr>
<tr>
<td>WUI</td>
<td>30,350,000</td>
<td>2021</td>
</tr>
</tbody>
</table>

**Central Division, Illinois**

<table>
<thead>
<tr>
<th>Region</th>
<th>Population</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>WLOC</td>
<td>13,260,000</td>
<td>2021</td>
</tr>
<tr>
<td>WRE</td>
<td>18,385,000</td>
<td>2021</td>
</tr>
<tr>
<td>WAPA</td>
<td>12,575,000</td>
<td>2021</td>
</tr>
<tr>
<td>WIFB</td>
<td>12,250,000</td>
<td>2021</td>
</tr>
<tr>
<td>WINA</td>
<td>11,320,000</td>
<td>2021</td>
</tr>
<tr>
<td>WILX</td>
<td>13,525,000</td>
<td>2021</td>
</tr>
<tr>
<td>WIDR</td>
<td>13,260,000</td>
<td>2021</td>
</tr>
<tr>
<td>WIZK</td>
<td>12,345,000</td>
<td>2021</td>
</tr>
</tbody>
</table>

**Dakota Division, No. Dakota**

<table>
<thead>
<tr>
<th>Region</th>
<th>Population</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>WBBK</td>
<td>18,000,000</td>
<td>2021</td>
</tr>
<tr>
<td>WBSK</td>
<td>16,710,000</td>
<td>2021</td>
</tr>
<tr>
<td>WBO</td>
<td>15,614,000</td>
<td>2021</td>
</tr>
<tr>
<td>WSDG</td>
<td>11,320,000</td>
<td>2021</td>
</tr>
<tr>
<td>WYKF</td>
<td>14,325,000</td>
<td>2021</td>
</tr>
</tbody>
</table>

**South America**

<table>
<thead>
<tr>
<th>Country</th>
<th>Population</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Argentina</td>
<td>43,496,000</td>
<td>2021</td>
</tr>
<tr>
<td>Brazil</td>
<td>24,968,000</td>
<td>2021</td>
</tr>
<tr>
<td>Chile</td>
<td>18,190,000</td>
<td>2021</td>
</tr>
<tr>
<td>Colombia</td>
<td>20,600,000</td>
<td>2021</td>
</tr>
<tr>
<td>Peru</td>
<td>24,570,000</td>
<td>2021</td>
</tr>
<tr>
<td>Venezuela</td>
<td>23,400,000</td>
<td>2021</td>
</tr>
</tbody>
</table>

---

**French Operators**

1. W5WQH operator.
2. W5PZZC operator.
3. W5WQ operator.
4. W5WOQ operator.
5. W5LZU operator.
The function of the ARRL QSL Bureau system is to facilitate delivery of QSL cards and the QSL cards which arrive from amateurs in other parts of the world. Its operation is made possible by volunteer managers in each W, K and VE call area. All you have to do is send your QSL manager (see list below) a stamped self-addressed envelope of about 4½ by 9 inches to get the QSLs. The ARRL QSL Bureau will see that these QSLs are sent to your address in the usual place on the front of the envelope and your call printed in capital letters in the upper left-hand corner. For a list of overseas bureaus see p. 33, June 72 QST.

W1, K1 - J. R. Baker, Jr., W1JOI, Box 232, Iwipaw, Mass.  
W2, K2 - H. W. Yahnel, W2SN, Lake Ave., Holmesta, N. J.  
W3, K3 - Joseh Biermann, W3KT, Box 34, Philadelphia 5, Penna.  
W4, K4 - Thomas M. Moss, W4HYW, Box 644, Municipal Airport Branch, Atlanta, Ga.  
W5, K5 - Will A. Shaw, W5ARV, 1610 Eight Ave., Fort Worth 4, Texas  
W6, K6 - Hercules G. Greer, W6TT, 414 Fairmont St., Oakland, Calif.  
W7, K7 - Mary Ann Tatro, W7FWR, 513 N. Central, Olympia, Wash.  
W8, K8 - Norman W. Aiken, W8LSJ, 701 East 240th St., Euclid 31, Ohio  
W9, K9 - John E. Schneider, W9CFT, 311 W. Ross Ave., Wasau, Wisc.  
W8, K8 - Alva A. Smith, W8DMA, 238 East Main St., Caledonia, Minn.  
VE1 - J. J. Fader, VE1FQ, 125 Henry St., Halifax, N. S.  
VE2 - Austin A. Scott, VE2SM, 5400 Jeanne Mance, Montreal 8, Que.  
VE3 - W. Bert Knowles, VE3VB, Lanark, Ont.  
VE4 - Len Coff, VE4LC, 386 Rutland St., St. James, Man.  
VE5 - Fred Ward, VE5OP, 806 Cross Avenue, Woonsocket, R. I.  
VE6 - W. R. Savage, VE6EIO, 325 15th St., North Lethbridge, Alta.  
VE7 - H. R. Hubbard, VE7HR, 1339 Michigan St., Victoria, B. C.  
VE8 - Roy Walton, VESZC, Box 534, Whitehorse, Y. T.  
KF4 - W. E. Mayer, KF4KD, Box 1061, San Juan, P. R.  
KZ6 - P. G. Comins, EZSPC, Box 407, St. John's, N. F.  
KFI9 - Andrew H. Fuchikami, K1GBA, 2543 Namos Dr., Honolulu, T. H.  
KL7 - Box 75, Douglas, Alaska
How:

We've all heard a lot about that inevitable statute, the so-called law of diminishing returns. As our 200-country DXers will heartily concur, it can be quite a statistical cross to bear.

The tabulation below will give an interesting illustration of the thing and its irreducible clutches. Beginning with the postwar DXCC listing in 1947's July QST, we set up from subsequent July Honor Rolls a tally of new-conformed counties per year for several of our perennial Century Club Honor Rollers:

<table>
<thead>
<tr>
<th>C.W.-PHONE</th>
<th>(47*48)</th>
<th>(48*49)</th>
<th>(49*50)</th>
<th>(50*51)</th>
<th>(51*58)</th>
</tr>
</thead>
<tbody>
<tr>
<td>W1FH</td>
<td>51</td>
<td>23</td>
<td>16</td>
<td>6</td>
<td>9</td>
</tr>
<tr>
<td>W8HEGW</td>
<td>70</td>
<td>20</td>
<td>17</td>
<td>15</td>
<td>6</td>
</tr>
<tr>
<td>W2BHA</td>
<td>56</td>
<td>35</td>
<td>19</td>
<td>9</td>
<td>7</td>
</tr>
<tr>
<td>W3BEE</td>
<td>--</td>
<td>37</td>
<td>16</td>
<td>10</td>
<td>11</td>
</tr>
<tr>
<td>Q2FL</td>
<td>--</td>
<td>30</td>
<td>18</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td>50</td>
<td>30</td>
<td>17.2</td>
<td>8.6</td>
<td>8</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PHONE</th>
<th>(47*48)</th>
<th>(48*49)</th>
<th>(49*50)</th>
<th>(50*51)</th>
<th>(51*58)</th>
</tr>
</thead>
<tbody>
<tr>
<td>W1FH</td>
<td>50</td>
<td>24</td>
<td>17</td>
<td>8</td>
<td>16</td>
</tr>
<tr>
<td>W2BHA</td>
<td>--</td>
<td>28</td>
<td>23</td>
<td>15</td>
<td>10</td>
</tr>
<tr>
<td>W11C6X</td>
<td>--</td>
<td>15</td>
<td>21</td>
<td>13</td>
<td>18</td>
</tr>
<tr>
<td>VQ4ERB</td>
<td>--</td>
<td>28</td>
<td>30</td>
<td>22</td>
<td>18</td>
</tr>
<tr>
<td>XP1AC</td>
<td>--</td>
<td>32</td>
<td>22</td>
<td>15</td>
<td>17</td>
</tr>
<tr>
<td>W8HEGW</td>
<td>--</td>
<td>30</td>
<td>21</td>
<td>11</td>
<td>11</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td>50</td>
<td>23.2</td>
<td>23.8</td>
<td>15.8</td>
<td>14.7</td>
</tr>
</tbody>
</table>

The average figures show that the pinch on 'phone is not yet too severe (and don't ask us if two-tenths of a QSL is okay for DXCC credit). Also, that 1951-1952 was a boom year for new ones, poor conditions notwithstanding. But the c.w. -phone average molecule is much more than one new QSL per month — slim pickin's. Of course, one can always change QTH drastically enough to start all over again — ouch!

What:

Twenty has held up pretty well during the daytime but you never know what will happen after dark. Whatever does happen happens fast! Temporarily turning his beam by hand, W8H1ZJ developed his beams on Dulc BC (14-02), FM (008), MB (037), F7KEAE (120), FL8MY (120), F7Q8AK (012), AP (024), HU3L (054), HZ1MY (056), IT1C/Tristead (036), JY1OOG (004), K6BAH (840), KC6s DX (025), QV (010), K5J6A (000), K6Z6W (050), K56A1 (043), PJ2s AC (075), AD (062), CC (024), SP2SI (082), SW8WB (038), TAA3A (022), TF3MI (030), TG9CR (076), VK0DD (057), VP4O (099), V8GCO (068), Vs5 1DU (080), LER (067), 5ELA, 8BA (070), SGC (045), ZB1KQ (018), ZE5JP (028), ZK1AB (004), ZS7C (008), 4X4BR (058), 4W1MY (113) and 9SAAD (095), ZC2MAC escaped Van's clutches. He understands KS6AA is now QRT and back in Hawaii ....... CRE5B (054), FFS8 (064), FL8MY, H4A5FA, K6BAH/K6H, K610MP/K6B (116), MF2AG (075), PJ2CB (095), SU1UG (060), VR2CC (065), Y1ZAM (078), ZAZKAA (080), ZB2A (040), ZC4RS (065), ZC6UNJ (110), ZD2HAH (068) and ZP9AH (013) fell prey to Elizabethtown's W3MFW ....... Pending

* DX Editor, QST.

October 1952 55
Members of the Navy Mike and Key Club in the Far East—gathered here at JAK2W, Yokosuka Naval Base—were (front, l. to r.) W9CMU, W6F PW, W1CO, W9WRO, W4FA, W6GOO, W9RFD, W9FBA, W3FOF, W4JPM/JA2MB, W3KJF/JA2WK, W9-HU/JA2VP, JAK2W, and JAS3M. Club officers are W6GOO, president; W4JPM, vice-president; and W3KJF, secretary-treasurer.

The summer heat should be nearly over as far as other hands are concerned. Forty got hot enough for W3MFW to nab Cayman Islander YPS9H (3007) and VR2CO (3070) —— KH6ARA (0099), worked by W9EZE, turns out to be ex-W2AS. F8R8K told W9NP what F8R8P (226) said: CJ1QW (048) and ZL4AB broke in W9MC's new r.f. section. —— W9EESQ wasn't phazed by the QI6N. Lou cornered E12Z, CE65M, KV4AE, F8R8J, and others. One Z53M3Z tickled the fancy of W1T6Z. Walter thinks more of VP4LZ (0093) —— W92JJ hooked his QRP 117L7G2 c.c. oscillator to a 45-foot piece of wire and raised F8R8K (W2BBK) without fum. —— F91A0F7 was DJ1SZ. F91A0F7, Z52A (190) and ZI3Z0X

If you're a regular on ten you've undoubtedly bumped into W22XMM/MM. Ed Collins of ARRl HG, dug this pitch on Kurt's Flying Enterprise 1 layout: A 0A0QA-807 exciter drives p.p. 4-220A with Class B 4-2400A modulating. The Captain receives with a F5B0-D and H9QX2E.

A 5-Kw. n.e. generator contributes the power and the antenna is a 3-element close-spaced rotary. W22XMM/MM intends to give Rothman's modulator a modulated check. HV is down about 5% thus, the band could level off for some consistent performance right about now. W4UAG decided that 21 Mc. would be a good band a feller might use to crack this DX game. Wayne scored with C121F, PY7Q, OK1JR, and 996X on the (2150-3150). —— F91A0F7, Z52A (190) and ZI3Z0X

Where:

Since the powers that be got around to legalizing ham radio for JAs (Japanese nationals), QSLs may be sent via JARL, P. O. Box 277, Tokyo, Japan. However, QSLs are not at hand. W3MFW advises that any K13A that gets their cards if sent to K136-60-and-so, Canton Island, Phoenix Group, South Pacific. —— In addition to the QTH router to follow, those stations desire QSLs via RE6B: HZ1TA, JY1QO, MP2A9, SUXZ, VUKAF, YZ8AM, Y13BZ1, and Z52A.

AF2L Box 151, Karachi, Pakistan
B148 Box 316, Taipeh, Formosa
CAB C. Terrail, M5A, APO 63, 2 PM, San Francisco, Calif.
CMC ex-CJ8K Box 410, Taipeh, Formosa
CJAHU Nuno Pinheiro, Bair Airport, Cape Verde Islands
CRU5U (QSL via W4FYJ
CRU9X Antonia, Box 378, Lusanda, Angola
EA6AD Box 185, Santa Isabel, Fernando Poo Island, Eq Guinea
ESSBB (QSL via W4NWO
ESSAN Marcel Verbe, Box 971, Dakar, Fr. West Africa
ESSAQ Emile Henry, Aerodrome de Temalat, via Gao, Sudan
ESSAS (QSL to F8SAN
ex-F8SHM P. O. Box 478, Pointe-Noire, Fr. Equatorial Africa
ESSAJ (QSL to V12BDD
ESSAV (QSL to V32OFK
ESSAP Gus Roblot, Box 192, St. Pierre & Miquelon
ESSAV (QSL to W22B0
ESSAC Vincent Fessart, Port Vila, New Hibernia
ESSBD APO 47, 2 PM, San Francisco, Calif.
ESSDC (QSL via W4BKO

Here's how Bill Storer whiled away the hours on Macouranie Island as VK2BS. Baby, it's cold outside! (Photo courtesy W5KUC, W5DCX)
Tidbits:

Africa — Q5GSA almost dropped his upper when, perusing the Belgian Congo Telecommunication Service's latest ham-radio reprint release, he found that the 80-meter band allocation had been omitted. Andy got off a fast letter to the Director and straightened him out — Q5GSA means to give 3.5 Me. the works this season — Q5GNV and F5SAJ are QRT for vacations in Belgium and France, respectively. Q5GSA is now a contest man in the Congo — F5BSE formerly signed F8BB and E5AD now has the same mail QTH as E5AB AB and AC — ON5AS is ex-EK1KB; 1504 has signed active at an Italian Somaliland — An original dispenser of Dakar contacts, ex-F8MM is now escribewed in central (French Equatorial) Africa. W1APA hears Henri is soon to be on with an F8A label pronto — Dutch Oregon, ex-M2TZE, is now doing an encore in Northern Africa. Back in Benghazi now, he expects to be radio-active by Christmas — W5DCO cleanings via W5KUC/UCQ facilities; V86BTC is rumored available. F5SAJ unbroke 1200 QSLs from his French home QTH. F5SAE returned to France temporarily but Fi8AQ has a c.s. 25-watt fired up. ZS6GYN may sign a ZD7 call early this month with 50 watts c.w. and "phone, all bands. VQ4BU intends VQ3 activity and VQ4HF has sights set similarly for ZD8. 12RO wants to know something re F800K.

Occas — KM6BB pulled out of Midway, became KM6BB/W for a while and then headed for the Middle East on an unusual assignment. He was one of the crew that flew a specially appointed and procured plane to Arabia for delivery to King Ibn Saud. Among the elaborate dressings aboard is a revolving throne and an on-board elevator. George will shortly be signing an ICQ call. Shipping out of Honolulu as radio for MSTS, K160GB has a chance to hit the rare spots. His last work ashore on Johnston Island produced an even 100 contacts, 63 of them We. Bill previously signed W1FJH/K7E6/K6/K3S and W1PJE, originated and conducted the "Radio Code School of the Air" over WRUL. He also did a trick at WCOJ.

(Continued on page 188)
An Antenna Coupler for 50 Mc.

Adapting Standard Coupling Methods to 6-Meter Operation

Until recently v.h.f. men have had little use for antenna couplers. It was possible to put power into their arrays satisfactorily without them — why bother? TVI problems have begun to change this attitude, however, and the imminence of u.h.f. TV makes the use of something more than simple inductive coupling almost mandatory. Shielding, filtering and the use of low-pass filters and antenna couplers will become fashionable in v.h.f. circles as soon as u.h.f. TV receivers find their way into our neighbors’ homes.

To keep down harmonic radiation, at least two steps are necessary. First, the equipment must be shielded, to prevent radiation of harmonics by the tank circuits themselves. Then the output of the transmitter must be fed through some sort of selective circuit or combination of circuits that will pass the desired frequency and reject the harmonics. In the case of operation on 50 and 144 Mc., a simple antenna coupler may be all that is required with a shielded transmitter in many cases, as the order of harmonics that can cause interference to either v.h.f. or u.h.f. TV is fairly high.

A suitable antenna coupler for 144-Mc. use was described by W8DUL in QST for January, 1952. It and the one for 50 Mc. shown herewith follow standard practice outlined many times before in QST and the Handbook, so only the basic details are given here. The 50-Mc. coupler is connected to the transmitter output by means of a coaxial line of any convenient length. The coupling loop $L_2$, should have a reactance at the operating frequency of approximately the impedance of the coaxial line from the transmitter. It is resonated by means of $C_2$ which in this unit runs at about 25 per cent of maximum capacitance. The taps on $L_1$ are set up for 300-ohm line, but their position may be varied to take care of any balanced transmission line.

A standard $3 \times 4 \times 5$-inch utility box makes a convenient base for the coupler, the principal components mounting on the top plate. The series-tuning condenser and the coaxial fitting are mounted on the side panel. The ends of $L_1$ are soldered to the lugs on the main tuning capacitor, and the coupling loop is supported by stand-offs fastened to the strap that ties the two end plates of the tuning condenser together. The leads from the input jack are made of 72-ohm transmitting Twin-Lead.

The antenna coupler should be adjusted for minimum standing-wave ratio on the coaxial line, as indicated on an s.w.r. bridge connected between the transmitter and the coupler. Adjust $C_1, C_2$ and the positions of the taps for minimum s.w.r. If no s.w.r. indicator is available, adjust first $C_2$ and then $C_1$ for maximum loading, varying the coupling at the transmitter end for the loading desired. The approximate position for the taps can be found by moving them out from the center of the coil until maximum loading is achieved.

The coupler can be used at any point between the transmitter and the array, including mounting the coupling unit at the array itself, if provision is made for weatherproofing the installation. The range of the tuned circuits as given is great enough to permit the use of the coupler in the 28-Mc. band also, if the builder so desires.

(Continued on page 139)

CONDUCTED BY E. P. TILTON,* WIHDQ

It was 18 years ago almost to the day, as we write, that the late Ross Hull embarked on the project that was to result in a complete overhauling of thinking in regard to wave propagation on the frequencies above 30 Mc. Ross got his urge to try out directive antennas on 56 Mc. in August of 1934, and he ran smack into the peak inversion of the year the very first time he tried out his famous stick-and-wire array strung between the trees at Selden Hill.

To him, as to everyone then on 5 meters, it appeared that the array had worked nothing short of a miracle, for here were solid S9 signals between Boston and West Hartford, an unheard-of thing in those days of 10-watt oscillator rigs, one-tube superregenerative receivers and halfwave vertical dipoles. For days and nights on end, Ross and his associates at Headquarters knocked themselves out working Eastern New England W1s by the dozen, until one night suddenly there were no signals coming through, beam or no beam. Why?

This sudden interruption of reception was even more of a challenge to Ross' inquiring mind than had been the first flush of success. With characteristic enthusiasm he embarked on a two-year program of signal observation and recording that led to the development of the theory of air-mass boundary bending of v.h.f. waves — perhaps the finest example of scientific investigation ever to be performed by a radio amateur.

In the years since, the closing days of summer have never failed to provide v.h.f. operators something of a thrill that the 5-meter gang experienced for the first time back in 1934. So it was in August, 1952. There had been widespread griping by the v.h.f. fraternity over the poor conditions encountered earlier, but as the month came to a close it seemed to be making up for the shortcomings of the first half of 1952.

* V.H.F. Editor, QST.

Officials at the 2 Meters and Down Club picnic, Los Angeles, July 27th. L. to r.: Brown, W6FYN, secretary; Reinsch, W6RJS, vice-president; Myers, W6IJK, 2-meter net control; Bodine, W6IJO, treasurer; Wing, W6MVH, past-president; Miller, W6VBG, president; Greenlee, W6ESR, ARRL SCM; Griggs, W6K, ARRL director.

October 1952

August in Review

Work on 144 Mc. between the Bay Area and Southern California was reported by W6MIIF, San Francisco. On the night of August 9th, Dave worked W6IJK/6, Mt. Pinos, some 300 miles to the south, much of the distance being over the rugged Coast Range mountains. It was the first time he had heard anyone that far south. W6IJK/6 is known to have worked W6AJF, Sonoma, and W6VSV/6 on Vollmer Peak, also, distances of 300 to 325 miles. This mileage is not great in terms of 2-meter coverage in more open terrain, but it is first-class DX over California's rugged mountains.

W9OUV, Hammond, Ind., reports hearing the signal of W5USA on 144 Mc., the night of Aug. 12th, beginning about 6:30 P.M. EDT. From Hammond to Houston, Tex., is nearly 1000 miles, the best north-south DX reported this year to date.

TV signals appearing on several of the high channels not used locally enabled W8SV, St. Cloud, Minn., to catch a nice 2-meter opening to the south on Aug. 17th. Beginning about 8:30 P.M., Bob worked W9MBI, Coleta, Ill., W9REM, Downers Grove, W9RXXS, location not available, W9LF, Creve Coeur, and W9ALU, Metamora, all good hauls from 50 miles above Minneapolis.

Tropospheric bending was good along the Atlantic Seaboard on several occasions, and some nice DX on 144 and 432 Mc. resulted. W1PBB, Monroe, Conn., worked W2QED, Seabrook, N. J., on 420 on the night of the 19th, with S9-plus signals over the 170-mile path. W1PBB also heard W3BSV, Salisbury, Md., about 250 miles. The next two mornings and evenings provided 420-Mc. contacts between your condutor and W2QED, signals on the morning of the 21st being almost identical on 144 and 435 Mc. This is a 210-mile hop.
It takes a real hang-up opening to push 2-meter signals over the Allegheny Plateau that lies between the 2-meter activity centers of the East and the Great Lakes area, but this path is broken down a few times each year, usually in late August or early September. This year it happened on Aug. 26th. It’s too early to give complete details as we write, but the report of W2UK, New Brunswick, N. J., shows what was going on. Tommy began by working WTSY, Pine City N. Y., near Elmira, a rough 160-mile path, early in the evening. Later W2ORI, Lockport, N. Y., W3QKI, Erie, Pa., and WSSFG, Hubbard, Ohio, were worked, and W2RPO near Buffalo was heard. Then just after 11 P.M., W8BFQ, Everett, Ohio, began to roll in S9-plus. Margaret was busy until the early morning hours, providing Ohio contacts for scores of eager W2s. K3AZ, near Mays Landing, N. J., worked W8BFQ and W8ELE in Detroit, and heard eight other Ohio, Michigan and West Virginia stations.

1200 Miles on 144 Mc. — New 220-Mc. Record — 500 Miles on 435 Mc.

Just as this issue of QST was going to press a series of v.h.f. openings got underway that promises to break all records for numbers of stations active and areas covered. Beginning the night of Sept. 7th, the 2-meter band went on a rampage from Minnesota to Texas, spreading out to the northeast the following two days and nights. Literally hundreds of contacts out to 1000 miles and more have been reported already, with the best DX so far being W8EMS, Adair, Iowa, to W1RUF, Wilbram, Mass., close to 1200 miles.

At 9 A.M. on the 9th, WSBFQ, Everett, Ohio, and W1HDQ, Canton, Conn., worked-two way on 220 Mc., a new record distance for that band, about 450 miles. On the morning of the 10th, W8BFQ heard the 435-Mc. signal of W2QED, Seabrook, N. J., but Ken was not able to hear her for a two-way 420-Mc. record. The opening was still in progress at press time.

On the night of Aug. 28th, FASRJ, Algiers, had a one-hour crossband QSO, 435 to 144 Mc., with F0BG, Toulon, France, a distance close to 500 miles. Details next month.

New England was on the edge of this one, and the only W1 known to have worked the W8s was W1PBB in Monroe, Conn., who caught W8BFQ and W8SFG, W1RUF, who holds forth in one of New England’s best v.h.f. spots, the top of Wilbram Mountain, near Springfield, Mass., heard W8BFQ but could not raise her.

This end-of-August opening was associated with a large and stable high-pressure center as it moved slowly across the eastern half of the country. It was blanketing the Atlantic Seaboard by the 27th, and 144- and 420-Mc. enthusiasts along the coast experienced a night that they will long remember. From Massachusetts to North Carolina, everyone was working out on 144 Mc., and there were several near misses on the 420-Mc. record. W2EH, Collingswood, W2BV, Haddon Heights, W2HEK, Woodstown, and W2QED, Seabrook, N. J., were all putting good signals into W1 on 420. W1PBB worked W3BSV, for their first 420-Mc. two-way, only a few miles short of the existing record, and heard W3RI, near Washington, at just the record distance. The inversion was still hanging along the coast as this copy was turned in, and it is known that W2BV and W2NLY worked W4CVQ, Raleigh, N. C., on the 28th. There may be more coming up; Labor Day week end is well known as a time for things to happen in v.h.f. circles.

Here and There on the V.H.F. Bands

The Purple Glow V.H.F. Club of Albuquerque, New Mexico, is planning another balloon test in cooperation with Air Force MARS. The PG-2, carrying a crystal-controlled o.w. transmitter operating on 143.99 Mc., will be launched on October 25th. The signal will be keyed continuously at slow speed using the call AFPCA and a three-letter opener for identification. Launching time will be 7:30 P.M. MST, and an easterly drift of 20 to 24 hours duration is anticipated. All 2-meter operators are requested to watch for the balloon transmitters and report reception details to WSCA, Tijeras, New Mexico.

While there is plenty of 2-meter activity around the New York area in the evening hours, W2MWE, Woodside, N. Y., would like to stir up daylight hours. To this end, he schedules W2AAY daily at 10:30 A.M., and
would welcome calls from others who have daytime operating hours.

240 and 420 Mc.

Things are beginning to roll on 240 Mc., and we can thank the Technicians for this. Their interest and activity have provided the impetus to get some of the rest of us started, and now activity reports are coming from many sections of the country. WS4CJ writes that at least three follows are working on 220 in the New Orleans area regularly, and looking for more company. WNS1S, Algie, La., has an 820B running at 50 Mc., fed by 4-element array. WS4ML, Harvey, La., runs an 822A at 25 watts, with a 4-element beam. W5WQ, with a pair of 24G running 120 watts, and a 16-element array. If there are others working in the New Orleans area, be sure to notify us in 220 Mc., these boys would be glad to hear from them.

W4HJK, Collierville, Tenn., is getting set for 220 again, with the hope of working down to the Texas 220-Mc. stations. Paul has a rig with an 822A in the final, a 400 preamplifier — HFS combination for receiving, and was working on a 32-element array at last report. W5RCI, Marks, Mississippi, Paul's partner in the 220-Mc. venture, has an 829B rig ready to go. He reports fairly frequent reception of Channel 13 from Columbus, Ala., so it appears that the DX should be possible. The first W4HJK-W5RCI 220-Mc. contact was on 220 Mc., made on August 26th, at 99 signals. They worked again next morning and noon, and still on weaker signals.

W4HJK, WBYN, and W5RCI are also on 220 Mc. With the aid of W4HJK's 420-Mc. converter, W5RCI has worked WBYN across the country, 144 to 420 Mc. The distance is 80 miles. W5RCI has a 16-element aluminum-welded array. WBYN has an 822A final amplifier, a 32-element array. Pressure from the boys around Cleveland, Ohio, got W5BXD, Detroit, Mich., started on 220. He has an 829B running 60 watts input, no modulation. He is working with a 16-element array. His receiver uses two 6BK7 parallel-connected cascaded stages, a GBX7 mixer-cathode follower and a 6DS overmodULATOR, and harmonic amplifier giving 25 times multiplication of the carrier frequency. His first contact of 220-Mc. activity in late July netted him contacts with W3SJS, Parma, Ohio, W3PQ, Cleveland, IY, North Olmstead, W3FC-BFQ, Everett, and FKQ, Hudson, distance up to 125 miles. Next stop (the hopes) is W5BN at Columbus. W5BXD is also working on 420-Mc. TV gear.

Keeping regular schedules pays off in contacts on 420 Mc. too. During the month of July, W4QED, Seabrook, N. J., had 48 QSOs on 420 with 9 different stations various times. Just a month ago the August record is running ahead of this as we write. Ken is on 435.6 Mc. each Thursday and Saturday from 11 A.M. to 1 P.M., if he misses it, he says it will be other way when conditions appear promising. W5FXJ and W5TLM of Dallas are on nightly from 10 to 11 P.M. W5KM's W5BKA is on 220-Mc. in the final stage delivering about 10 watts output. W5RE is back on from his new home near Washington with a new 4X-150 transmitter.

WS4S, Victoria, Texas, the southern end of the 220-Mc. record, is now operating on 420 also, using a 9903 as a tripler to 432.3 Mc. His 5-over-5 array is about 55 feet above ground level.

Just too late for inclusion in last month's column, we received word from W5AYU, Houston, Texas, that he had made contact crossband, 432–144 Mc., with W4AXY at Austin, 150 miles. WS4ST at Austin and W5OSN have also heard contacts of W4AXY's 432-Mc. signal on several occasions. The first 432-Mc. 2-way W5AXY-A711 contact was made early in the morning of August 25th. W5AXY heard W5OSN for the first time the same morning.

The 432-Mc. has received a lot of attention. It uses a 6A4 grounded-grid r.f. amplifier with a half-wave through-line plate circuit, tuned at the open end by a Johnson 5MM11 variable capacitor. The trough is 1½ inches wide, 2 inches deep and 6½ inches long. The plate line is made of 1/2-inch aluminum tubing, fed to the grid lead in at 1½ inches from the tube end. The signal is coupled by the line 1½ inches from the plate end to a coaxial-line 1N21B crystal mixer. The mixer line is 5 inches long and 1 inch in diameter, with 1-inch tubing for the line conductor, the coupling being 1½ inches from the shorted end. The crystal tube is 1 inch long. The 432-Mc. transmit frequency, the i.f. is 5 Mc. A doubler stage in the mixer-injection chain operates 212 to 424 Mc., and the 212-Mc. energy serves as an injection source for a 220-Mc. converter using the same i.f.

There is continued interest in amateur TV on 420 Mc., and some discussion of the formation of an amateur TV society to aid in exchanging ideas among interested experimenters. The TV enthusiasts are scattered far and wide, unfortunately mostly one to a neighborhood. W4BDD, W4BTH, W8FPH, W8FUP, and W8MAP have been heard from regard to amateur TV in recent weeks, and in the last year or so we've had letters about TV experimental work from just about every section of the country. Several of these following or involved in equipment in their work. W4MS has made prints of the W4BDD modifications on the original Q975 TV circuits, and the design of the camera is nearly completed, and will make available to genuinely-interested parties.

October 1952
DOCKET 10237

Editor, QST:

Regarding proposed changes ... I wish to state that I believe the changes will be detrimental and think they should not be made. ... 

— J. Roy Medow, W8SPP

822 West 22 Street

Kearney, Neb.

Editor, QST:

As a natural-born highly-taxed long-suffering citizen of this country I object to Docket No. 10237 as proposed. ... It should be obvious to amateurs throughout our country that without ARRL we could not long survive as a group of ardent radio enthusiasts, privileged to pursue our hobby with a minimum of bureaucratic restrictions. More power to ARRL.

— Glen H. Byars, W9BNF

R.F.D. I, Box 216

Findlay, Ohio

Editor, QST:

... I urge ARRL to fight this bureaucratic encroachment on the routine operation of amateur stations. ... 

— Ross Mardhead, W9AKO

2901 S. Congress Ave

Austin, Texas

Editor, QST:

I am definitely against the proposed restricted band segments for calling and answering. The system would do no more than try the patience of the most tolerant ham, so precise is the required procedure. ...

— William E. Harris, W7TVN

20 Allen St.

Berkwich, Me.

Editor, QST:

... The Great Bay Radio Association with a membership of about 40 amateurs protests the proposed new section 12.122. We can see little merit in calling-frequency segments as proposed except possibly during emergency operations. It means the practical loss of these kilocycles for normal amateur use and saddles the amateur with another group of regulations and band edges to watch. ...

— Walter M. Amason, W1PLN

118 Robinson Place

Red Bank, N. J.

Editor, QST:

The one hundred and twenty licensed members of this organization wish to go on record as opposed to the recent proposal of the FCC to amend Part 12 Rules Governing Amateur Radio Service. We feel this proposal will serve no purpose to further the art of amateur radio and has no valid place in the rules and regulations of the amateur radio service.

— David Henderson, W2QND, Secy.

Garden State Amateur Radio Assn.

P. O. Box 572

Springfield, Ill.

Editor, QST:

This is to advise that at our last regular meeting it was voted that our club go on record as being unanimously opposed to the FCC proposal to amend the Rules Governing Amateur Radio Service (Part 12), regarding calling and answering frequencies.

— Jane Lyons, W0MAE, Secy.

Sangamon Valley Radio Club

114 Idlewilde Drive

Winston-Salem, N. C.

Editor, QST:

Having been a licensed amateur since 1924 I would like to be on record as vigorously opposing this proposal. ... There is a little bit of freedom to be lost if this impractical and restrictive regulation goes into effect.

— Lewis Kanoy, W4DCB

872 Watkins

Birmingham, Mich.

Editor, QST:

... The amateur bands are too small now to handle the 104,000 licensees, even without cutting off 634 kilocycles from the current general-use amateur frequencies.

— Andrew M. Gent, W6CCP

R.F.D. 4

Colchester, Conn.

Editor, QST:

My copy of QST arrived on time as usual and was diligently perused from cover to cover. When I read the editorial under "It Seems To Us" the storm broke. I am referring to that portion relative to the establishment of a calling frequency within the amateur bands. I strongly urge that the League adopt a policy of opposition to this proposed regulation designed to establish a calling frequency for normal usage in our bands.

— Charles V. Koss, W1LF

Granite City, Ill.

Editor, QST:

... Egyptian Radio Club and others in Illinois and Missouri areas around St. Louis violently opposed to this plan of operation. ...

— J. H. Adamson

233 Holmes Road

Pittsfield, Mass.

Editor, QST:

... My conversations with many other amateurs indicate that such a plan is unnecessary and very much unwanted.

— Robert M. Stephens, W1JLT

1301 Gunby Ave.

Tampa, Fla.

Editor, QST:

... A resolution was made and passed unanimously by the members that Tampa Amateur Radio Club, Inc., be placed on record as completely and unalterably opposed to the setting up by FCC of calling-answering channels when there is no emergency need. The Secretary was requested to so advise the League. We are certainly not opposed to calling and answering channels when there is a definite emergency need for such channels, but we feel that such channels for everyday use is senseless and that there is no need or basis for a dictatorial and mainline restriction of that nature.

We urge and call upon the League to oppose this senseless and useless proposal.

— Mack S. Lee, Secy.

Tampa Amateur Radio Club

125 Blackburn Road

Summit, N. J.

Editor, QST:

... The Somerset Hills Radio Club believes that the adoption of the rule assigning calling frequencies to amateur radio is not in the best interests of amateur radio and will not permit the best use of the amateur bands.

— F. B. Parsons, W2COT, Pres.

Somerset Hills Radio Club

135 Blackburn Road

Summit, N. J.
SOURCE OF INSULATED TUBING

Hospitals throw away the gum tubing used to give patients intravenous feeding. The discarded tubing is just the right size for use as spaghetti insulation covering, is more flexible than ordinary sheathing, and not particularly inflammable. In addition, it is extremely strong, and less susceptible to damage by heat than many plastics. — Joseph R. Lebo, W20BU

TUNABLE I.F. STRIP FOR V.H.F. CONVERTERS

Very few communications receivers have the tuning rate required for use with crystal-controlled converters in the v.h.f. bands. This problem can be solved by modifying a BC-454 receiver so that it tunes from 8 to 14 Mc. instead of the original 3 to 5 Mc. About the only difficult part of the modification is to change the r.f., mixer, and oscillator coils. A noise limiter and a.v.c. are added refinements that have already been described in QST.1

The coil modifications are shown in Fig. 1. To change the r.f. coil, first remove the coil from its shield can, and then remove the tuning slug by first yanking off the bakelite locking strip with needle-nose pliers. Next remove the winding by unsoldering the top coil connection only. Peel back the winding to the bottom and wind 12 turns upward, double-spaced in the original wire grooves (not double the wire diameter). It will be necessary to cross over one groove per turn for this purpose, but the wire can be held in place by winding tight and drilling a new hole at the top of the winding. The slug is then replaced, and a ¼-inch hole for slug adjustment is drilled in the shield can and base. To add friction to the adjustment screw, melt a little wax and let it run down the screw. This will make a tight thread, and will make it unnecessary to replace the bakelite locking strips.

The mixer coil is changed by taking about half of the top plug winding off and resoldering it to the connector prong. The grid winding is unsoldered at the bottom coil connection and 13 turns are wound down from the top double-spaced like the r.f. coil. The slug is replaced, and the shield drilled for adjustment as before.

On the oscillator coil, leave the small feed-back winding exactly as it is. Un solder the top connection of the tuned grid winding, and rewind 12 turns upward, double-spaced, starting at the feed-back winding. Replace the slug and drill the shield can for adjustment.

Replace the coils in the unit, and with the aid of a signal source, align the circuits in the conventional manner. The conversion at WSFKC resulted in a 7.5- to 14.1-Mc. tuning range. The tracking is as good as in the average communications receiver, and the over-all gain is excellent. The i.f. used at WSFKC is 9- to 13-Mc. for coverage of the 2-meter band, and from 9- to 14-Mc. for the 2.0- to 20-Mc. band.

This arrangement can also be used to make an efficient mobile v.h.f. receiver. It permits the use of crystal-controlled converters to gain the desired stability, and can be built very compactly, with the converter mounted alongside the i.f. strip in a surplus PT-220 receiver rack. — Ralph W. Burhans, WSFKC

Fig. 1 — With simple modifications, the BC-454 “Command” receiver can be made into an excellent tuned i.f. and audio system for use with v.h.f. converters. The coil modifications shown here are described in detail in the text.
The Simulated Emergency Test. It is hoped that each local test spark-plugged this October by an ARL Emergency Coordinator will be, in effect, a "surprise" test, a practical drill based on appropriate communications plans for the locality. In many cases the local government officials of a city or area and the agencies served will be contacted by our local amateur leaders to establish friendly relations, maintain contact and enable them to take a part or offer suggestions so the test will be most nearly the type an actual emergency might call for as to the timeliness or traffic handled. Besides analysis of the EC's annual report to show our over-all position and ability to cope with emergencies and to help us strengthen any weak spot, this is the annual time to re-register emergency-powered equipment, note changes in capabilities and plans to bring them up to date, to demonstrate operative mobile gear. There's the new (gratis) ARL Emergency Mobile Unit pocket card, also the Emergency Radio Unit placard to put on the car or rig. Where you have appropriate operating equipment to demonstrate to your EC, you should get such placard from your EC before or during these exercises. Using this enables you to get better public understanding of your mobile, and reflects the prestige and values in these public service aspects.

AREC and Novices. Announcement of the AREC and its facilities. The test by AREC reminds us to say to one and all that this is the time to get your cards in order. Be sure to register your facilities to get proper official recognition of your status as to readiness for public service work if you are not an AREC card holder already. All amateurs should be a registered part of the Emergency Corps. Our amateur fraternity in its emergency operating aspect needs the entire strength of active organized amateur radio behind it. Thus only can this agency do most for our institution in fulfilling the traditional obligations in time of natural disaster or other need.

It is the official policy of the League for ARL Emergency Coordinators to welcome Novices and to register fully their facilities. Their availability when registered will be considered to man circuits and posts and assist in other ways in the larger emergency plans developed for the amateur group to create and maintain "one strong facility" in connection with general emergency work and civil defense planning. It is appreciated that all Novices are busy learning to enjoy CW to the full, and aiming at the FCC General Class ticket in the shortest possible time. To belong to AREC or RACES to receive some "in emergency" local operating assignments to different points and stations should in no way interfere with this objective! Where there are enough Novices, it can be arranged for them to work under the guidance of an operator working on the emergency band. This will give them an opportunity to practice on their own as well as to get used to operating under emergency conditions; that net should be put in the 145-Mc. sector which is also set aside for RACES nets under circumstances requiring special civil defense testing if one is set up, but just to volunteer your operator availability is the big and needed step to take. Since a high percentage of RACES work is by voice, training of all personnel in handling record-type communications with concise practices and achieving good net discipline under an NCS of their choosing is in the best communications tradition, and an aim for all responsible amateurs. We therefore encourage ECs to sign up all new-licensed General Class personnel and Novices working all bands as well as to try to see that every outstanding AREC card receives endorsement in the Full and Supporting Division of the AREC! Novices, seek out your EC (address from SCM given on page 6, QST, if necessary) and get the AREC identity cards given on registration.

Full WIAW Schedule. Note in this issue the new WIAW schedule, effective with the change from Daylight to Standard Time September 28th. The station then resumes the Tuesday-Thursday policy of looking in the Novice band for QSOs from 3:55 Mo., right after the 7 p.m. CST e.w. bulletin before WIAW goes over the band for other calls. Code-practice periods will continue to start daily at 8:30 p.m. CST in practice speed ranges 5 to 35 w.p.m.; monthly certification speeds 10 to 35 w.p.m. Four times per day Information Bulletins and CRPL forecasts "to all amateurs" start at 7 and 11 p.m. CST (e.w.) and 8 and 10:30 p.m. CST by voice. The general periods for two-way work with all amateurs in the different bands are as indicated in the table elsewhere in this issue.

In Less Than a Year . . . 35 W.P.M. Most active WNs find little trouble getting the General Class ticket well ahead of the 12 months available! To move from the Novice Class to get a thirty-five-word-per-minute ARL Code Proficiency Certificate is also pretty nice going in one short year! In July '51 Eugene Gertler became WN2KJH. In May '52 it was our pleasure, after awarding Gene a succession of endorsement stickers for different intermediate code speeds, to
“graduate” him from the ARRL CP Program at 35 w.p.m. As a good high school student WN2KIIJ worked his rig mainly week ends starting in September.

Here is one example of going much further and faster with the steppingstone ARRL-WIAW program than in the average case. May we invite attention to all new amateurs and Novices to this practice program and the monthly run for certifications! First certificate can be obtained starting at 10 w.p.m. It’s safe to get your first endorsement sticker for 15 w.p.m. before going up for the FCC exam. Make copy-down of all Official Bulletins as well as practice transmissions a habit. We’re happy to correct papers and certify, where indicated, on the once-per-month runs for qualification. Use the ARRL CP Program! — F. E. H.

WIAW OPERATING SCHEDULE

(Effective September 28, 1963)

(All times given are Eastern Standard Time)

Upon return to Standard Time, W1AW will return to its fall-winter operating schedule, continuing operation until 0300 (for increased West Coast coverage) and adding general operation on the new band 21-21.45 Mc. Daily code practice period and a Novice period will be continued. Micro-photographed master schedules showing complete WIAW operation in EST, CST or PST will be sent to anyone on request.

Operating—Visiting hours:
Monday through Friday: 1500-0300 (following day)
Saturday: 0900-0230 (Sunday)
Sunday: 1500-2230

Exception: WIAW will be closed from 0300 November 27th to 1500 November 28th in observance of the Thanksgiving Day holiday.

General Operation: Use the chart below for determining times during which WIAW engages in general operation on various frequencies, phone and c.w. Note that since the schedule is organized in EST, certain morning operating periods may fall in the evening of the previous day in western time zones. WIAW will participate in all official ARRL operating activities, using scheduled general operating periods for this purpose if necessary.

Official ARRL Bulletin Schedule: Bulletins containing latest information on matters of general amateur interest are transmitted on regular schedules:

Frequency:
C.W.—1885, 3555, 7130, 14,100, 52,000, 146,000 kc.
Phone—1885, 3960, 14,280, 52,000, 146,000 kc.

Frequencies may vary slightly from round figures given; they are to assist in finding the WIAW signal, not for exact calibration purposes.

WIAW OPERATING SCHEDULE

(Effective September 28, 1963)

WIAW welcomes calls from any amateur station. Starting September 28th, W1AW will listen for calls in accordance with the following time-frequency chart.

<table>
<thead>
<tr>
<th>EST</th>
<th>Sunday</th>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
<th>Saturday</th>
</tr>
</thead>
<tbody>
<tr>
<td>0000-0100</td>
<td>.......</td>
<td>.......</td>
<td>3555</td>
<td>7130</td>
<td>7130</td>
<td>7130</td>
<td>3555</td>
</tr>
<tr>
<td>0100-0200</td>
<td>.......</td>
<td>3950</td>
<td>7130</td>
<td>3950</td>
<td>7130</td>
<td>3950</td>
<td>7130</td>
</tr>
<tr>
<td>0200-0300</td>
<td>7130</td>
<td>14,280</td>
<td>21/28 Mc.</td>
<td>14,100</td>
<td>21/28 Mc.</td>
<td>21/28 Mc.</td>
<td>14,100</td>
</tr>
<tr>
<td>1500-1600</td>
<td>14,280</td>
<td>21/28 Mc.</td>
<td>21/28 Mc.</td>
<td>14,100</td>
<td>21/28 Mc.</td>
<td>21/28 Mc.</td>
<td>14,100</td>
</tr>
<tr>
<td>1600-1700</td>
<td>14,100</td>
<td>21/28 Mc.</td>
<td>21/28 Mc.</td>
<td>14,100</td>
<td>21/28 Mc.</td>
<td>21/28 Mc.</td>
<td>14,100</td>
</tr>
<tr>
<td>1700-1800</td>
<td>7130</td>
<td>21/28 Mc.</td>
<td>21/28 Mc.</td>
<td>14,100</td>
<td>21/28 Mc.</td>
<td>21/28 Mc.</td>
<td>14,100</td>
</tr>
<tr>
<td>1800-1900</td>
<td>7130</td>
<td>21/28 Mc.</td>
<td>21/28 Mc.</td>
<td>14,100</td>
<td>21/28 Mc.</td>
<td>21/28 Mc.</td>
<td>14,100</td>
</tr>
<tr>
<td>1900-2000</td>
<td>7130</td>
<td>21/28 Mc.</td>
<td>21/28 Mc.</td>
<td>14,100</td>
<td>21/28 Mc.</td>
<td>21/28 Mc.</td>
<td>14,100</td>
</tr>
<tr>
<td>2000-2100</td>
<td>7130</td>
<td>21/28 Mc.</td>
<td>21/28 Mc.</td>
<td>14,100</td>
<td>21/28 Mc.</td>
<td>21/28 Mc.</td>
<td>14,100</td>
</tr>
<tr>
<td>2100-2200</td>
<td>7130</td>
<td>21/28 Mc.</td>
<td>21/28 Mc.</td>
<td>14,100</td>
<td>21/28 Mc.</td>
<td>21/28 Mc.</td>
<td>14,100</td>
</tr>
<tr>
<td>2200-2300</td>
<td>7130</td>
<td>21/28 Mc.</td>
<td>21/28 Mc.</td>
<td>14,100</td>
<td>21/28 Mc.</td>
<td>21/28 Mc.</td>
<td>14,100</td>
</tr>
<tr>
<td>2300-2400</td>
<td>7130</td>
<td>21/28 Mc.</td>
<td>21/28 Mc.</td>
<td>14,100</td>
<td>21/28 Mc.</td>
<td>21/28 Mc.</td>
<td>14,100</td>
</tr>
</tbody>
</table>

1 Starting time is approximate. General-contact period on stated frequency begins immediately following transmission of Official Bulletin which begins at 0000 and 0200 on c.w. and at 2100 and 2330 on phone.
2 WIAW will listen for Novice Class licenses on 3760-3765 kc. before looking over the band for other contacts.
3 Operation will usually be conducted on 21,020 kc. c.w., but 23,785 kc. phone will be used occasionally.

JULY CD QSO PARTIES

Apparent not to bring top score honors back to the East, W4KFC outclassed all other participants in the c.w. section of the July CD Parties with 91,030 points. W5FQB, fourth in the April Party, pulled up to second place. Those Westerners are still in their pitching, though, W6GEB's third-place score was a mere 560 points below that of W5FQB, and he had plenty of competition from W6WOO! W4FV, who usually manages to stay in the top score brackets of 'phone parties, turned in the highest 'phone total. He was followed closely by W3ZY, who would have tied for first place had he made one more contact. C.W. party leader W4KFC chalked up the third highest 'phone score and showed he can handle a microphone, too. Listed below are the other high claimed scores. The figures following each call indicate the claimed scores, number of contacts, and number of ARRL sections worked. Final and complete results will appear in the October CD Bulletin.

C. W.

W4KFC... 01,030-350-61  W4BVT... 44,300-105-32
W5FQB... 72,000-291-50  W3FRT... 45,470-301-42
W5GEB... 71,440-155-47  W5NCH... 41,170-175-48
W6WOO... 70,618-101-48  W8ZTO... 40,700-178-44
W6N9K... 62,808-232-36  W6IA... 35,955-166-45
W6YIM... 63,830-134-45  W6QAM... 36,400-170-40
W7AT... 37,200-226-50  W7RGL... 36,400-120-44
W7QMB... 64,310-292-52  W7QMB... 34,800-173-38
W8N9H... 49,890-196-51  W2AQ7... 33,800-105-40
W8S9H... 49,140-196-48  W1DV... 33,800-181-36
W8EGB... 49,300-283-47  W7F0... 32,400-199-38
W8ARC... 47,000-350-47  W7JU... 31,390-26-37
W7MIL... 46,620-120-47  W2GCM... 30,500-181-38
W8B9P... 45,892-112-44  W7UUM... 30,650-81-40
W8JUM... 45,890-198-47  W2CPN... 30,840-149-41
W8J9K... 45,800-212-42

PHONE

W4FV... 1650-25-11  W3DEJ... 800-13-8
W3ZYV... 1600-26-10  W4QEB... 650-14-9
W4KFC... 3755-16-11  W4EHJ... 450-8-6
W8J9M... 1150-17-10

WIAW GENERAL-CONTACT SCHEDULE

(Effective September 28, 1952)

W1AW welcomes calls from any amateur station. Starting September 28th, W1AW will listen for calls in accordance with the following time-frequency chart.

Times:
Sunday through Friday: 2000 by c.w., 2100 by 'phone.
Monday through Saturday: 2330 by phone, 2400 by c.w.

Code Proficiency: Practice transmissions are made on the above-listed c.w. frequencies, starting at 2130 daily. Speeds are 15, 20, 25, 30 and 35 w.p.m. on Monday, Wednesday and Friday, and 5, 7.5, 10 and 15 w.p.m. on Sunday. On Tuesday and Thursday, and Saturday. Approximately ten minutes of practice is given at each speed. Exceptions:
On October 15th, and November 13th, W1AW will transmit Code Proficiency Qualifying Runs instead of the regular code practice. Next certificate qualifying runs from W7QDQ are October 15th and November 13th; from W6WOP, October 4th and November 9th.

October 1962
The successful operation of these emergency units was a result of over a year of training in conjunction with other local services, notably the Police Department, with which operators and equipment were freely interchanged during the emergency.

Beyond all doubt, amateur radio has thoroughly justified itself in this area and has earned the gratitude of the community. Official recognition has come from the Chief of Police, the Public Information Commissioner and many of the police officers who had the opportunity to see the gang in action. During the training period and especially during the flood, an "esprit de corps" has sprung up that is truly remarkable. Many of the hams who are not members of the Auxiliary Police group are in and offered to help. To them, sincere thanks. Without a single exception, assignments were accepted and executed promptly and cheerfully.

Control center was set up at W7MGA, and the gang will be forever grateful to Walt and Esther (this XYL) for their generous hospitality and kindness. To the rest of the ham gang who voluntarily stayed off the frequency, and the short- ship stations who listened but stayed clear, a hearty "thank you". The following took part in the direct operation: W7AEF, W7EYX, GGR, HJM, JOE, JVA, LCA, MQF, MGA, NMK, NCO, NOE, OSL, PVJ, QAA, QDF, SBK, BP and ZDX. 

West Hartford EC W7JVA recently commented that a considerable number of AREC registrants are Novices in the teen-age group. It is easy enough to tell whether or not a registrant is a Novice licensee, but on our present Form 7 registration there is no place for the applicant to state his age so that the EC will have a better idea how to work him into the organization. Vern's suggestion that all AREC registrants indicate their ages after their names strikes us as being a good and practical one. Next time we revise Form 7, we'll have a space for the registrant's age. Meanwhile, let's try to remember to put it in anyway.

A 90-m.p.h. wind on June 22nd struck the Brookhurst Camp at Wall Lake, about 12 miles west of Sioux Falls, South Dakota, blowing down tents and telegraphing telephone service with Sioux Falls. W6IIS, HWS, and NGW set up a mobile radio link between the camp and Radio Station KHIO at Sioux Falls, relaying information and requests to parents to come out for the girls.

The flood level rose steadily and at times it looked as if the streets areas would be greatly extended. The river rapidly reached flood stage and the entire area along its banks was threatened. All of the control stations, communications were furnished to the full extent of our personnel and equipment. All in all, the critical period lasted for nearly four weeks. During that period, there was hardly a time during the day or night, that one of the control stations was not standing by on the emergency mobile frequency (29,620 kc.) and the extra men were at the field. Insofar as it was possible, two men were kept in each mobile unit so that if one had to leave the car to go in on foot, the unit was not lost to the control station. In some places, handy-talkies on the 75-meter band were used to communicate from dike-to-car and then on 10 meters from car to control center. Much was learned that will be of value in future operations and as rapidly as possible is being incorporated into our procedures and set-up.

This is the "portable package" of the Missouri Civil Defense Agency, constructed under the supervision of State Communications Chief William M. This complete field station is transported in a mobile-equipped station wagon, and is capable of operation in the Disaster Communications Service bands. Over-all state plans call for construction of seven of these units, designed technologically and operated by local amateurs. The speaker is mounted in the top cover of the receiver, to save room. The generator is rated at 750 watts.
### Section Emergency Coordinators of the Amateur Radio Emergency Corps

The Section Emergency Coordinator is appointed by the SCM to take charge of the promotion of the Amateur Radio Emergency Corps organization throughout the Section. He acts as the SCM’s executive in the furthering of provisions for emergency amateur radio communications in every community likely to suffer in case of a communications emergency.

One of the duties of the SEC is to recommend the appointment of Emergency Coordinators for the various communities in his Section. Does your town have an ARC? If not, recommend the name of a likely prospect to the SEC. The SEC invites your questions concerning the status of the ARC in your Section.

#### ATLANTIC DIVISION

<table>
<thead>
<tr>
<th>State</th>
<th>Call Sign</th>
<th>Name</th>
<th>Address</th>
<th>City</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eastern Pennsylvania</td>
<td>W9IE</td>
<td>W. T. Shreve</td>
<td>1507 Nielsen Rd.</td>
<td>Orland</td>
</tr>
<tr>
<td>Maryland-Delaware-D.C.</td>
<td>W26TH/FRL</td>
<td>Herbert C. Brooks</td>
<td>800 Lincoln Ave.</td>
<td>Palmyra</td>
</tr>
<tr>
<td>Southern New Jersey</td>
<td>K2BH</td>
<td>Henry A. Bogdott</td>
<td>500 Duffner Dr.</td>
<td>Rochester 16</td>
</tr>
<tr>
<td>Western New York</td>
<td>W2GMY</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Western Pennsylvania</td>
<td>W2BZH</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### CENTRAL DIVISION

<table>
<thead>
<tr>
<th>State</th>
<th>Call Sign</th>
<th>Name</th>
<th>Address</th>
<th>City</th>
</tr>
</thead>
<tbody>
<tr>
<td>Illinois</td>
<td>W9QLZ</td>
<td>George E. Kohl, Jr.</td>
<td>8632 #2, Box 22A</td>
<td>Utica</td>
</tr>
<tr>
<td>Indiana</td>
<td>W9LZT</td>
<td>J. Herman Barnett, Jr.</td>
<td>20 Meridian Pl.</td>
<td>Indianapolis</td>
</tr>
<tr>
<td>Wisconsin</td>
<td>W9WYO</td>
<td>Clayton Carly</td>
<td></td>
<td>Milwaukee</td>
</tr>
</tbody>
</table>

#### DAKOTA DIVISION

<table>
<thead>
<tr>
<th>State</th>
<th>Call Sign</th>
<th>Name</th>
<th>Address</th>
<th>City</th>
</tr>
</thead>
<tbody>
<tr>
<td>North Dakota</td>
<td>W9KRM</td>
<td>E. G. Anderson</td>
<td>1413 11th St. N.</td>
<td>Fargo</td>
</tr>
<tr>
<td>South Dakota</td>
<td>W9RCG</td>
<td>Wilbur Somgard</td>
<td>114 E. 10 St.</td>
<td>Mitchell</td>
</tr>
<tr>
<td>Minnesota</td>
<td>W9BOL</td>
<td>Robert A. Prehn</td>
<td>1130 Delaware Ave.</td>
<td>St. Paul 7</td>
</tr>
</tbody>
</table>

#### GREAT LAKES DIVISION

<table>
<thead>
<tr>
<th>State</th>
<th>Call Sign</th>
<th>Name</th>
<th>Address</th>
<th>City</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wisconsin</td>
<td>W9RDA</td>
<td>Leo V. Briana</td>
<td>6th William</td>
<td>Milwaukee</td>
</tr>
<tr>
<td>Michigan</td>
<td>W9RKW</td>
<td>E. H. Harper</td>
<td>3171 Pine St.</td>
<td>Sheboygan</td>
</tr>
<tr>
<td>Michigan</td>
<td>W9RDX</td>
<td>Harry T. Carroll</td>
<td>616 Marquette Rd. S.</td>
<td>Madison</td>
</tr>
</tbody>
</table>

#### HUDSON DIVISION

<table>
<thead>
<tr>
<th>State</th>
<th>Call Sign</th>
<th>Name</th>
<th>Address</th>
<th>City</th>
</tr>
</thead>
<tbody>
<tr>
<td>New York</td>
<td>W2HLM</td>
<td>Henry C. Hall</td>
<td>34 Grovesen Ave.</td>
<td>Nyack</td>
</tr>
<tr>
<td>New Jersey</td>
<td>W2KTF</td>
<td>Frances E. Gary</td>
<td>638 Honea Rd.</td>
<td>Hackens</td>
</tr>
<tr>
<td>New Jersey</td>
<td>W2NHD</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### MIDDLE ATLANTIC DIVISION

<table>
<thead>
<tr>
<th>State</th>
<th>Call Sign</th>
<th>Name</th>
<th>Address</th>
<th>City</th>
</tr>
</thead>
<tbody>
<tr>
<td>New York</td>
<td>W2HLM</td>
<td>Stephen J. Nelson</td>
<td>794 River St.</td>
<td>Troy</td>
</tr>
<tr>
<td>New Jersey</td>
<td>W2KTF</td>
<td>Charles F. Baker</td>
<td>94 North Grand Ave.</td>
<td>Troy</td>
</tr>
<tr>
<td>New Jersey</td>
<td>W2NHD</td>
<td>Thomas J. Ryan, Jr.</td>
<td>1082 Anna St.</td>
<td>Elizabeth 4</td>
</tr>
</tbody>
</table>

#### NEW ENGLAND DIVISION

<table>
<thead>
<tr>
<th>State</th>
<th>Call Sign</th>
<th>Name</th>
<th>Address</th>
<th>City</th>
</tr>
</thead>
<tbody>
<tr>
<td>Massachusetts</td>
<td>W9RRA</td>
<td>Jack P. Henry</td>
<td>1215 Vine St.</td>
<td>Watertown</td>
</tr>
<tr>
<td>Massachusetts</td>
<td>W9RRA</td>
<td>W. G. Schenk</td>
<td>1528 Pierce St.</td>
<td>Newton</td>
</tr>
<tr>
<td>Massachusetts</td>
<td>W9RRA</td>
<td>O. H. Higgins</td>
<td>605 R. 73rd St.</td>
<td>Newton</td>
</tr>
<tr>
<td>Massachusetts</td>
<td>W9RRA</td>
<td>Francis B. Johnson</td>
<td>830 S. 84th St.</td>
<td>Newton</td>
</tr>
</tbody>
</table>

#### CONNECTICUT DIVISION

<table>
<thead>
<tr>
<th>State</th>
<th>Call Sign</th>
<th>Name</th>
<th>Address</th>
<th>City</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connecticut</td>
<td>W1KPF</td>
<td>Peter K. de Bruyn</td>
<td>101 S. Marshall St.</td>
<td>Hartford</td>
</tr>
<tr>
<td>Connecticut</td>
<td>W1LRF</td>
<td>Donald R. Dean</td>
<td>76 James St.</td>
<td>Ashbury</td>
</tr>
<tr>
<td>Connecticut</td>
<td>W1LRF</td>
<td>Raymond F. Boardman</td>
<td>57 Thurston Rd.</td>
<td>Newington 64</td>
</tr>
<tr>
<td>Connecticut</td>
<td>W1LRF</td>
<td>Roger F. Corey</td>
<td>67 W. Allen Ridge Rd.</td>
<td>Springfield</td>
</tr>
<tr>
<td>Connecticut</td>
<td>W1LRF</td>
<td>Carl H. Heise</td>
<td>185 E. 57th St.</td>
<td>Burlington</td>
</tr>
</tbody>
</table>

#### NORTHWESTERN DIVISION

<table>
<thead>
<tr>
<th>State</th>
<th>Call Sign</th>
<th>Name</th>
<th>Address</th>
<th>City</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alaska</td>
<td>KPLK</td>
<td>John H. Hulter</td>
<td>Box 6075</td>
<td>Fairbanks</td>
</tr>
<tr>
<td>Idaho</td>
<td>W7WUS</td>
<td>Alan C. Ross</td>
<td>2095 Irene St.</td>
<td>Boise</td>
</tr>
<tr>
<td>Montana</td>
<td>W7KHU</td>
<td>Walter K. Martin</td>
<td>1022 Yale Ave.</td>
<td>Billings</td>
</tr>
<tr>
<td>Oregon</td>
<td>W7DHN</td>
<td>R. C. Wieland</td>
<td>1004 N. E. Shaver</td>
<td>Portland</td>
</tr>
<tr>
<td>Washington</td>
<td>W7DTS</td>
<td>Eugene H. Dodge</td>
<td>663 N. Skyline Dr.</td>
<td>Tacoma 6</td>
</tr>
</tbody>
</table>

#### ROCKY MOUNTAIN DIVISION

<table>
<thead>
<tr>
<th>State</th>
<th>Call Sign</th>
<th>Name</th>
<th>Address</th>
<th>City</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colorado</td>
<td>W8KED</td>
<td>O. R. Cunningham</td>
<td>Box 176</td>
<td>Redstone</td>
</tr>
<tr>
<td>Utah</td>
<td>W7JOE</td>
<td>John Timpness</td>
<td>1509 Orchard Dr.</td>
<td>Salt Lake</td>
</tr>
<tr>
<td>Wyoming</td>
<td>W7LQK</td>
<td>Diane L. Williams</td>
<td>1022 S. Cherry Apt. 4</td>
<td>Casper</td>
</tr>
</tbody>
</table>

#### SOUTHEASTERN DIVISION

<table>
<thead>
<tr>
<th>State</th>
<th>Call Sign</th>
<th>Name</th>
<th>Address</th>
<th>City</th>
</tr>
</thead>
<tbody>
<tr>
<td>South Carolina</td>
<td>W4ZG</td>
<td>Roy C. Cardenham</td>
<td>792 Oaklawn Ave.</td>
<td>Winston-Salem</td>
</tr>
<tr>
<td>South Carolina</td>
<td>W4YX</td>
<td>Ben L. Tammy</td>
<td>1500 Fair St.</td>
<td>Candler</td>
</tr>
<tr>
<td>South Carolina</td>
<td>W4YX</td>
<td>William R. Sampson, Jr.</td>
<td>4001 Smart Ave.</td>
<td>Richland</td>
</tr>
<tr>
<td>South Carolina</td>
<td>W4YX</td>
<td>S. A. Whitehead</td>
<td>890 Kirk St.</td>
<td>Pickens</td>
</tr>
</tbody>
</table>

#### SOUTHWESTERN DIVISION

<table>
<thead>
<tr>
<th>State</th>
<th>Call Sign</th>
<th>Name</th>
<th>Address</th>
<th>City</th>
</tr>
</thead>
<tbody>
<tr>
<td>Northern Texas</td>
<td>W5QD</td>
<td>P. G. Pearson</td>
<td>121 Margaret St.</td>
<td>Mobile</td>
</tr>
<tr>
<td>Oklahoma</td>
<td>W5ACM</td>
<td>H. B. Luskin</td>
<td>Box 57</td>
<td>New Port Richey</td>
</tr>
<tr>
<td>Southern Texas</td>
<td>W5PKL</td>
<td>Harold Smith</td>
<td>2029 N. &quot;Q&quot; St.</td>
<td>Penasco</td>
</tr>
<tr>
<td>New Mexico</td>
<td>W5PKL</td>
<td>J. H. Aspin</td>
<td>202 N. Semmes St.</td>
<td>East Point</td>
</tr>
<tr>
<td>New Mexico</td>
<td>W5PKL</td>
<td>Pedro A. Pras</td>
<td>1075 5th Ave.</td>
<td>Ponce, P. R.</td>
</tr>
<tr>
<td>New Mexico</td>
<td>W5PKL</td>
<td>Frank H. Lachen</td>
<td>1005 12th Ave.</td>
<td>Balboa</td>
</tr>
</tbody>
</table>

#### WEST GULF DIVISION

<table>
<thead>
<tr>
<th>State</th>
<th>Call Sign</th>
<th>Name</th>
<th>Address</th>
<th>City</th>
</tr>
</thead>
<tbody>
<tr>
<td>Texas</td>
<td>W5QD</td>
<td>H. Bruce Craig</td>
<td>1706 27th St.</td>
<td>Lufkin</td>
</tr>
<tr>
<td>Oklahoma</td>
<td>W5ACM</td>
<td>Claude F. Gardner</td>
<td>609 NW 8th Ave.</td>
<td>Oklahoma City</td>
</tr>
<tr>
<td>Texas</td>
<td>W5PKL</td>
<td>George N. Sharp</td>
<td>3416 Federal Rd.</td>
<td>Pasadena</td>
</tr>
<tr>
<td>Texas</td>
<td>W5PKL</td>
<td>Ben C. Scott</td>
<td>2774 Hance St.</td>
<td>Rancho Verde, Socorro</td>
</tr>
</tbody>
</table>

#### MARITIME DIVISION

<table>
<thead>
<tr>
<th>State</th>
<th>Call Sign</th>
<th>Name</th>
<th>Address</th>
<th>City</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maine</td>
<td>W9FIR</td>
<td>L. J. Faller</td>
<td>125 Henry St.</td>
<td>Halifax, N. S.</td>
</tr>
<tr>
<td>Massachusetts</td>
<td>W9FIR</td>
<td>T. W. Clenment</td>
<td>2278 King St., E.</td>
<td>Hamilton, Ont.</td>
</tr>
<tr>
<td>New Hampshire</td>
<td>W9FIR</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quebec</td>
<td>W2VR</td>
<td>A. George Brewer</td>
<td>1314 Monroe Ave.</td>
<td>Westmount, Montreal, Que.</td>
</tr>
<tr>
<td>Ontario</td>
<td>W3RM</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quebec</td>
<td>W3RM</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>British Columbia</td>
<td>W3RM</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yukon</td>
<td>Y8MD</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manitoba</td>
<td>VE3BZ</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### PRAIRIE DIVISION

<table>
<thead>
<tr>
<th>State</th>
<th>Call Sign</th>
<th>Name</th>
<th>Address</th>
<th>City</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saskatchewan</td>
<td>VE3BZ</td>
<td>Wm. R. Macdonough</td>
<td>Box 54</td>
<td>Zealandia, Sask.</td>
</tr>
</tbody>
</table>

---

October 1952  67
DX CENTURY CLUB AWARDS

HONOR ROLL
W1FH... 248 W4YXO... 210 W6AM... 235
W6RGW... 244 Q2PL... 239 W2CV... 235
W3KES... 213 W6ENV... 238 W6MEK... 234
W6VFR... 241 W3GHD... 238

RADIOTELEPHONE
W1FH... 219 W6HBB... 200 W5TULU... 190
WFYK... 216 W1WNO... 199 SM8K... 190
VQ6ER... 213 W19W... 196 W6GGW... 189
XE1L... 213 W2APU... 192 W8BES... 185
W6QGH... 201 W2BKA... 190

From July 15 to August 15, 1952, DXCC certificates and endorsements based on postcard contacts with 100-or-more countries have been issued to the amateurs listed below.

NEW MEMBERS
Q5Q... 151 W3LXE... 102 W8NN... 100
W3CT... 111 W25QG... 101 W4JEO... 100
W6JU... 108 W6ALQ... 100 W6IEF... 100
PIYK... 105 DJ1RK... 101 W6VZG... 100
P77LJ... 102 W2LWI... 100 WTPZ... 100
SM5Y... 102 PA9MOT... 101

RADIOTELEPHONE
Q5Q... 122 ZBG... 109 C7TDX... 103

ENDORSEMENTS
PA4UN... 260 W4NMH... 173 W6WO... 145
W5QGE... 230 W5H... 171 W5LM... 144
W5MB... 216 W5NTR... 171 W1EKE... 141
Z5X... 211 W3ALX... 170 W6LZM... 137
W5CG... 210 W5BID... 170 G8CBN... 132
SM1QP... 101 W9VO... 168 G8G... 131
W5YW... 200 ZLGA... 160 W1DOM... 131
W1GK... 200 W7TX... 160 W5NY... 130
W5VE... 200 W5E... 160 W5E... 130
W9DC... 200 W9TVZ... 128 W1QF... 128
W1HL... 200 W9ERF... 160 W6EYX... 126
4XAR... 194 DL1AU... 132 W52M... 119
KHCD... 183 W7AH... 152 2B66... 113
W7Y... 180 W7TV... 128 W9TV... 128
PY4E... 180 W8HWC... 145 W9HUV... 111
SM5W... 170 G8R... 146 W5BES... 110

RADIOTELEPHONE
W3GHD... 151 Q5AY... 156 G8NW... 110

DXCC NOTES
Announcement is hereby made of the addition to the ARRL Postcard DX Century List of Qatar, A. Sheldom on the Persian Gulf coast of Arabia near Bahrain Island. To our knowledge, no official prefix has been assigned this country. DXCC credit will be given for any Qatar cards confirming contacts made since November 18, 1945. And in future ARRL DX Conditions those working Qatar may claim credit for a separate country.

CODE-PROFICIENCY PROGRAM
Twice each month special transmissions are made to enable you to qualify for the ARRL Code Proficiency Certificate. The next qualifying run from W1AW will be made on October 15th at 2100 EDT. Identical texts will be sent simultaneously by automatic transmitters. Frequencies of transmission from W1AW will be 1987, 3555, 7130, 14,100, 28,000, 52,000 and 146,000 kc. The next qualifying run from W6WP only will be transmitted on October 4th at 2100 PST on 3500 and 7248 kc.

Any person may apply for ARRL membership or an amateur license is required. Send copies of all qualifying runs to ARRL for grading, stating the call of the station you copied. If you qualify at one of the five speeds transmitted, 10 through 25 w.p.m., you will receive a certificate. If your initial qualification is for a speed below 35 w.p.m., you may try later for endorsement stickers.

Code-practice transmissions are made from W1AAN each evening at 2130 EDT. References to texts used on several of the transmissions are given below.

Date Subject of Practice Text from August QST
Oct. 2nd: Automatic Tuning of the Antenna Coupler, p. 11
Oct. 8th: V.H.F. Parasitics in Beam Transformers, p. 14
Oct. 15th: An ARRL Tune-Up Transmission for 40 Meters, p. 17
Oct. 14th: Cutting Down VFO Drift, p. 20
Oct. 16th: A Flexo-Portable , p. 24
Oct. 20th: Cheaper and Better Phone Monitoring, p. 31
Oct. 22nd: The Wavelength Factor — III, p. 42
Oct. 28th: Antenna Couplers for the Novice, p. 27
Oct. 30th: The World Above 40 M., p. 53

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 full 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 date specified in the case where no valid nominating petitions were received in response to previous notices, the closing dates are set ahead to the dates given herewith. The complete name, address, and station call of the candidate should be included with the petition. It is advisable that eight or ten full member signatures be obtained, since on checking names against Headquarters files, with no time to return invalid petitions for additions, a petition may be found invalid by reason of expired memberships, individuals who have mislaid their signatures or otherwise are uncertain or ignorant of their membership status, etc.

The following nomination form is suggested: (Signers will please add city and street address to facilitate checking membership status.)

Name: [Signature]
Address: [City, State, Zip]

Communications Manager, ARRL, 38 La Salle Road, West Hartford, Conn.

We, the undersigned full members of the ARRL Section of the [Section Name], hereby nominate [Candidate's Name] 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 ballots mailed from Headquarters to full members will list in alphabetical sequence 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. E. Handy, Communications Manager
ELECTION RESULTS

Valid petitions nominating a single candidate as Section Manager were filed by members in the following Sections, completing their election in accordance with regular League policy, each term of office starting on the date given.

San Joaquin Valley  E. Howard Hale, W6FYM  April 11, 1952
Montana       Edward G. Brown, W7KKG  Sept. 1, 1951
Northern Texas  William J. Gentry, W5GF  Oct. 15, 1952

TRAFFIC TOPICS

The First and Second Call Areas of the Transcontinental Phone Net handled a total of 1470 messages in July, 641 and 829 respectively, as reported by W1SS. This traffic was handled by 28 stations.

National Traffic System. All NTS Net Managers have been informed that the annual ARLI Emergency Test will take place on October 11-12. The mass origination of traffic to ARLI Headquarters will not be solicited this year, but each EC participating in the net will originate a message to Headquarters summarizing local SET activities for the record. We hope and expect that much of this traffic will flow through the National Traffic System, and that section, regional and area NTS nets will operate on a standby basis in extra sessions on these two dates so that traffic for Headquarters will reach its destination promptly. There will also be considerable traffic flowing around of a Red Cross and perhaps a Civil Defense nature, so there ought to be enough to do to keep everybody busy.

July reports:

<table>
<thead>
<tr>
<th>Net</th>
<th>Sessions</th>
<th>Traffic</th>
<th>High</th>
<th>Low</th>
<th>Average</th>
<th>Most</th>
<th>Consistent</th>
</tr>
</thead>
<tbody>
<tr>
<td>EAN</td>
<td>23</td>
<td>673</td>
<td>68</td>
<td>10</td>
<td>29</td>
<td>1RN, 2RN</td>
<td></td>
</tr>
<tr>
<td>CAN</td>
<td>33</td>
<td>235</td>
<td>37</td>
<td>4</td>
<td>19.7</td>
<td>3RN</td>
<td></td>
</tr>
<tr>
<td>1RN</td>
<td>23</td>
<td>147</td>
<td>15</td>
<td>1</td>
<td>6.4</td>
<td>Conn.</td>
<td></td>
</tr>
<tr>
<td>2RN</td>
<td>46</td>
<td>395</td>
<td>15</td>
<td>6</td>
<td>0</td>
<td>JN</td>
<td></td>
</tr>
<tr>
<td>3RN</td>
<td>40</td>
<td>119</td>
<td>12</td>
<td>0</td>
<td>3</td>
<td>Pa.</td>
<td></td>
</tr>
<tr>
<td>4RN</td>
<td>15</td>
<td>111</td>
<td>11</td>
<td>1</td>
<td>7</td>
<td>Fas., S.C., Va.</td>
<td></td>
</tr>
<tr>
<td>RNS</td>
<td>9</td>
<td>10</td>
<td>4</td>
<td>0</td>
<td>1.1</td>
<td>Ala., Okla.</td>
<td></td>
</tr>
<tr>
<td>RN7</td>
<td>31</td>
<td>785</td>
<td>42</td>
<td>1</td>
<td>24.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RN7</td>
<td>22</td>
<td>226</td>
<td>20</td>
<td>1</td>
<td>10</td>
<td>Wash.</td>
<td></td>
</tr>
<tr>
<td>8RN</td>
<td>22</td>
<td>220</td>
<td>8</td>
<td>0</td>
<td>1</td>
<td>Mich.</td>
<td></td>
</tr>
<tr>
<td>9RN</td>
<td>26</td>
<td>222</td>
<td>23</td>
<td>1</td>
<td>9.2</td>
<td>Ky.</td>
<td></td>
</tr>
<tr>
<td>TEN</td>
<td>24</td>
<td>341</td>
<td>61</td>
<td>1</td>
<td>14.2</td>
<td>Minn.</td>
<td></td>
</tr>
<tr>
<td>QIN</td>
<td>38</td>
<td>335</td>
<td>24</td>
<td>1</td>
<td>6.1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Ind.)

For the first time in NTS reporting time, we have received either a formal report or informal word of how things are going from every area and regional net manager. Only PAN and TRN failed to submit statistical reports. Considering that this is written in mid-summer, when traffic activity is at its lowest, we think that this is a harbinger of better things to come in the fall.

Eastern Area Net: In making his report, WSSGW “averaged out” unreported sessions to gain a fairly accurate overall picture. Central Area Net: W8JUJ reports fine support on CAN. It would make things a little easier if regional representatives would try to QNI promptly at 2030 CST.

Pacific Area Net: W7WJ says it’s rough trying to cover RN7, PAN and part of TCC three nights a week. PAN hopes for more activity and support from regional nets this fall.

First Regional Net: Certificates have been issued to W1A EFR, ODW and VCH.

Second Regional Net: K2BG is the new 2RN Manager.

Fifth Regional Net: Formal report by Assistant Manager W4KIX, but a letter from W5MRK indicates thinking toward a bigger and better RN5 this fall.

Sixth Regional Net: 3RN is back on PDST, meeting at 1945 and 2130. Net certificates have been issued to W6s JOH, PIQ and WPF.

Seventh Regional Net: Special credit for holding the fort during the summer goes to W7s GZX, FRI, GDV, TID and WBBTV/T.

Ninth Regional Net: Orchids to the Kentucky Net (KYN) which was represented 100% in July, W9TTT says it is a relief to have CAN on the air this summer.

Tenth Regional Net: The big event in July was that Iowa missed a TEN net session — first time in history. TEN will open up full blast September 15. W87QT says he believes that Doc, W8SCA, is still doing some dentistry as traffic peaks and then permits.

Thirteenth Regional Net: Y6SATR and VE2BBU are holding down the fort; no VE1s or VE2s heard.

BRASS POUNDERS LEAGUE

Winners of BPL Certificates for July traffic:

<table>
<thead>
<tr>
<th>Call</th>
<th>Orig.</th>
<th>Red.</th>
<th>Rel.</th>
<th>Del.</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>W3CUL</td>
<td>215</td>
<td>2377</td>
<td>1914</td>
<td>445</td>
<td>3051</td>
</tr>
<tr>
<td>W6LAB</td>
<td>20</td>
<td>1531</td>
<td>27</td>
<td>2773</td>
<td></td>
</tr>
<tr>
<td>K8KFP</td>
<td>72</td>
<td>1092</td>
<td>922</td>
<td>173</td>
<td>2308</td>
</tr>
<tr>
<td>K8GFAA</td>
<td>467</td>
<td>939</td>
<td>706</td>
<td>183</td>
<td>2295</td>
</tr>
<tr>
<td>W2DBYB</td>
<td>15</td>
<td>921</td>
<td>845</td>
<td>13</td>
<td>1091</td>
</tr>
<tr>
<td>W86K</td>
<td>101</td>
<td>723</td>
<td>612</td>
<td>113</td>
<td>1840</td>
</tr>
<tr>
<td>K4WAB</td>
<td>472</td>
<td>438</td>
<td>355</td>
<td>88</td>
<td>1338</td>
</tr>
<tr>
<td>W6QZT</td>
<td>9</td>
<td>645</td>
<td>661</td>
<td>7</td>
<td>1319</td>
</tr>
<tr>
<td>W6JUJ</td>
<td>16</td>
<td>555</td>
<td>516</td>
<td>10</td>
<td>1099</td>
</tr>
<tr>
<td>W6GVE</td>
<td>34</td>
<td>472</td>
<td>39</td>
<td>1058</td>
<td></td>
</tr>
<tr>
<td>K7LAH</td>
<td>79</td>
<td>458</td>
<td>406</td>
<td>50</td>
<td>991</td>
</tr>
<tr>
<td>W8WPF</td>
<td>18</td>
<td>462</td>
<td>431</td>
<td>31</td>
<td>942</td>
</tr>
<tr>
<td>W6CRW</td>
<td>43</td>
<td>432</td>
<td>395</td>
<td>1</td>
<td>901</td>
</tr>
<tr>
<td>J8ANXRAAB</td>
<td>188</td>
<td>371</td>
<td>300</td>
<td>71</td>
<td>590</td>
</tr>
<tr>
<td>W7PEF</td>
<td>318</td>
<td>335</td>
<td>335</td>
<td>0</td>
<td>788</td>
</tr>
<tr>
<td>W8ZOL</td>
<td>2</td>
<td>363</td>
<td>371</td>
<td>3</td>
<td>729</td>
</tr>
<tr>
<td>W8KYX</td>
<td>115</td>
<td>316</td>
<td>124</td>
<td>1</td>
<td>181</td>
</tr>
<tr>
<td>W8QXO</td>
<td>12</td>
<td>335</td>
<td>336</td>
<td>8</td>
<td>661</td>
</tr>
<tr>
<td>W8GUD</td>
<td>418</td>
<td>169</td>
<td>169</td>
<td>2</td>
<td>690</td>
</tr>
<tr>
<td>K5FAL</td>
<td>67</td>
<td>269</td>
<td>181</td>
<td>8</td>
<td>605</td>
</tr>
<tr>
<td>W8SBA</td>
<td>10</td>
<td>274</td>
<td>263</td>
<td>5</td>
<td>552</td>
</tr>
</tbody>
</table>

The following made the BPL for 100 or more origination-plus-deliveries:

W6NZE 247  W7BA 105  Late Report
W8AO 134  W4HVS 103  W9YTX (June) 124
W9OFJ 105

A message total of 500 or more or 100 or more origination-plus-deliveries will put you in line for a prize in the BPL. The Brass Pounds League is open to all operators who qualify for this monthly listing.

October 1952
ATLANTIC DIVISION

EASTERN PENNSYLVANIA — SCM, John H. Du-Bois, W3BXX - SEC: ISE, RMs: AXA, BIP, E.P. Na-tee; 3510 kc. The Lebanon Athletic Club held its 26th annual Radio Operators' week 2-meter hamfest this weekend, and reports a highly successful e.d. demonstration held on July 27th. All York and Adams County clubs were urged to register with AGC for that area. Variations did not curtail operation for several of the gang; RJF was portable 8, 9, and 10 meters, phone and c.w.; SJY was portable 8, 9 and 10 meters, c.w. and DUS at Canadensis on 40 meters, and W3S8NR was mobile in Ohio on 2 meters. In the mobile group, HWT and 2TX made 150 and 75 QSOs, respectively. We go on air at noon, and will operate "80". We look forward to seeing you. The AGC is back in full operation with new officers elected: President, Rusty Roach, W3BXX; Vice-President, JFJ, W3EYR; Secretary, RJF, W3EYR; Treasurer, SJY, W3EYR.

MARYLAND-DELWARE-DISTRICT OF COLUMBIA — SCM, James W. John, W3OMN — The Chesapeake Amateur Radio Club held its regular meeting on July 14th. The annual ARRL picnic was held Sunday, Aug. 3rd, on the Skyline Drive, The Rock Creek Amateur Radio Association, W3CN, arranged the whole thing. The RCARA "infamous" bull sessions was the program for the July 27th. PTH has completed a mobile rig, EXC, University of Maryland mode, through the whole time and made it in the first place QSO. CQCD visited CDQ, JRA is set, Nerprud and HAM in Catonsville and is on 20 meter. Traffic: W3AUV 300+ QSOs, W3EYR 215, W3CN 68, W3JL 51, W3IM 39, W3ON 47, W3OV 38, W3XL 37.

SOUTHERN NEW JERSEY — SCM, Lloyd L. Gainey, W2UCV — S219 became manager of SCM on July 1st. "Rollie" Baker spoke on "One Meg. Commercial Mobile Radio Communication." Raymond S. Bank of Redwood, gave a talk on "HAMS in Action" at the SCM July 26th meeting. The annual PRV picnic was held Sunday, Aug. 3rd, on the Skyline Drive, The Rock Creek Amateur Radio Association. The RCARA "infamous" bull sessions was the program for the July 27th. PTH has completed a mobile rig, EXC, University of Maryland mode, through the whole time and made it in the first place QSO. CQCD visited CDQ, JRA is set, Nerprud and HAM in Catonsville and is on 20 meter. Traffic: W3AUV 300+ QSOs, W3EYR 215, W3CN 68, W3JL 51, W3IM 39, W3ON 47, W3OV 38, W3XL 37.

SOUTHERN NEW JERSEY — SCM, Lloyd L. Gainey, W2UCV — S219 became manager of SCM on July 1st. "Rollie" Baker spoke on "One Meg. Commercial Mobile Radio Communication." Raymond S. Bank of Redwood, gave a talk on "HAMS in Action" at the SCM July 26th meeting. The annual PRV picnic was held Sunday, Aug. 3rd, on the Skyline Drive, The Rock Creek Amateur Radio Association. The RCARA "infamous" bull sessions was the program for the July 27th. PTH has completed a mobile rig, EXC, University of Maryland mode, through the whole time and made it in the first place QSO. CQCD visited CDQ, JRA is set, Nerprud and HAM in Catonsville and is on 20 meter. Traffic: W3AUV 300+ QSOs, W3EYR 215, W3CN 68, W3JL 51, W3IM 39, W3ON 47, W3OV 38, W3XL 37.

CENTRAL DIVISION

ILLINOIS — SCM, E. L. Lunds, W9KRL — Section Net: ILN (605) 3615 (1) ICN (phone) 2a40 (2) SEC: LQZ. ASS: SEC: HPG, RM: RJK. BUK: KFX. W9WIC. After completing a home-made antenna, the rig is on the air now in Wisconsin, and rebuilding the rig using a new antenna on the air. The Rock Island, Starved Rock, and W9WIC. W9WIC reports all reported a good time. Field Day report messages were received from T1, EA, E818, PES, UTI, WWI, WX, N9Q, and W9WIC reports all reported a good time for 27
Two of the most important considerations in the design of a Communications receiver are the amount of voltage gain and the signal to noise ratio. Voltage gain is pretty well understood, the amount desired usually being that which will produce fair noise output from the receiver in the absence of an antenna or signal. It is good practice to provide some reserve gain to care for aging tubes and adverse operating conditions. When this reserve gain is available, the background noise level noted with the RF gain fully advanced will be high. This is not considered to be disadvantageous since the amount of gain actually in use can be controlled by a front panel RF gain control.

The amount of background noise in the absence of a signal bears no relation to the signal to noise ratio of the receiver nor does the amount of random line noise pickup. This point is frequently misunderstood, the signal to noise ratio often being incorrectly linked to the receiver's ability to reject noise. The best check that can be made on signal to noise ratio without the benefit of instruments is to note the amount of residual noise present when a weak signal is received in the absence of locally generated noise such as line noise or splatter. This can only supply rough information since no standard is available. Two receivers side by side would of course provide comparative data. The amount of selectivity used has some bearing on the signal to noise ratio; the narrower the selectivity, the better the signal to noise ratio up to the point where loss of sideband power becomes objectionable. This fact can best be appreciated when CW is received with the crystal filter switched to the most selective position. Although the background noise drops noticeably, the actual signal strength remains almost the same, or in the case of the HRO-Sixty, increases.

In all of our receivers we strive for maximum signal to noise ratio and reasonable gain. The gain is controlled in production by altering the cathode bias resistors of one or more tubes. The gain alteration actually takes place in the IF amplifier with the amount of RF gain being controlled as a design feature. Often when a receiver is retubed or the circuit altered changes in the bias are necessary.

While the “S” Meter of a receiver serves as an indication of relative signal strength, it should not be relied upon for comparison between receivers of the same or different manufacture. The “S” Meter sensitivity, or activity, is generally dependent on gain and design factors other than those which affect the signal to noise ratio. Additional preselectors added to receivers already using two stages of RF amplification seldom do any more than increase the “S” Meter reading. This could have been done more simply by increasing IF gain. If the receiver had sufficient front end gain the signal to noise ratio is unchanged or adversely affected by adding stages unless the added preselector stage is of better design. Too much front end gain results in cross modulation and poor overload characteristics.

Jack Ivers, W1HSV
Eldico's TR-75TV is a 60 watt all-band cw transmitter sensibly priced, solidly designed. When the last connection is soldered, when you press your key for the first time, here is a rig that will work and work well on all bands. The TR-75TV is air-proved by thousands.

"My TR-75TV is doing FB and so are the other two a couple of the boys here got after seeing mine. In a little over two weeks have made contacts with every US region (W1, W2, W3, etc.) to a VE1, VE2, VE7 and CM8CC. All reports were good, in fact I have yet to get anything less than RST59X."

W8EHC

"Your TR-75TV construction was simple and all components of the highest quality. Some DX and most of the States have been worked but best of all no complaints from TV owners."

W5UTC

"Incidentally the use of a TR-75TV has completely eliminated a bad case of TVI on Channel 5 which I have never been able to clear up with any of my other transmitters."

W2RME

"I think your TR-75TV outrates all other transmitters because it is so reasonably priced and since the kit gives the owner the experience of building a transmitter and seeing it work."

WN9QVP

"Everything considered, the TR-75TV is outstanding. Since its completion a little over a month ago I have worked 12 countries (ten confirmed)."

W2GAU

" Pleasantly surprised with high quality of components, the completeness and the excellent engineering and design of my TR-75TV transmitter kit."

W6OAP

"TR-75TV is really working fine and I am reaching out. Worked Tacoma, Washington; Lebanon, Oregon; San Marta, California; Hobbs, New Mexico; so I am beginning to get around for just a green novice."

WN8HOP

43-31 DOUGLASTON PARKWAY, DOUGLASTON, L. I., N. Y. • BAyside 9-6666
LOOK AT THESE OUTSTANDING FEATURES OF THE TR-75TV:

- Simple enough for the beginner to assemble, sturdy enough for years of trouble-free operation.
- Uses the time proven crystal oscillator final amplifier combination.
- Circuit permits use of 80-meter or 40-meter crystals to cover all bands.
- Plug-in coils eliminate trick circuits.
- Husky power supply employing a 5U4G rectifier delivers 500 volts d.c. to the final.
- Antenna tuner output simplifies loading of transmitter with all types of antennas; ideal for multi-band operation.
- All stages are metered using a meter which can be switched to oscillator plate, final grid and final plate.
- A terminal strip is provided to connect a modulator if radiophone operation is desired at a later date. Elido's MD-40/MD-40P Class B 6L6 modulator is designed expressly as a companion unit.

Over-all size with cover 17" x 10" x 9". Complete kit (less crystal) ... not another bolt or wire to purchase, including a smartly styled shielded cabinet to minimize television interference. For 110-120 v, 50-60 cycles.

**TR-75TV**, complete kit with instructions $64.95
Factory wired and tested $94.95
(Continued from page 79)

Mc. Licensed operators around Chanute AFB have organized an excellent club. QSB reports ten counties worked on the first night of the organization of the amateur radio club. The Morse Code, a radar warning net, 4MXU is still 9 from Scott AFB working c.w. on 3.5, 7, and 14 Mc. Add to the list of 100 counties the presence of amateur radio operators at one time in these states: with Dad, ZME; Mom, WNSP; and Son, RQT. Dad's brother is TNBH. We have a good chance of getting a little more activity in the vicinity of Chanute. Our operator, 4LQQM, is a local legislator. HR3B, a former Danville, spent two weeks visiting around the Vermillion County area. PAO has been heard on 40 meters from a station on the 630-meter band, BPAE made DXCC with 110 countries confirmed. NJE dropped a dit and now is heard as BJ. Following a warm up he gave a good signal. Another ham in the area was heard, ICF has to contend with some 80-cycle sawtooth wave on 40 meters. OQY graduated. One station in Chicago, KBQZ, sent a note. 4NUU is a newcomer to Highland Park. NJE is delaying his vacation until the morse rig is completed. KG7D is a mobile, QGQ is a converter but the h.c. radio still is missing. DOR moved into the same block with NJE and JRT; air time and TVI are both in town. QBS's call is superior of signals for the C order to get the rig from under the bed, is adding a room to his house. Q5L operates in the 21-M. band and is trying to give a noise a JA for QSB. Washington, D. C. To expedite delivery he hopped a plane and made personal delivery the same afternoon. EKH spent a long working into the famous 19-M. vertical. LCG got WAS the hard way; his contacts take 30 to 90 minutes. BVY has added a 144-Mc. rig to his equipment. The Kek SN has a famous 19-M. vertical. WM4XIP/9 22, W9LOR 12, YTV 11, LMC 9, (June) W9YIX 226, CSW 243, LGR 30, STX 22, DOH 13, YTV 12, K9DWH.

INDIANA — SCM, Clifford C. McGuigan, W6DDA — OAC spends time researching. DOR now is with the Department of Labor. LCO has moved up in his organization. QVW is building a new high-powered final amplifier for 2 meters. CZL has new receiver and has added a QN to Mitchell. RJL operates near Tipton. W8AEH has an Advanced Class license. ESQ is president of the Kokomo Club, with YDP the club reporter. QZD has new receiver and mobile. BXP is contesting 40 meters. With a new final amplifier, VGD likes Marconi-type tubes. PQA works 40 meters with an old 45 T.N.T. transmitter. W6WPH, Elmora, held an antenna picnic at Indianapolis with good attendance and our Central Division Director, W4W, was present. DUE is installing his new 2-meter rig. TVI, LEP, RTJ, DOP and DJL attended the v.h.f. picnic at turkey Run, O.L. is a new member of QN. TT received his Extra Class license. PFH is a member of the group. QBS's call is superior of signals for the C order to get the rig from under the bed, is adding a room to his house. Q5L operates in the 21-M. band and is trying to give a noise a JA for QSB. Washington, D. C. To expedite delivery he hopped a plane and made personal delivery the same afternoon. EKH spent a long working into the famous 19-M. vertical. LCG got WAS the hard way; his contacts take 30 to 90 minutes. BVY has added a 144-Mc. rig to his equipment. The Kek SN has a famous 19-M. vertical. WM4XIP/9 22, W9LOR 12, YTV 11, LMC 9, (June) W9YIX 226, CSW 243, LGR 30, STX 22, DOH 13, YTV 12, K9DWH.

MINNESOTA — SCM, Charles M. Bove, W6MRC — Ast. SCM, Jean Walter, 10YK, SEC, BOL, RM, RPT, KC6F. The Mobile Amateur Radio Club recently demonstrated in the Minneapolis Aquatennial. They had a request from the Aquatennial Committee to participate in this civic activity. This involved emergency calls and control wherever large crowds were assembled, such as on the 2 meters and the two large parades. The Mobile Corpora responded 100 percent. OYU has moved to Minneapolis. FIT, of Albert Lea, is responsible for two new Novices. For services rendered during the recent floods the St. Paul Red Cross has sent a new Novice to work. OYU is new to Minnesota. LFJ, of Albert Lea, is responsible for two new Novices. For services rendered during the recent floods the St. Paul Red Cross has sent a new Novice to work. OYU is new to Minnesota. LFJ, of Albert Lea, is responsible for two new Novices. For services rendered during the recent floods the St. Paul Red Cross has sent a new Novice to work. OYU is new to Minnesota. LFJ, of Albert Lea, is responsible for two new Novices. For services rendered during the recent floods the St. Paul Red Cross has sent a new Novice to work. OYU is new to Minnesota. LFJ, of Albert Lea, is responsible for two new Novices. For services rendered during the recent floods the St. Paul Red Cross has sent a new Novice to work. OYU is new to Minnesota.

ARANSAS — SCM, Fred Ward, W6ULX — Everyone enjoyed the meeting at Spofforth, on Lake Conway, near Conway, Ark. A large gathering of Crawford Chapter members and their guests were present. The Crawford Chapter had a big Field Day, using the call W6BDT with 500 10-meter and 20-meter stations in the area. The ARRL field day tent was well attended. The Crawford Chapter was one of the largest groups of amateurs to take part in the ARRL Field Day.
"Use marching fire—and follow me!" Shouting this command, Lieutenant Carl Dodd struck out in advance of his platoon to lead the assault on Hill 256, near Subuk, Korea. During the fierce in-fighting that followed, he constantly inspired his men by his personal disregard of death. Once, alone, he wiped out a machine gun nest; another time, a mortar. After two furious days, Dodd’s outnumbered, but spirited, force had won the vital hill.

“You were helping, too,” says Lieutenant Dodd. “You and the millions of other citizens who have bought Defense Bonds. For your Bonds, which keep America strong, were behind the productive power that gave us the weapons we used.

“I hope you’ll go on buying Bonds—always. Because your Bonds—and our bayonets—make an unbeatable combination for keeping safe the land that we all love!”

* * *

Now E Bonds earn more! 1) All Series E Bonds bought after May 1, 1952 average 3% interest, compounded semiannually! Interest now starts after 6 months and is higher in the early years. 2) All maturing E Bonds automatically go on earning after maturity—and at the new higher interest! Today, start investing in better-paying Series E Bonds through the Payroll Savings Plan where you work! Or inquire at any Federal Reserve Bank or Branch about the Treasury’s brand-new Bonds, Series H, J, and K.

Peace is for the strong! For peace and prosperity save with U.S. Defense Bonds!

* The U.S. Government does not pay for this advertisement. It is donated by this publication in cooperation with the Advertising Council and the Magazine Publishers of America.
MISSISSIPPI — SCM, Norman B. Foschen, W4JFS — The only new operating amateur announced this month is VMR. There must be more let’s hear from you so we can welcome you to the fold. We now have a Mississippi MARS (Public Service) mobile amateur, W4CLW. Let’s all get behind him and give him all we’ve got. There is more news from Korea, thanks to RMC. JFE is in Japan with an ACIS outfit. He is there for a one-month DX operation on three bands. RUT is on a break from his gig as a hang-up job over there. IRLA, Jim from K6FBR, will be on W2ICN as SDM. Another check into the Hurricane Net mobile with W2ZJ is on the air. WA checks in on the emergency power. RM, RHE, and PFC are regular members of the group. HJ and WA are QRV on their own. It is time to shine the old bug up for the traffic season. I hope there will be more for this column next month. Traffic: W3R0H 37.

TENNESSEE — SCM, Mark M. Bowelle, W4CXY — SEC, AEE; RM, AGC; PAM, FFF. Considering that this is the first month of the season, these operators of reporting stations are very fine. Fine work, gang; please keep those reports rolling in. TPN now meets at 0600 UTC on 1500 kc. Morn through with TBPW as NCS. In addition to the regular at 1900 UTC and 2200 UTC Sun, (c.w. net) is back on 3585 kc at 1900 UTC Mon through Sat, and RM AGC will become new members. Pick one of the night time that you like best and check in, fellows. Don’t let low power; phone; or slow code keep you from this fine operation. It’s there in the bag.

TENNESSEE — SCM, John E. Siringer, W4AJW — Asst. SCM: O. H. Lowery, W4UVN, and J. E. Erickson, S4D; SEC, UBF; PAM, PUN. Traffic: W4AJW 26. This month to you, you guessed it, ARO. New appointment is PM, RHE, and WA. NCS is on his own. WA is a desk man. PM and HJ are all QRV. WA is quite a talker, they all are. NCS is a good fellow and a DX enthusiast, talking high frequency contest man, is building new temperature-controlled frequency standard. FRT reported that MGT bought a new TV set. The TV set is a good one. We wish CDA thanks the hot WX. It was only about 105 in my shack for a couple of months. All I thought I was doing was a good one. NCS reports on his TX. W2ICN, has new NE on the air. This is a good one.

KENTUCKY — SCM, I. W. Lyle, jr., W4KKG — SEC, AEE; RM, VYD; PAM, FFF; Technician Class license. T2T worked Indiana and Illinois, with no trouble. F2T still is rebuilding the entire shack. MGF now is at Fort Dix with the 27th Engineers, Kentucky National Guard. For some schedules. He signs R2AWO. My term expires June 30. I have been in business 1 year. I have been unable to accept nomination again as some of the fellows have mentioned. Get that nomination in right now for your case. No matter what happens, I will try to do what I can to give it all the same and start working to get him elected. Traffic: K4WBG 439, W4TAV 188, WMX 110, FRT 30, CDA 11, NER 7, K4G 2, S2I 1.

MICHIGAN — SCM, Norman C. MacPhail, W8DLZ — Asst. SCM: R. B. Cooper, AQ; J. R. Belais, SCW; M. C. Wills, CPB; SEC; GJH; RMA; YC; ELW; TVX; PAM; UTH; New appointments: EC to W2BZ (Bay County); EC to TPT (Saginaw County); OBF to FGB and GNS. The annual picnic at Midland was a big success. Hats off to BYY and his gang for a great job. New officers for the BR are LR; pres. AQA; QPO; and TDO; directors; NZZ; AQU; and TPO. New operators are AQA; EEF; MQU; TDO; DXJ; ZNZ; SPF; JYJ; TQX; and DXL. DXL will give the DXers some guidance preceding the small and DX operators are gaining ground.

GREAT LAKES DIVISION

KENTUCKY — SCM, I. W. Lyle, Jr., W4KKG — SEC, AEE; RM, VYD; PAM, FFF; Technician Class license. T2T worked Indiana and Illinois, with no trouble. F2T still is rebuilding the entire shack. MGF now is at Fort Dix with the 27th Engineers, Kentucky National Guard. For some schedules. He signs R2AWO. My term expires June 30. I have been in business 1 year. I have been unable to accept nomination again as some of the fellows have mentioned. Get that nomination in right now for your case. No matter what happens, I will try to do what I can to give it all the same and start working to get him elected. Traffic: K4WBG 439, W4TAV 188, WMX 110, FRT 30, CDA 11, NER 7, K4G 2, S2I 1.

MICHIGAN — SCM, Norman C. MacPhail, W8DLZ — Asst. SCM: R. B. Cooper, AQ; J. R. Belais, SCW; M. C. Wills, CPB; SEC; GJH; RMA; YC; ELW; TVX; PAM; UTH; New appointments: EC to W2BZ (Bay County); EC to TPT (Saginaw County); OBF to FGB and GNS. The annual picnic at Midland was a big success. Hats off to BYY and his gang for a great job. New officers for the BR are LR; pres. AQA; QPO; and TDO; directors; NZZ; AQU; and TPO. New operators are AQA; EEF; MQU; TDO; DXJ; ZNZ; SPF; JYJ; TQX; and DXL. DXL will give the DXers some guidance preceding the small and DX operators are gaining ground.

Hudson Division

PENNSYLVANIA — SCM, Stephen J. Neasong, W3W7L — RM, YC, KBF; PAM, LQG, JQI, K2CA, VP, DVZ, Advance Class. SEC, GBS. The生意 on 3.5 and 28 Mc. YOK is Advanced Class. FBV has returned to Michigan. KN2AX is a new ham in Sussex, N.J. KN2V is back in town. K3DSD claims it’s too hot in the shack these days for ham radio. LE1J has an upper anchor for Italy. PCE works out FB with SM3I on 28 Mc., 23 Mc., and 16 Mc. N3SWP is back at WKNY. SIF is an FB control operator at c.d. headquarters in Union. Y2C members of the ARCC have been awarded an honorary membership in the Rip Van Winkle Club. MRR is recovering from a serious illness. Gill is EC for Rockland and has 11 mobiles operating on 28.8 Mc. Part of the ARCC, K2CA and Novice EOM, recently ill, is recovering. AWF will be A3 on all bands soon. RMM is mobile with a new EOM. AAF is mobile on 144 and 28 Mc. CLL, our former SCM, will become active again this fall. Traffickiers attention: N8Y meets on 3165 kc at 7 p.m., NYS on 3065 kc at 2 p.m., NYS Phone Net, 3080 kc, on Mondays through Sat. at 8:30 a.m. and Sun. at 8:30 a.m. Your cooperation during the past season is appreciated and progress is made. SEC, NYS. Contests report: The section total will reach an all-time high this season if you will take that minute to send in your report no matter how small it may be, and when the season is a few months away from its conclusion, you will be surprised to see how well your shack has performed. Again the column, POY is camping in the Adirondacks and is mobile on 28 Mc. GM is on vacation in West Virginia. HEI is Advanced Class. CHJ is upper anchor for Italy. N1Z is on 21 Mc. and 28 Mc. The生意 has been working...
Eimac offers for the amateur radio operator’s use five top radial-beam power tetrodes proved by years of commercial and amateur application. Economy and dependability are the results whenever Eimac tetrodes are employed. Not only are they money savers through long life, low driving power and simple circuit design, they also minimize TVI worry. And for outstanding performance you can’t beat the high power gain, ruggedness and stability of Eimac tetrodes. At any practical power or frequency range there is an Eimac radial-beam tetrode to do the job.
ports e.d. buttons are being distributed in N.Y.C. SEC KTF shows continued AREC improvement. NJL traffic net had good summer coverage with GXC, LPI, OBU, DJJ, and VNJ. If your NLI welcomes your call at 20:30 p.m. EST on 3080 kc. Mon. through Fri. ZAI reports 10-meter AREC drills Thurs. at 8-9 p.m. on 28.72 Mc. KNA reports 144-Mc. XA has new 813 final. IN is looking for new QTH. AOD reports little activity on 430 Mc. VNT, PMI for NLI is rebuilding. CIT, QBR, QBS, and TUK are active with Frequent Naval Reserve, CLG is increasing power on phone. LFR has a new Viking rig. EC has his Extra Class ticket. CG and his XYL vacated their VHF-Ham. RWG is sailing out of the harbor. KRY and WL are active Official Observers. KNSAFY has a good 2-meter signal. VNJ is leaving for Northern New Jersey and NLI loses one of its best members, JZT, 3BT, AD, CQG, GIC, and WFY assisted in the Air Race Radio Net, relaying reports on the Women's Transcontinental Air Race. JXZ attended the Awards Dinner where amateur radio received praise for its valuable assistance. BQM is in charge on 144-Mc. AREC net. Suddenly a 75-Mc. net. DLF, without a home station, does very well with mobile rig. DJC has new antenna for 75 meters. PF spent time at QTA. Sa. TV is on 144 Mc. PF is on 144 Mc. KAC is on 144-meter mobile with new Comet Gangster. The Tu-Boro Club offers a certificate to anyone who contacts five of its members on any band, phone or c.w. LGK will be active on 10 meters in the October CD Party. The Lake Success, Middlebrook, and Chelmsford Clubs, together with MARS members, demonstrated amateur radio at the Mincoila Fair for the third consecutive year. UX7 is on 2- and 20-meter mobile. Remember the Hudson Division Convention at Albany this year. Join the AREC and prepare for possible emergency work or EACES activity. Drop in on the section traffic nets whenever you have traffic. The QSLs and OPS boys will always help with reliable traffic know-how. Traffic: W2YNJ 330, GXC 145, EC 109, LPI 78, JR 30. LGK 20, IN 12, BQM 9, PF 8, XBT 5, CLG 4, DLF 2, OXG 2.

NORTHERN NEW JERSEY -- SCM, Lloyd II, Manasquan, W2QFR -- Assc. SCM, Donald V. Reis, ZFMPG, SEC: NKD. We are pleased to announce the appointment of NKD, your former SCM, as the new SEC. Please forward SCM's activity reports to him at 1084 Amos St., Elizabeth, N.J., N.J.. NJP. Phone Net meets at 9 a.m. Sun., 3000 kc.: Jersey Net (c.w.) nightly except Sun. on 3950 kc.: N.J.C.D. Phone Net 2003 kc., Sun. at 9:30 a.m. N.J.C.D. Net Tues. at 7:45 p.m. RG NCS, CQS has been active as Net Control Station for the TCPN and C.D. Nets. CFB has received his QRS certificate. NET Control Station for Tomtown e.d. drill held in early September, IKO, Springfield, has just received his M.S. Degree from Stevens Institute of Technology. CQT reports 6 meters open occasionally from Canada and east of the Mississippi during the month of July, CUI has been active on four nets. CWK just received his DXCC certificate. WJW, of Greensboro, was and was very pleased with our Headquarters station. JBN has new 2-meter mobile rig in operation. LMB now is located at 800 Summit St. Now is a member. Good luck, Herma, at your new QTH. NTY won the Vermont QSO Party as high for N.J.D. XKD now is on 144 Mc., with 829 final, crystal-controlled converter and five-element rotary beam and is very active in many nets. OUS is 2-meter Net Control for Monmouth County e.d. communications net. Mon. on 147.150 Mc. OUS's new QTH is in Livington, N.J. ZBY visited Palisades Amusement Park MARS radio station. STRK has received his General Clases license and is on 10 meters at new QTH in Paterson with 40 watts on three-element rotary beam, and has 25 watts mobile. He reports he has joined the Passaic Valley Radio Club and now has become a member of the Amateur Radio Club. Glad to have you join us. Another newcomer to the scene is K16ADY. Ted now is Supply Officer at NAD, Earle, N.J. ZETU reports fifteen days active duty as Commanding Officer of the 823rd Signal Operations Company at Atlantic City. Trafalgar Pub: W2CN 150, OUS 34.

MIDWEST DIVISION

IOWA -- SCM, Wm. G. Davis, W4PP -- Things are quiet and reports few but this is vacation time. Mobile activity is very high judging from the things I hear. DLG vacationed in California. DFC now has Advanced Clases ticket, as has BVE. BBZ has Extra Class license. TQX reports from Greenfield; he is on way to Pole, The Waterloo Club visited the Marshalltown Club and Back. CA tv with 12 mobiles on 210 Mc. 9HQQ visited NYX. The

(Continued on page 80)
Reconciling ham radio with the symbol of the American highway is a difficult problem since modern automobiles are seldom designed with amateur radio installations in mind. Here is a unique, universal installation that should prove acceptable to critical XYL's across the land. The receiver and transmitter are mounted in an oblong box that pivots from a point under the dash. The equipment housing is reinforced with angle stock for rigidity. Dimensions are limited only by your own requirements. The pivot mechanism is a simple pipe stand held on top and bottom. The pipe should be threaded by a local plumber to permit nuts and washers to snugly hold the equipment case, yet permit it to pivot 90°. When not in use, the entire station is simply pushed under the dashboard. And, unlike the inconsiderate automotive designer, Electro-Voice has designed, specifically for mobile operation, the new Model 208, a handheld, light-weight carbon microphone. This remarkable unit is a single button, high output, carbon microphone designed for maximum intelligibility. A panel mounting bracket included with the microphone holds it face in on dashboard or side of transmitter...thus, when it is removed it is instantly ready for use. A differential noise-cancelling design (the first ever engineered at a popular price), to be operated close to your mouth, it has a high impact gray styrene case which is shock resistant and water proof. Press-to-talk switch actuates button and relay simultaneously. Amazingly enough, the amateur net is only $9.90. See your E-V distributor today!

W8HCW
Iowa 75 picnic was a great success with 103 in attendance, including the SCM, Assat, SCM, and SEC. YKS now is reporting on TICCN. VRA reports that the Waterloo gang is very active on its DX drives. All completed, though the reports from the other Ec's in the State are few. PP had a swell vacation-rafting in Wyoming and Colorado, and visited the AEN at Denver. The CCBM will cut down the reports this month. Let's have the news when you get home. Traffic: W8SCA 55, BDR 195, BYE 85, QVA 82, DBB 20, PIF 4.

KANSAS — SCM, Earl N. Johnston, W6UOV — SEC: PAH, FAM, HEC, ARI, FD. The Johnson County Radio Amateurs held the following new members: PLB, president DTD, vice-pres.; LQY, secy.; ECZ, treas.; WMH, act. mgr.; CLA, technical chairman, and JAR publicity. The Club made a 200-mile trip through W5 July 26th. TCRK of Salina has a new call, K1Q, with SGC as custodian. CRK held its first QSL drill with QSL office July 18th. There were fixed stations and mobiles participating. The new antenna on City Hall gave 25-mile range with S-9 signals and 9W. The WAMR of Wichita has now received a ten-meter cross-country transmitter and now has more than 60 mobiles. CVN has a new Viking. STC has new 10-meter beam. ILB is on 40- and 80-meter, which helps in the final. Both newcomers have QCX. The Mississippi Valley Emergency Net, reporting weekly, has 100 per cent attendance, has 14 mobiles out of 16 in operation. QC, 202, N6O, has new Viking. IFR is working on mobile rig. BNJ was active with traffic during July. NCW and WIT of Topeka, had an enjoyable trip to Tecumseh, camping out with the family and visiting to their hearts' content. IMH has new Elmar in the car. SWR is going to town with his composite mobile rig on 75 meters. E8D has a very active mobile on 10-meters and has lots of contacts while vacationing in Chicago. Traffic: W9NY 96, B7-37, BNU 30, FJD 19, ICV 4, PB 4, ILB 2, VFF 1.

MISSOURI — SCM, Clarence L. Arundale, W6QGJ — SEC: VRF. The Tri-State Radio Society held its annual picnic at Reedsburg Park, in Joliet, July 27th. The weather was perfect and lots of nice prices were awarded to the winners. The St. Louis Amateur Radio Club held its annual picnic June 20th, Field Day activities the 21st. Participating were CAR, QZL, EST, CDA, and W6NHGPN. The Club recently achieved a 3000-watt emergency generator. The North West St. Louis Amateur Radio Club participated in Field Day activities, using new power source located in Clayton. DFC and RDU have radio clubs near completion. Axion has new W6QTM 661, QFA 118, HUJ 58, KBB 63, W8KIK 85, BJE 12, ODQ 0, QGK 5, GBJ 4, EDA 2, GOL 1. (June) W9WAP 16, QMF 4.

NEBRASKA — SCM, Guy R. Bailey, W6QBD — It is with deep regret that SCM reports the death of our former director, VVI. GFB was a great ham and we all miss him. AUI reports new officers of the Grand Island Club are DWW, pres.; AUI, secy.-treas.; ATB also reports new officers of the SCC are BWR, pres.; BWW, secy.-treas.; and GTW, act. mgr. Margaret also says SJOV was a recent visitor to STRNC, his old stamping ground. CRK has new DX on his rig and now is working 20 meters. W9GQ, ATU, and CBH are working 20 meters for the summer. RKQ is putting up new sky hook for 20 meters. WAP will attend M.T.J., this fall. QXR, I8R, TMYU, GPO, JDC, and HQQ attended the Estes Park Hamfest. M139R, ISV, DPF, G9R, and S6B are now established. CIDR is a new call using the old call of K17X, and new DX is working 20 meters. The officers of the Falls City Radio Club are JUS, pres.; AFI, vice-pres.; and QUS, act. treas. The active hams at Kearney are K6R, FOW, FJU, H5I, KGB, and, of course, Glen himself. Traffic: W9QHG 86.

By the time you read this, Floridians like W7CBH, will be your new SCM. See page 6 for his address.
An Interesting New Application for the Mallory 151-L Hamswitch*

This switch may be used conveniently for switching a single meter into or out of 5 isolated circuits. Ample space is provided between its two switch sections for soldering meter multiplying resistors directly to its soldering lugs. Thus, range expansion of the meter may be had automatically as the switch is actuated from circuit to circuit.

Use this switch with voltages up to and including 1500 volts DC. Because its simple construction omits the two circuit-closing center sections, it must be used with multiplying resistors exclusively when measuring the flow of DC. The multiplying circuits must remain active in each respective circuit at all times.

Switch No.151-L comes complete with pointer knob, hex nut and lock washer. Dial Plate No. 487 has been designed especially for use with it.

You can rely on Mallory Precision manufacturing to supply you with the most dependable line of: ham band switches, push button switches, controls—rheostats—potentiometers—pads, tubular capacitors, transmitting capacitors, dry electrolytics, dry disc rectifiers, vibrators, and vibrator power supplies—practically every component you need to keep your rig in A-1 condition.

Send for complete details on this switch. A copy of the above schematic will be sent upon your request.

CHICAGO TRANSFORMER
DIVISION OF EISEE WIRE CORPORATION
301 ADDISON STREET • CHICAGO 18, ILLINOIS

H-TYPE

there's nothing tougher than
CHICAGO'S "Sealed-in-Steel" construction

S-TYPE
Steel base cover fitted with phenolic terminal board. Conventional numbered solder log terminals. Flange-mounted.

C-TYPE
With 10" color-coded leads brought out through fibero board base cover. Lead ends are stripped and tinned for easy soldering. Flange-mounted.

NEW ENGLAND DIVISION

CONNECTicut QSO Party October 25-26, 1982
All Connecticut amateurs are cordially invited to take part in the Fifth Annual Connecticut QSO Party to be sponsored by the Connecticut Wireless Assn.

Rules: 1) The Party will begin at 5:00 P.M. EST October 25th and end at 11:00 P.M. EST October 26th. 2) Any and all amateur bands may be used, and either 'phone or CW. 3) All contacts must be made with the corresponding station. 4) All QSOs are to be scored using the "CW Connecticut" on 'phone. 5) The same station may be counted only once regardless of band. 6) All reports must be postmarked no later than November 15th and should be sent to H. A. Bulbe, W1FJP, 47 Middlebury, Cheshire, Conn.

Prizes will be awarded to the winners. All decisions of the C.W.A. Contest Committee will be final.

Here is an opportunity to see how many Connecticut stations you can work in a 30-hour period. Get on the air October 25th and 26th and meet the gang around your section!

MAINE - SCM, Orsates R. Brackett, WJPTL - SCM, BYG, RM - KJP. The Pine Tree Net meets on 3906 ke at 1000 EDT, Mon., through Fri. VVNN, from Warren, has his new ticket and WAS, from Portland, also got his after much heart-breaking trial. VVNN, SB, also got his new one. He is now working a well signal on 75 meters. Sure good to hear him in there. The gang from the PAWA in Portland sure went out all to see that the hurricane didn't happen. The entertainment was the best, quite a bit different from the average, and there were about 350 in attendance. Some very nice prizes were given, among which was one of the new Viking transmitter kits which was won by the XYL of WQWY. I guess AI is going to claim it, though, and already he has it together and on the air. There were many hams from out of the State. As a matter of fact I believe there were some from out of the State that there were from the TUT. The foot-sending contest, with 3MAX coming in a close second. K1G0M, from the Hawaiian Islands, came the farthest to attend. KQ4C, from Bethel, Tenn., on the air after a long absence. Traffic: W1EKP 51, SUK 34, EFR 18, HQX 11, VV 11, PLL 8, BX 4.

EASTERN MASSACHUSETTS - SCM, Frank L. Baker, jr., W1ALP - TVC is our new EC for Watertown. UTH is new OQ, Class IV. Appointments endorsed for another year: MCB, Boston; MA, New Bedford; BB, Winthrop; BKR, Westford; CARL, Littleton, Tewksbury, as EEs; BB and BH as OOs, LMU as OES and OBS; BCU and JCR as AIDS; AAI as RM. W1AFC has a new W2C on 28 Me. OXH has a new baby WLY. PLQ now is in the Air Corps. FWS and his XYL went to VO-Land to see his second grandson. T6J and TQG have Class A. UPS, New Hampton, has Harvey Weller transmitter. UXN is on 28 Me. SAR and QRY are on 28 Me. BGM and BW are on W7EY on 144 Me. SH is still in BGM. The South Shore Club held its summer meeting in July. MEG has Defense Dept. Certificate of Merit, also WNH certificate No. 31. TYA is at Camp Gordon, Ga. HFZ is on

(Continued on page 84)
For selective channel operations

With its six crystal-controlled fixed-frequencies, the "SP-600" is the perfect receiver for point-to-point and network applications. Pre-arrange day and night fixed-frequencies. With crystal control you can select your desired channels immediately without searching. You'll always be on the nose because of crystal control.

The "SP-600-JX," built to JAN specs and specially ruggedized to provide years of day-in-day-out competent performance, is the most carefully engineered receiver available anywhere for selective channel operation.

But whether you want to operate on a fixed-frequency for contact with an individual station or network, or roam the entire receiver range from 540 Kc to 54 Mc in search of other contacts, you just can't operate a finer receiver than the "SP-600-JX."

Write to the Hammarlund Manufacturing Company for further details.
More Safety...Less Guesswork When You Use

**PRECISION**

**TEST EQUIPMENT**

Stay On The Air

With "PRECISION"

**SERIES 85**

**AC-DC**

Circuit Tester

(20,000 Ohms per Volt)

SELF-CONTAINED TO 6000 Ohms,
60 Megohms, 12 Amperes, +70DB

A compact, laboratory type, high sensitivity test set indispensable for test and maintenance of modern amateur communication equipment.

20,000 Ohms per Volt D.C. — 1000 Ohms per Volt A.C.

**VOLTAGE RANGES:**

- 0.5-12-60-300-1200-6000 A.C. & D.C.

**CURRENT RANGES:**

- 0.120 microamps; 0.1.2-120-MA; 0.1-12-12 Amps D.C.

**RESISTANCE RANGES:**

- 0-6000-600K-6 Meg-60 Megohms.

**DECIBEL RANGES:**

- From -26 to +70DB.

Complete with batteries and test leads.......$39.95

PLUS superior physical features:

- 4½”, 50 microamps, Easy Reading Meter.
- Heavy duty bakelite case 5½ x 7½ x 3”.
- Deep etched, anodized aluminum panel.
- Recessed 6000 volt safety jacks.
- Only two pin jacks for all standard ranges.

LC-1 LEATHER CARRYING CASE—Custom designed, top-grain cowhide case with tool and test lead compartment. $8.50

See Series 85 and other famous "Precision" instruments, on display at leading radio parts and ham equipment distributors. Write for latest catalog.

Precision Apparatus Co., Inc.
92-27 Horace Harding Blvd., Elmhurst 13, N. Y.

3.5 Mc. with BC-457. HPF won top prize at the Portland Hamfest, an S70 receiver. He is out of the Navy. Quite a few from the section also were at Portland. Mr. MCM, W28E, MME, SA1, BB, HM, SOS, SS, SNU, MPP, TY, and many others. The Palmhouse Amateur Radio Club, OUG, was out on Field Day. DWO is said painting his house. Since he has rig in the car on 28 Mc. The Sharon C. D. net helped out in a recent forest-fire fight. EMG has been taking it easy on notes. AVY went to Portland. T3S has a skip to the Fletchler Ice Station at North Pole. WU has a pair of 2-125A. AKN is on from his camp in Washephen. PEX is busy with OAP. TQG is in provincetown, in the position to make W2S, 24 more to go. UTH is on almost all bands. MEV has moved all his things to Maine. Luck to you, Emery. K14O has moved to Maine. The Gypsy Island A.R.C. held an outing. John George passed his exam. BSY and his XYL, WNW, W2MB, moved to Westport, A.P.M., of Hamburg, has had his call that he had in 1928 as W39C. KVO and TIO are new hams in Winthrop. Traffic: (July)

**WINEMG 95, TY 07, JCK 17, AVY 15, JFS 14, RSE 14, BB 11, W15W, BY 9, AKN 4, PTH 2, 3, UTH 1 (home) W4B 1, WGB 10, PEX 4, QON 4, TQG 3.**

**WESTERN MASSACHUSETTS** — SCM, Victor W. Fiiciphi, W1EBO — SEC: YTL, M. RDR, RM: BVR; WMN meets Mon. through Fri. at 7 p.m. on 3560 kc, TZA has been accepted by the University of Massachusetts and will start the fall. WN1TP spent part of the summer portable from Jaffrey, N. H. BDV is using 10-watt ‘phone and c.w. from York Beach this summer. COI is planning more roustabout work in the hills. Response will be poor, as the slow-speed net have been low. How about you newcomers and old-timers? Here is a chance to obtain some training in net operation. It is good practice, and gives a great ‘phone net operation. SPF sends Official Bulletins in Worcester on 28720 kc. Mon., Wed., and Sat. at 7:15 p.m.

There are on the 162A phone station on the CRO and on the 10-meter net. BDV carried the mail in Maine. GYJ attended the Portland Hamfest. AZT sent activities reports on many of the Pittsfield gang. Many thanks, BBR, finally finished his home and a new VFO. Hope he will become active again. WN181, at 12 years, is the youngest member of the Pittsfield RC. HRC has moved from Rhode Island to Pittsfield. Welcome, Clay. JLT is up to 180 countries. XDS is building remote tuning for end equipment.

New hams in the Pittsfield area include W1Ns WGG, VUY, WUK, VZK, WCC, and UEC. FG formerly was in the WAO. Look for most of the Pittsfield gang open by the summer rebuilding or experimenting. There should be plenty of activity from that direction this coming season. Traffic: (July) W1YB 96, TVS 18, HBB 10, HBY 9, GYJ 6, (June) W1VBR 54, TZA 19, GYJ 11.

**NEW HAMPSHIRE** — SCM, Carroll C. Currier, W1NMG — SEC: CRW. This is my first report as your new SCM and I hope that I will receive the same support that has been given to Norm and assure you that I always will be ready to help in any way that I can. If news must come from you, so keep it coming. A postcard will do. NTVQ and N1UNV are now Gen. Cl. NAZ and N1UQQ recently were married. The Nashua City and Key Club have new poles up for antennas. Congratulations to CRW on the organization of the World Wide Network and the great job you are doing. SOD and QHS have mobile rigs. Now that we are to start our winter’s busy season why not get in some of the various nets and get in some good practice in traffic-handling and also meet some great fellows?

Do you know that we have top honors in the New England States for the past handled phone and 10 meter "Chief" has been called to active duty in the Naval Reserve. BT says he has his T11T licked. Don’t forget to send in some new items and to write for all those competitors, and no matter how small. Let’s keep New Hampshire alive. Traffic: W1CRW 991, JNC 22, GMH 6.

**VERMONT** — SCM, Raymond N. Flood, W1PFS — SEC: JEN, PAM: AXN, RM: OAK. Only five reports were received this month. Guess vacations and other activities are interfering with ham radio. AVP says that the Rutland stations took part in a Simulated Emergency Test with good results. Nice going, Billy. UFZ is using an Atom-X transmitter and has an 8-40 receiver on 10 and reports he is getting good luck on that band. TQD now is using VFO on 40 meters. There’s no let-up in OAK’s ham activity; she sends in another fantastic total for the first SEC report; he is pretty busy with other activities but still found time to tend to his SEC duties. Thanks, OT5. TPO took a weekend trip to MMN/OAK (some antenna farm); and also stopped at the Deneny in Burlington. Traffic: W1OKA 198, AVP 98, FFS 2.

**NORTHEASTERN DIVISION**

**ALASKA** — SCM, Glen Jefferson, KL1NT — Reporting too late to include last month, W6MME says he regained residence in Alaska just in time to get reissue of his old call, KL7DG. He also says he recovered from participation in the annual Seward Mountain Race and says the 60 miles course, being 11G over, is open for entry than ever at the start. AON, after stacking a “Beer Can” vertical, transfers to Sitka. KL1AR, Elmendorf Field, AOP chief operator, works W6AGG/PM.
Here all similarity ends...
FROM THIS POINT ON IT'S CRAFTSMANSHIP!

Bliley craftsmanship creates—does not "grind out!"

Such basic factors as design and development, ability to meet rigid tolerances, modern quality control and two decades of experience are important to your ultimate satisfaction.

Your quartz crystal requirements, whether military, commercial or experimental, will be served best with Bliley craftsmanship.

Bliley ELECTRIC COMPANY
ERIE, PENNSYLVANIA
Proven Performance
WITH
SONAR
TWO-WAY COMMUNICATION EQUIPMENT

Two Complete Receivers

MOBILE OR FIXED

AD

Equipment with BFO for CW, SSB, or phone signals.

AND HAM STATIONS

MODEL MR-3 5 BANDS • 8 TUBES

Ideally suited for mobile with its compact size, lightweight, the MR-3 is excellent for CD, CAP, or any emergency operations. The MR-3 is a COMPLETE 5 BAND RECEIVER—NOT a converter—for 40-75, 20, 10-11 mtrs bands, with less than 1 microvolt of sensitivity — comes complete with 8 tubes, one of the best automatic noise limiters yet designed, voltage regulated oscillator, accurate slide rule, dial and mounting brackets. 

$8995

and...

MODEL SR-9

• 2 MTRS

• 6 MTRS

• 10-11 MTRS

MODEL MB-26

This 6 tube Transmitter is designed as the perfect companion to the above receivers, operating from the same power supply of 200 to 300 VDC at 100 mA, and instructions for cable connections make plug to plug operation automatic. Crystal controlled (6 or 24 mc crystal), screwdriver adjustments, antenna loading network, power supply filter, all stage meter switching, the MB-26 comes complete with mounting brackets and plugs—less crystal and meters... 

$7245

also...

Sonar makes a complete line of Commercial and Aircraft Equipment for both AM and FM. WRITE FOR DETAILS.

SEE YOUR DEALER—LITERATURE ON REQUEST

SONAR
RADIO CORPORATION
3050 West 21st St. • Brooklyn 24, N. Y.

on Fletchers Island, near the North Pole, regularly. KLJVT at Summit, KJ at Seward. visits are known in 3 and/or 6 meters. This looks like a chance for business since KLJVS at Lake Minicounna says FAA v.h.f. circuits are solid in Anchorage. The circuit is also quite clear across the Alaska range. Let's get going some of you fellows. APM is alone at Cordova and on 7050 kc. every night. Traffic: KLJVS 801, AON 32, RE 19, KG 100, IIA 11, IIA 12, IDAHO—SCM, Alan K. Ross, WT1UW—Leaverton: IDZ sends a nice letter with the following news: IFP was built in a plane barn but has recovered OK. EYC, ex-IDC, has returned to Alaska. OOW and XYL, QQV, leave a new film of mobile on 10 and 75 meters. OOV also is the first YL in the state, with Advanced Class. K7KKB and has a new Morocco converter. Vaccinating houses are DTF at Lake Peno Ojibwe; CCM in Mexico; FPM, the mountain lake, with D7Q, Pupit Sound. Twin Falls; K3KE at Pocatello for position as radio engineer with FCC monitoring station in Twin Falls. He plans to visit some of the Boise foxes whenever he returns. Shortwave frequencies in the Twin Falls area, the new K2QW, seems to be turning to DX with VE9RR and EI2Q for July. Boise: The Gem State Radio Club picnic in Nampa was well attended. FOP's VFO was 2F to 7F with short-lived grasshopper in the coil. Traffic: (July) W7GOO 21, F5 15, LQ 2, (June) W7PFS 5.

MONTANA—SCM, Edward G. Brown, W7RKG—Hamfest and other vacation activities have taken a heavy toll of news and activities reports for this month. Thanks very much to the gang for relaying KQG to another term as SCM. SAW has taken over the duties of Emergency Coordinator in the Billings Area. LIT returned home after spending several years in the Navy, and has been busy aboard ship and spent much of the time in Korea waters. C7 and AVQ are turning to attend the Semiannual Hamfest. K7U has moved to Belgrade and is grade B in the state on Amateur Radio Club activities. QCN made the grade and has dropped the prefix from his N5H Callsign to N5QTH in Laurel and is temporarily off the air. BDM is building 160-meter mobile using an S-55A for a receiver. LJK is mobiling with 1.5 watts on 40 meters with a high gain antenna. W794 North 25th street, Billings, received his W7TSC call last week. The Billings gang was busy setting up a radio booth at the Midland Empire Fair Grounds again this year. Traffic: W7JDB 28, KQJ 12.

OREGON—SCM, J. E. Boden, W7MQ—GDF finds out that a queen antenna gets out better than a queen ant, he reports. He also is active in MARB. BDN lost all of his radio repair equipment, manuals, and parts in a disastrous fire at his place of business. ONJ is working hard trying to keep the O&N the top-notch net in the country, and seems to be succeeding regardless of the summer slowness, amateur activities. ONJ also is heard on the air with a new rig and this should place his community of Ritter on the map. AEX has disposed of his radio business to LZO, who recently returned from Alaska. KQJ now is the father of twin girls, who will add somewhat to his QHA! problems, no doubt. The Pendleton Amateur Radio Club is making plans to build a complete radio-equipped trailer to be used for any emergency, and will include a large 15-volt a.c. power supply. Traffic: KFQ 160, GY 55, MG 48, GNJ 38, HDN 38, JKT 30, EUG 15, FKA 14, ETG 11, LV 5, WASHINGDON—SCM, Lawrence M. Schirng, W7CZV—SEC: BTV, RM: FLX, JAM; NBR. CWV spent his vacation at Mutiny Bay, ETO is having trouble with line noises, EQB is working old HRO pipes hearing and getting more noise than from the antenna. RG now has 3-band mobile receiver. He took in the Pacific Division Convention in San Francisco, at BTV de-Telegraph his Visalia. New officers of Seattle's Northland Club are HRC, pres.; HH, vice-pres.; PFG: treas.; FTR: secy.; CO, Sgt. at arms. FWD completed one-year perfect attendance on WSN. OVC reports 4 clubs with loops for hidden transmitter hunts. KIX and CTS won the code contest at the Richland picnic, sending with their left feet. AIB has completed numerous amateurs experiments, conclusions, folded dipole. PFK has a new rig under construction using 2F0A in the field. NRO is tuning the "Big Boy" (Tacoma) TV customers in a happy mood. JIR and LFA are at Camp San Luis. KIH is home from brush-up Alaska. LKQ is trying his hand as ECS on WSN. FPZ has a new job with Northwest Airlines. PHP sends word that he does not like Army clothes, he said E2B held its picnic at the lake. Members of the Seattle Northland Club held a "Saw-Wood Picnic," headed by KZP, at M5's place on Lake Carney, where they blew saw-edged wood to embiggen and burn on Field Day. The XYL of B designed and made up mobile hunt trophies, with blue ribbon for first, red for second, and blue rag for third. POF has 3 blue ribbons for LF. BFB is home from Japan and operating mobile until his home rig is de-Telegraphed. IFP has a new HRO-60. NQ has new set miniature transmitter, DTR-201. New owner of Trunk 'phone net on 3810 kc. During vacations JNC and
Centralab's new miniature switches give you more flexibility... provide more positions per pole, even with smaller size. For example:

1 pole — 12 active positions per section
(Former 1-pole switch had only 11 positions).
2 poles — 6 active positions per section
(Former 2-pole switch had only 5 positions).

These switches feature one-piece shaft construction, for more accurate indexing. They are available with one to six sections per shaft, one to 18 poles per switch. Sections are Steatite in either shorting or non-shorting arrangements. Adjustable stop allows selection of positions or continuous rotation. More, these switches are guaranteed to stand a minimum of 50 hours of salt-spray tests. No other units on the market as stock items will do as well.

Separate Steatite sections, index assemblies, hardware and accessories also available.

For your miniature or mobile rigs... insist on Centralab switches. Centralab offers you the exact switch you want, when you need it, always available from one source... and at attractive low prices!

The Centralab miniature switch line is only one of the more than 470 new items listed in Centralab's new Catalog 28. Get your copy of this 12-page index to the latest developments in the fast changing electronics field. See your distributor or write direct.

Centralab
A Division of Globe-Union Inc.
912 East Keefe Avenue • Milwaukee 1, Wisconsin
In Canada, 635 Queen St. East, Toronto, Canada
For General Purpose Diode Applications... The RAYTHEON CK705 GERMANIUM CRYSTAL DIODE!

The CK705 makes an ideal general purpose rectifier for applications where small size, low shunt capacitance and absence of heater voltage are important. In addition to its small size (9/64" dia., 25/64" length) the CK705 has small, flexible leads, completely insulated body and a red colored band for quick identification.

CHARACTERISTICS: (At 25°C)

Maximum Inverse Current at -10 volts .......... 0.05 ma.
Maximum Inverse Current at -50 volts ........ 0.8 ma.
Minimum Forward Current at +1 volt ........ 5.0 ma.
Shunt Capacitance .................................. 1.0 ufd.
Min. DC Reverse Voltage for Zero Dynamic Res. 70vols

See the CK705 Diode at your Raytheon Tube Suppliers or write for free data sheet on the complete line of Raytheon quality Crystal Diodes.

Ask your supplier about Raytheon Subminiature, Miniature, Hearing Aid, Reliable, Nucleonic, Voltage Regulator, Rectifier and Transmitting Tubes and Raytheon Transistors. They're tops in quality and performance, too.


PACIFIC DIVISION

HAWAI'I - SCW, John R. Sanders, KHR9D - The HARRC gang plans an outing similar to Field Day this fall minus the radio gear and contest work. The Honolulu Mobile Club has another Transmitter Hunt, QO, who has long carried the 75-meter mobile "Standard" almost alone, has lately been joined by FY, AFQ, RK, and ADM. ZF has been working Islander very nicely with 2 watts and sideband on 3.9 Mc. KB built a new 14-Mc. fili. AO has been working much DX with his new push-pull 14-Mc. first. FY again active in Honolulu after a two-year sojourn on the Mainland. KR says the Halemaumau Fire Pit reminds him of some final plates he has seen during DX Contest! TQ put his hand out to get his station wagon full of mobile gear into his new Willys sedan. APL is a new station at Waimanalo. TS has logged 115 stations reporting into the Inter-Island Net over a period of ten days. If you have traffic for other Islands or wish to participate in the net activity, come up on 2000 kc. Tues., Thurs., and Sat., 8 p.m., HST. Traffic: KG6FPA, 2295, JASA5/KEAR3, 900, KHI9T 22.

NEVADA - SCW, Ray T. Warner, W7JT - SEC: JJ, ECF, JLM, JWS, KAO, MQX, QXX, TYT, VO, LOS, and ZT, RM: PST, OPS, JQO, O0, LOS. Nevada State frequencies are 9600, 7200, and 2900 kc. Your SCM tells that 33 Nevada hams now are registered with ARRL, under 9Gc. Have you placed your application for the RACES program? 15 TRM is active with his new Villing and NC-183. QH is heard on 40 meters. JO says he's not a bit snobby - just can't hear you through power leak. HJ, ECFJ, JWS, NR1, and JJ are all on 75 meters. Mobile, ZT is NCS on MARIS phone net. JJT now is active in MARS. John Reinhart, K9C, will give a talk on "Modulation" to the Southern Nevada hams Oct. 9th or 19th. VOZ, of Steed AFAB at Reno, is on 10 meters, both mobile and fixed. BVZ haunts 7226 kc. when not W6J building his new shoed in Paradise Valley. ARES appointments are open for hams in the Reno and Northern Nevada area. Traffic: W7JY 21.

SANTA CLARA VALLEY - SCW, Roy J. Cousin, WB8LZI - Summer activities are keeping the clubs in the section very busy. The NPEF furnished communications for the Redwood City Rodeo, which was appreciated very much. The SCCRCA really is in high gear preparing for the Annual Bar-B-Q on OUK will be mandatory in the section... OUK will soon move to Sacramento. The NPEF will miss you both and hope to see you via the wire lane. A newcomer to the South San Francisco Area is W7PB, from Salt Lake City. The PAARA is holding Monday night drives on 146.00 Mc. JWD is Net Control Station. Your SCM and many other members of the section enjoyed themselves very much at the Pacific Division Manifest held in San Francisco July 4-5-6. AVJ, RKG, and LNG enjoyed 75-meter trips and had a great time in the Santa Clara Valley section and now is in the East Bay section. MMG is off to W1-Land for his annual vacation. OLF of the Police Commissioners of Mountain View, will finish his new rig soon; he now checks in on LSB at 2130 Monday through Friday on 3000 kc. C2M is having a fun evening and checking in on the Palo Alto Emergency Net at 2000 Monday nights on 146. HC still is very busy but manages to check in on RCN. With W6Maso in Pinole area hams will have a booth displaying emergency equipment. The SCCRCA is planning a booth at the coming Santa Clara County Fair. Now calls in the WNGD, OIK, OW, QW, and W6FTF. Area: W6FTF 1053, HC 15, CAZ 8, MIG 1.

EAST BAY - SCW, Ray H. Cornell, W6ZJ - Ass't. SCM: Guy Black, 6LH, and Julio Amaro, 6WOM. SEC: RVC: RM: FWP, JOH, PAM: K2F, KZP, our PAM, is in New York to move across town where he still will be heard on MTN and on the staff net. RVC is taking a six-week course on the U.C. campus and finds little time to carry out his EC duties. The August meeting of CCRCA was held at WGM's QTH. FCC regulations and Field Day trophies took up the entire session. Many East Bay hams attended the SCCRCA picnic at San Jose. One local ham dealer had a rooting section that really entertained the hams. LMZ now is known as Capt. Nelson in Bombay. JTG is rebuilding the ham shack and mobile station. HILX is active on BAN. JOH and IPW are active on BAN and RNF. WIF put K7B on 6000 kc. from his three-wire service to the main QTH as the service to control TFL. 45EVX visited yours truly and contracted an Duffy for his 6Mc. A new member of the house is KVC 9. Alameda County c.d. still is conducting effective drives. Movies and coffee follow the drives. K6PMA makes BPL on the first reported report. 6QNQ is a new member of the section; QTV at St. Helena, Calif. PWB has a FB picture of his station in the July/August DXDEX. NZ finally booked Zone 39. 4W1MY, at Yemen, is completing 4-200-A final with p-network. Phone men active.

(Continued on page 90)
SPECIFY ALSIMAG®

THE BEST IN

HF INSULATION

Custom Made Technical Ceramics

FOR ELECTRONIC AND ELECTRICAL USES
SOLD ONLY TO MANUFACTURERS

AMERICAN LAVA CORPORATION, Chattanooga 5, Tennessee
51ST YEAR OF CERAMIC LEADERSHIP
Modernize with Triplett meters

A Size, Type, and Style for Every Installation

Your instrumentation is strictly modern in design and construction with Triplett Meters. You can have sizes 2" to 7" in a wide variety of case shapes and mounting arrangements, A.C., D.C., R.F., Rectifier or Dynamometer. Molded and metal cases, rear illumination, and other special features are available. For precision and economy virtually every meter part is made in Triplett plants under rigid humidity and dust control. Every meter represents the refinements gained in half a century of meter experience. Keep your panels up-to-the-minute with Triplett Meters—famous the world over for quality, accuracy, and dependability.

FOR THE MAN WHO TAKES PRIDE IN HIS WORK

Modernize with

Triplett meters

A Size, Type, and Style for Every Installation

Your instrumentation is strictly modern in design and construction with Triplett Meters. You can have sizes 2" to 7" in a wide variety of case shapes and mounting arrangements, A.C., D.C., R.F., Rectifier or Dynamometer. Molded and metal cases, rear illumination, and other special features are available. For precision and economy virtually every meter part is made in Triplett plants under rigid humidity and dust control. Every meter represents the refinements gained in half a century of meter experience. Keep your panels up-to-the-minute with Triplett Meters—famous the world over for quality, accuracy, and dependability.

FOR THE MAN WHO TAKES PRIDE IN HIS WORK

90
the COIL that foils breakage

BUD 75 WATT COIL
with Polystyrene Plastic Base

Now Bud gives you improved performance, better appearance and long lasting quality in these 75 watt coils with the new Polystyrene base. Polystyrene has proven superior to porcelain for many reasons, including

1. Far greater resistance to breaking or cracking.
2. The Q of the coil is exceptionally high due to the extremely low power factor.
3. Pins are moulded in place—always remain perfectly aligned.
5. Transparency adds to smooth modern appearance.

Bud 75 watt coils are furnished with fixed or adjustable center links and fixed or adjustable end links. They are air wound, mount into 5-prong tube sockets and can be used on bands from 6 meters to 160 meters. OEP and OCP Coils are designed for use in circuits using Pentode tubes with high output capacity such as 6L6, 807, etc.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed</td>
<td>Fixed</td>
<td>Adjustable</td>
<td>Adjustable</td>
<td></td>
<td></td>
<td>Net</td>
</tr>
<tr>
<td>Center Link</td>
<td>Center Link</td>
<td>End Link</td>
<td>End Link</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| OLS-160     | OES-160     | 160 Meter   | 100 MMFD    | $2.28
| OLS-80      | OES-80      | 80 Meter    | 75 MMFD     | 1.95 |
| OLS-40      | OES-40      | 40 Meter    | 52 MMFD     | 1.92 |
| OLS-20      | OES-20      | 20 Meter    | 40 MMFD     | 1.83 |
| OLS-10      | OES-10      | 10 Meter    | 25 MMFD     | 1.74 |
| OCP-10      | OEP-10      | 6 Meter     | 17 MMFD     | 1.41 |
| OCP-20      | OEP-20      | 10 Meter    | 45 MMFD     | 1.74 |
|             |             | 20 Meter    | 50 MMFD     | 1.83 |

* Denotes tube plus circuit plus tank plus output coupling capacity required to resonate coil at low frequency end of band.

- **SHIELDED COIL LINKS**

These links are made to fit RLS, VLS, and MLS series of coils. This link will prevent capacity coupling between the tank coil and the link and would reduce TVI by greatly attenuating harmonics. The links can be used on coax or balanced lines.

<table>
<thead>
<tr>
<th>Catalog Number</th>
<th>DESCRIPTION</th>
<th>Amateur Net</th>
</tr>
</thead>
<tbody>
<tr>
<td>AM-1300</td>
<td>Used with RLS coils (180W)</td>
<td>$1.92</td>
</tr>
<tr>
<td>AM-1301</td>
<td>Used with VLS coils (500W)</td>
<td>2.19</td>
</tr>
</tbody>
</table>

Bud products include coils, condensers, R.F. chokes, sheet metal ware, etc. See the complete Bud line in your local distributors.

- **ADD-A-LINKS**

When the circuit that you are using requires a different number of turns on the coil link than is furnished with the standard coil, the links listed below can be used to replace the standard link.

<table>
<thead>
<tr>
<th>Cat. No.</th>
<th>Used With</th>
<th>No. of Turns</th>
<th>Amateur Net</th>
</tr>
</thead>
<tbody>
<tr>
<td>AM-1303</td>
<td>RLS</td>
<td>3½</td>
<td>.52</td>
</tr>
<tr>
<td>AM-1304</td>
<td>RLS</td>
<td>4½</td>
<td>.54</td>
</tr>
<tr>
<td>AM-1305</td>
<td>RLS</td>
<td>5½</td>
<td>.63</td>
</tr>
<tr>
<td>AM-1307</td>
<td>VLS</td>
<td>3½</td>
<td>.52</td>
</tr>
<tr>
<td>AM-1308</td>
<td>VLS</td>
<td>4½</td>
<td>.54</td>
</tr>
<tr>
<td>AM-1309</td>
<td>VLS</td>
<td>5½</td>
<td>.63</td>
</tr>
<tr>
<td>AM-1310</td>
<td>VLS</td>
<td>6½</td>
<td>.72</td>
</tr>
<tr>
<td>AM-1311</td>
<td>MLS</td>
<td>3½</td>
<td>.81</td>
</tr>
<tr>
<td>AM-1312</td>
<td>MLS</td>
<td>4½</td>
<td>.96</td>
</tr>
<tr>
<td>AM-1313</td>
<td>MLS</td>
<td>5½</td>
<td>1.05</td>
</tr>
<tr>
<td>AM-1314</td>
<td>MLS</td>
<td>6½</td>
<td>1.14</td>
</tr>
</tbody>
</table>

BUD RADIO, Inc.
2120 EAST 55th STREET  CLEVELAND 3, OHIO

The Mark of Perfection
NTD, and ROX. More activity reports are needed to fill this column. Please send them to the SCM promptly at the end of the month. Those interested in organizing field groups to work for South Carolina license tags are asked to contact the SCM. The South Carolina section does not have a Route Manager. Anyone interested in organizing a South Carolina e.r. net should apply for RRM appointment.

Emergency coordinators, please keep the NEC, DX, and WEF of BPL formed of emergency preparations in your community.


**VIRGINIA** — SCM, IL Edgar Lindauer, W4FF — On October 11th the Roanoke Division Convention in Richmond gets underway, so if you plan to attend your reservations in time. Early registration helps in coordinating planning and programming. The Shenandoah Valley Radio Club Hamfest at Dickey Ridge Skyline Drive was attended by 150, 8MO, a visitor from the Bradford ESC, a visitor from the Bradford ESC Radio Club, Philadelphia, was winner as the first mobile rig to make outside QSO in a specified time limit. Some 50 mobiles were present and in competition. UWS, VFM, and UUC decreased their call sign power and "N" by passing General Class exam. UWS and LJK are active on VN-BSN and have been appointed ORS. ITA Japan, PYN, William and Mary College, will return to VN after an absence of one year. WN4WBC sports a new S-26. FY will have five SWLas to take Novice try. KFC, FF, and CC are organizing a program for Novice Roundup by FYRC. The purpose is to enlighten Novices in the Washington Area of ham activities available for expanding their new hobby. Get those mobile rigs in your auto and display your call signs in the form of license plates 250 have been issued to date. Be ready in case of emergency. Net operations begin Oct. 6th at 3080 kc. for c.w. nets, VSN 1030 w. (2130 E.S.T.) and VN (2040 p.m. EST). VN will occupy 3085 kc. at the usual time, 7300 p.m. EST. Net Managers are MWI for VN, FXA for VSN, and FCA for VN. Traffic: (Juday) W4BHU 49, W4BPR 40, W5 39, FY 22, UWS 20, CFV 17, 2KJ 4/16, KFC 8, FF 2, James W4PV 35.

**WEST VIRGINIA** — SCM, John T. Steele, W8MCR — There is very little to report from West Virginia this month. The group has been vacating and too busy to report any activity. SEMG has been very active on 75-meter contests, surveying the State and having a lot of fun. FGS reports going mobile on 70 meters; he also reports he is planning to take the Extra Class exam in September. Portable equipment is used in the coal fields by the Elk River Coal Company portable from Camp Shaw-Mt-Del-Ega, near Lewisburg, and having many fine contacts. Activity on the W. Va. Phone Net will have resumed the first Monday in September, according to SEVL, the PAM. The frequency will be 3800 kc. as always. We have had no reports as to when VN, will resume. The net is also will be in early September. The following news was received from AU: YPR and YM visited Weston has recently. The Stonewall Jackson ARC held its annual picnic at Lake Riley, BWI and 8BF have moved back to Weston. The civil defense meeting was so well attended it looked like a hamfest. Traffic: W8PUS 22, GEP 6, AUJ 5.

**ROCKY MOUNTAIN DIVISION**

COLORADO — SCM, M. W. Mitchell, W9QZ — SEC's COA & BQR, Aaska, SEC, and its staff, handed yours truly a batch of Grand Junction news. The Curtis Radio Club, has moved to Sacramento. WXY is now president and DGA is new vice-president. The Grand Junction Club held Field Day on Grand Mesa, the highest flat-top mountain in the world with an altitude of 10,500 feet and 57 square miles on top. BXM vacationed back East, so missed his report this time. He reports that the v.h.f. try-out from Laramie Peak was a failure. He's looking forward to the opening. Tough luck. Maybe next year it will open up.

This month's news covers both June and July because of lack of time. The lack of reports is due to poor bangaboo at its headquarters in Denver and some of the boys are getting complaints. Your SCM bought a set and isn't bothered with TVI because he watches the programs while they are on the air! Find a very simple solution? If no more reports are received next month than in the last two months, the next news will be the last your SCM will write for this column if a new SCM has been elected. Traffic: (Julay) W9/EQ 169, W9/EQ 16, G9 169, G6L 919, W6TTC 299.

UTAH — SCM, Floyd L. Hinshaw, W7TTM — Judging by station activity reports, or rather the lack of them, vacation-time is a firm grip. Fred in Longmont completed his new rig and is chasing DX on 20-meter 'phone and e.r. KWK is "knee-deep" in 2-meter gear, but finds work interferes with making. Bill in Salt Lake City and WILL check into R77 at 9 p.m. on 3725 kc. will be welcomed and is urgently needed to receive Utah traffic from Servicemen in the armed forces. Come on, fellows, let's show the gang we are alive!

(Continued on page 84)
To You,
Belden's Golden Anniversary
Means
—product performance that
can come only from a "know-
how" that has grown through
actual service since the
inception of Radio.
—an ability to co-oper-
ate in pioneering new
wires to meet or antici-
pate industry's grow-
ing needs.
In the years that follow
This Belden
Program Is—
— TO BE
CONTINUED

LONG LIFE—LOW MAINTENANCE
NO COMEBACKS WITH THE

NEW 300 OHM
TRANSMISSION CABLE
BY BELDEN

No. 8230

180° FLEX TEST
BELDEN 8230 WELDOHM
COPPER
Result
254% More
Flex Life

BREAKING STRENGTH
BELDEN 8230 WELDOHM
COPPER
Result
162% More Breaking
Strength

COPPER-
SHEATHED
20-GAUGE
STRANDED STEEL WIRE
Brown Polyethylene—Resists Weather and Oxidation

The new Belden Weldohm, 300-ohm Transmission Cable is the
greatest advancement in television installation since television began.
Reducing TV lead-in conductor breakage to a minimum is easy.
The new Belden Weldohm Cable has overcome the breakage point by
162%, that's 1 1/2 times the strength of pure copper wire.
In actual test, Belden Weldohm Cable will withstand 254% more
whipping or severe flexing than the average installation of 300-ohm
copper lead-in wire.
There is no difference in the electrical characteristics between an
all-copper conductor and the Belden Weldohm copper-coated steel wire.
The web is 72 mils of 100% virgin polyethylene.
Replace with Belden Weldohm or make your next new installation
with Weldohm and avoid expensive loss of time and labor.
Specify Belden—Weldohm Transmission Cable.
Belden Manufacturing Co., 4621 W. Van Buren St.
Chicago 44, Illinois

Belden
Radio WIRE
FOR IMMEDIATE DELIVERY!
THE NEW JOHNSON VIKING II 100-WATT PHONE-CW TRANSMITTER KIT. Featurizing effective TVI suppression. Complete kit with tubes. Only $279.50.

NEW JOHNSON LOW PASS FILTER. Greatly attenuates transmitter harmonics and spurious output above 54 MC. Will handle a full kW, 100% modulated, 52 ohms. Only $16.50.

THE NEW JOHNSON TVI SUPPRESSION KIT for installation in present Viking I Transmitters. Only $24.75.

SOUTHEASTERN DIVISION

EASTERN FLORIDA — SCM, John W. Hollister, Jr., WA4FGR, 4240 Bentley Ave., Winter Park, Fla., reports that he will have another Emergency Test and he is also considering the possibility of an Emergency Net. SCM and others report a growing interest in the sporting activities and the potential for better communication during these events. All nets, both private and public, need your support.

On Oct. 11, SCM will have another Emergency Net in Jacksonville. The JARS Group held a tribute to PZ7T, a former member from CQ to date, at the Jacksonville Emergency Net on Oct. 11. SCM and others will be in attendance. The JARS Group is a local group that has been active in Emergency Net activities. SCM is planning to have a surprise party for PZ7T.

INFLUENCE OF SPACE WEATHER ON RADIO PROPAGATION

The influence of space weather on radio propagation is a complex and multifaceted topic. Space weather refers to the natural variations in the Earth's environment that affect the behavior of radio waves. These variations can be caused by solar activity, such as solar flares and coronal mass ejections, and by geomagnetic activity, such as magnetic storms and substorms.

The impact of space weather on radio propagation can be significant. For example, solar flares can cause a sudden increase in the number of high-energy particles in the Earth's atmosphere, which can lead to a decrease in the ionization of the upper atmosphere. This decrease in ionization can cause a decrease in the reflection of radio waves, which can result in a loss of communication between two points on the Earth.

The degree to which space weather affects radio propagation depends on various factors, including the frequency of the radio waves, the location of the communication endpoints, and the specific type of space weather event. Understanding the relationship between space weather and radio propagation is important for a wide range of applications, including military communications, space exploration, and weather forecasting.
The popular GATES HF-10 High Frequency Transmitter is available in five different models for applications in broadcast, voice communications, high speed telegraphy or combinations of these services. These fine transmitters have gained world wide recognition for their complete reliability and excellence of signal quality. They are daily handling a sizeable quantity of the intercontinental communications between nations, both government and private.

High level Class B modulation is employed for all voice or broadcast models. The low plate voltage (5000 volts) assures reliability in line with high efficiency. Rated at 10 KW (telegraph) from 2-22 Mc. and 8 KW (telegraph) at 24 Mc., or 10 KW 100% modulated 2-18 Mc., 7½ KW at 22 Mc. and 6 KW at 24 Mc. These rugged transmitters are worth investigating for your future. Write for full descriptions and specifications.
Here are only a few of the big values in the latest 148-page 1953 B-A CATALOG!

Write us if you have not received it yet.

BURSTEIN-APPLEBEE CO.
1012-14 McGee St., Kansas City 6, Mo.

Send Free B-A Catalog No. 551.

My order is attached for items from below.

Name: ___________________________ Enclosed.

Address: ___________________________.

City: ___________________________ State: _____________

POWER SUPPLY KIT
110 VOLT FILTERED DC at 40MA

For all $1.79

Here is a big saving you get Top Quality basic components for a Power Supply with many applications...for Mike or Phono Pre-Amp, Midget Radios or Audio Amplifiers, Photo Cell equipment, Garage Door Openers, Code Practice Oscillators, TV Boosters, Test Equipment, etc.

Kit consists of a compact, fully enclosed Power Transformer, pt117 V, 60 cycle AC 110 V @ 40 MA, H.V. Sec., and 5.5 V @ 1 amp, for filament. A 38 MA-120 V Selenium Rectifier and a 16 Mfd-150 V, DC wkg-225 V peak electrolytic Filter Condenser...both very compact and easy to mount with the tinned wire leads. WI-1.1 is included.

You Get All Above
No. 14B993. PER KIT: $1.79

75 AND 80 METER CRYSTALS

In regular FT243 holders

First quality guaranteed active oscillators made to Signal Corps specs...every one brand new and tested!

Get plenty while available. We doubt this lucky buy can be repeated.

Available in following frequencies:
3525 KC No. 1SA1173
3665 KC No. 1SA1174
3700 KC No. 1SA1175
3735 KC No. 1SA1176
3770 KC No. 1SA1177
3800 KC No. 1SA1178

You can easily change frequency if necessary by following crystal grinding instructions in any handbook.

Assortment of 4 Crystals--Our choice from No. 17B818. Per Assorted: $2.45

INCLUDE ALLOWANCE FOR POSTAGE--ALL OVER-PAYMENTS REFUNDED.

BURSTEIN-APPLEBEE CO.
1012-14 McGee St. KANSAS CITY, MO.

San Juan, AK now can run a kw, on 40 meters. The AEC 10-meter net, KP4CY as 1PC, on 1 PC, will run 8 P.M. on 28.8 Me. KP is building combined grid-dipper/antennascope. IF built vacuum-tube voltmeter, KP4D's phone number, Red Cross, is 0707. KP4USA 2-0000, extension 5150. Traffic: KP4D14, DJ 6.

SOUTHWESTERN DIVISION

LOS ANGELES -- SCM. Samuel A. Greenleaf, WAEBR--SEC. KSX. PAM: PB. RM. FYW. CJP. Section Traffic Note: L.A., Section Net (J1N) Monday through Friday -- 8:00 to 9:00 cc, at 2300 Capital Jet (ECN), 3955 ke, at 1900. BPL, this month was held by IBC, KWP, RM. and KKY. On July 21st amateur of the Pacific Coast made history, shortly after the final moratorium, when mobile units were on their way to locate the source of the disaster. For hours the only communications in and out of the desert town of Yelvas was by ham radio. An magnificent job performed by our traffic nets and by the many hams who were either active or standing by to help if needed did much to secure the continuance of hamdom in the sad event. Gentlemen of LAX -- well done! Activity keeps up despite the bad QRM. DPL is working on organization of coordination net; report (to SCM's OO). CFPJ diagrammed a new tower that seems to raise itself. Congrats to NJU on General Class ticket. FYW (RM) will be the EL in J2L Net when new traffic procedure and that the Pazo Robles Club gang on 144 Me. consists of MSC, YCZ, W2W, FYW, and WNE BXI and CMNL. 5B worked 10 and 50 metered 10 and his friend 5810. W7B UNO takes trip up North. BLY reports that ZPB and NPC put on PB communications demonstrations at Service Clubs, that PIB got back from his QSLing for The Tube. By the way -- don't forget to write your Assemblyman supporting that movement, or contact PB for information.

HR2 sent in his report of Mican and 4 RUP for the go of U. C., Santa Barbara. Grand job, fellows. NDA finally set up LTVY FIK on his own QSL and could print his remarks about some TV sets, golly! Tsa said the Daylight Emergency Net (2 meters) is going great guns.

COF reports that a band of angels twisted a $300 TTI (by docketed!), who now is OGG in BFI. W7 LOM, and he's dodging odors that go boom. KKY says it's all in a word for anyone who opposes BC action on Plat-2 and 3. The annual picnic of the Two Nets and Down Coast was a terrific success.

and what prices! EPL got Old Times Club certificate.

FMG. Net Manager calls attention to the new time for LSN, 8:30 P.M. Note to Santa Barbara and San Luis Obispo hams: if we don't hear from you, we can't record it. 1C4R is new of the U. C. Club. Others in town are CAM, RLN, and BPOU, very busy. DUU came upon a bad wreck on the highway, sent Mayday on his mobile, got an ambulance by CB, and made it to hospital just in time for helping a life. (This information via QW). A low bow to the boys at HGV for always being on deck when wanted. They were activated quickly to help the 'qake stations.

You can easily change frequency if necessary by following crystal grinding instructions in any handbook.

Assortment of 4 Crystals--Our choice from No. 17B818. Per Assorted: $2.45

Here is a big saving you get Top Quality basic components for a Power Supply with many applications...for Mike or Phono Pre-Amp, Midget Radios or Audio Amplifiers, Photo Cell equipment, Garage Door Openers, Code Practice Oscillators, TV Boosters, Test Equipment, etc.

Kit consists of a compact, fully enclosed Power Transformer, pt117 V, 60 cycle AC 110 V @ 40 MA, H.V. Sec., and 5.5 V @ 1 amp, for filament. A 38 MA-120 V Selenium Rectifier and a 16 Mfd-150 V, DC wkg-225 V peak electrolytic Filter Condenser...both very compact and easy to mount with the tinned wire leads. WI-1.1 is included.

You Get All Above
No. 14B993. PER KIT: $1.79

75 AND 80 METER CRYSTALS

In regular FT243 holders

First quality guaranteed active oscillators made to Signal Corps specs...every one brand new and tested!

Get plenty while available. We doubt this lucky buy can be repeated.

Available in following frequencies:
3525 KC No. 1SA1173
3665 KC No. 1SA1174
3700 KC No. 1SA1175
3735 KC No. 1SA1176
3770 KC No. 1SA1177
3800 KC No. 1SA1178

You can easily change frequency if necessary by following crystal grinding instructions in any handbook.

Assortment of 4 Crystals--Our choice from No. 17B818. Per Assorted: $2.45

INCLUDE ALLOWANCE FOR POSTAGE--ALL OVER-PAYMENTS REFUNDED.
to the **E.E. or Physics Graduate**

with experience in

**Radar or Electronics**

Hughes Research and Development Laboratories, one of the nation's large electronics organizations, is now creating a number of new openings in an important phase of its operation.

**Here is what one of these positions offers you:**

1. **The Company**
   Hughes Research and Development Laboratories is located in Southern California. We are presently engaged in the development of advanced radar devices, electronic computers and guided missiles.

2. **New Openings**
   The positions are for men who will serve as technical advisors to the companies and government agencies purchasing Hughes equipment. Your specific job would be to help insure the successful operation of our equipment in the field.

3. **The Training**
   Upon joining our organization, you will work in our Laboratories for several months until you are thoroughly familiar with the equipment you will later help the Services to understand and properly employ.

4. **Where You Work**
   After your period of training (at full pay), you may: (1) remain with the company Laboratories in Southern California in an instruction or administrative capacity, (2) become the Hughes representative at a company where our equipment is being installed, or (3) be the Hughes representative at a military base in this country—or overseas (single men only). Compensation is made for traveling and for moving household effects, and married men keep their families with them at all times.

5. **Your Future**
   You will gain all-around experience that will increase your value to the company as it further expands in the field of electronics. The next few years are certain to see a large-scale commercial employment of electronic systems—and your training in the most advanced electronic techniques now will qualify you for even more important positions then.

**How to Apply**
If you are under thirty-five years of age, and if you have an E. E. or Physics degree, with some experience in radar or electronics, write to:

**Hughes**
Research and Development Laboratories
Engineering Personnel Department
Culver City, Los Angeles County, California

Assurance is required that relocation of the applicant will not cause disruption of an urgent military project.
dleston, ODLN; Thomas H. Wells, GEWUT, SEC; SK, RM; IZO, EC: DEY. The new SEC for this section, SR, would appreciate any help and suggestions offered. Remember the dates, October 11th and 12th — the Southwestern Division Convention will be held then in Balboa Park, San Diego. The two-day affair, including a pre-convention get-together, rag chase, and swim party (Friday night at the Mark Hotel), has been well planned and it looks like weather for all, so try to be there to help make it a really big success! In case you're doubtful, the door prize will be an H-60 and the presentation prior to the Elmore mobile phone, RM IZO offers many thanks to TST, GTG, MUE, FCT, 7MILL, MAE, BH, and KB6NC, as well as all SSN men, for fine QSOs during the month of July. A summary of activities in Orange: DEY reports that the control station is located at Orange County Communications Center, with a RG-610 on 10 meters, a 222 on 2 meters. The fellows are obtaining a 15' x 20' room at the same location by October for ARRC/c.d. and a club station. KKB is back in the fold from KLZ-Land. ZE and DE on 2 meters have been making some successful experimenting with 2-meter mobile gear. IAB, the Pendleton station, ran up a total of 2779 for July traffic total. Ray, chief operator, says the gear includes stacked rhomboids to Japan, a single rhomb for stateside and KID6 work, and a new bi-square with reflector going up for 20 meters. The boys operate 75 and 20 meters simultaneously in two large trailer vans in the field. Our thanks to all who rendered assistance during the recent quakes at Tustin/Fullerton. Traffic: (July) W6IAB 2779, ELO 302, IZO 305, BAM 3. (June) W6IAB 1565.

WEST GULF DIVISION

NORTHERN TEXAS — SCM, William A. Green, W5BKH — SEC: JQD, RM: QAL, PAM: IWQ. I wish to express my appreciation to all for the cooperation accorded me in the administration of this section. Your SCM, Bill Gentry, W5GF, is a swell fellow and I ask that you make his term of office as enjoyable as you have mine. He will need your support and activity reports each month in order to give your work recognition. The Odessa Emergency Net took part in the city-wide cleanup campaign helping to fight polio, communication instant communication from several patrol cars to the central dispatching point. This is good practice for 300 men fewer than 500 members being handled by GUD, LUP, KBU, QPA, HAF, and SHL, all of whom put in much time. The Central Texas ARC of Brownwood has elected: AL, pna.; UW, vice-pres.; UW, secy.-treas. Nice publicity was received by Sherman ARC featuring RGP, POO, SGR, and IDZ. The Abilene and Odessa Clubs, through B.R. and GUD, played a big part in the communication system set up to assist in the All-Woman Transcontinental Air Race, SRG, now the NCS for NTX, accumulated 3250 points in the CD Party to keep this section in the running. TFB is organizing a Novece ragchasing net (NCT) to operate on 3720 kc. Tues. and Thurs. Traffic: (July) W5GUD 630, PAR 116, W5X 108, K5K 98, ARK 65, TFB 45, IWQ 27, SGR 22, RRM 30, RHP 19, SBQ 19, CKE 16, UFP 12, TGV 8, PEG 2, FYQ 2. (June) W5WQ 19.

OKLAHOMA — SCM, Jesse M. Langford, W5GVY — SEC: AGM, RM: QOD, PAMs: GZK and ATU. The Oklahoma C.W. net opened for the winter session on Sept. 27 and all are invited to bring their traffic to OLE on 3885.5 kc. Monday through Friday from 1900 to 2000 CST. A slow-speed net will be started shortly but normal operation will be slowed to meet the operating speed of any who check into the net. ESF fell from his antenna pole the week end of August 2nd and suffered a large cut on his shoulder and arm. SFR is active in OVN and NTO Nets. RZE, Woodward, is now on 75 meters. FFH reports two of his Novices, UGG and UPT, are now General Class. HZZ is working on new mobile and emergency rigs. EHC reports a swell vacation in Colorado. UBB is back from vacation. WFP is working the bugs out of his 7-Mc. rig. UZG is de-tying his 32V-1. WNSWEH is operating on 3.7 Mc. SWL is off the air because of business, TKG now has a shack for himself since RKG has one. QNC has 600 Lyasco and is building modulator. RIE's new QTH is Oklahoma City. New QTH of QPK is Tulsa. PUG is now a new member, MEN has a shack and is building his in his 304TLa. ORH is working for a commercial user of microwave. LNX will be moved with a reduced college schedule. GZK and ROZ still are doing a fine job with overseas traffic. Traffic: W5GZK 401, ROZ 121, MFH 106, VPIA 97, PA 70, UVY 64, ABZ 84, PML 62, OUG 53, SVR 40, SSL 40, QRO 29, FKL 16, EHC 15, KY 15, RST 6, YYV 3.

SOUTHERN TEXAS — SCM, Dr. Charles Fremzsaich, W5BJF — NYI reports 21 Mc. rather interesting, sometimes good DX and sometimes short skip for W5A. SA reports that W5TIF, a slum-ed, recently got an Advanced Class ticket. ACL is busy working on his rig. NFX is active in 6 Texas Phone Nets and as OBS. He reports OJU is working for Colb in Dallas, TYJ is working 2-meter mobiles using converted ARCs. RFG reports the arrival of a Jr. operator in June. SJA is in the process of rebuilding the 1-gallon rig of HARC. SMG reports that LFG took a vacation in Laredo and now has new 6148 rig.

You Can Be Sure... If It's

Westinghouse

Check These Outstanding Benefits: Top pay, ideal working conditions, advancement on merit, graduate student opportunities, employee scholarships, paid re-location expenses, Baltimore location.

Sand resume of experience and education to:

Manager of Industrial Relations, Westinghouse Electric Corp., 3519 Wilkens Ave., Baltimore 3, Maryland.

If you are using your greatest skill in a defense industry, do not apply.

You Can Be Sure... If It's

Westinghouse

98
NEW!
1953 ALLIED CATALOG

COMPLETE, UP-TO-DATE
236-PAGE
BUYING GUIDE

FREE!
SEND
FOR IT

EVERYTHING IN
STATION GEAR

Your Buying Guide for Everything in Radio, TV and Industrial Electronics

Get it—keep it handy—the latest complete ALLIED Catalog that helps fill all your station needs—that brings you everything in electronic supplies—always at lowest prevailing prices. Your ALLIED Catalog features largest stocks of receivers, transmitters, electron tubes, parts, test instruments, audio equipment, recorders, radio and TV components, industrial electronic supplies. And ALLIED gives you the advantages of speedy delivery, expert personal help, lowest prices and the easiest terms in radio. Fill all your electronic supply needs from your ALLIED 1953 Catalog!

ALLIED gives you every buying advantage:

- Largest Amateur Stocks
- A Real Break on Time Payments
- A Square Deal on Trade-Ins
- Fastest Service on All Orders
- Ham-to-Ham Personal Help

ALLIED RADIO
Dept. 15-K-2, 833 W. Jackson Blvd., Chicago 7, Illinois
QOC is redecorating the house and shack. DPA, Humble Oil & Refining Co., recently lent the HARC a shack and antenna farm to house DPA. Now, building a new stronger antenna support mast out of pipes so antenna can tilt to ground. MN works H. & B. on 7150 kc, and has skeds with WD4CFA, K7DU, and 3GUL. AQO is plagued with summer QRN. RID got new NC-138D and worked 8 new countries, bringing the total to 51. His rig is an 852B receiving 50 watts, antenna is 60-cl. ATOC was plagued with new NC8 on SAE8; THU is 96L NC-9 and 4Z2H, secy. The SARC had an FB party at the Pearl Bakery Aug. 12th. CLN is active in El Paso. RZL is 81-cl. Recent skeds were with K8L, ARS, and K8D, with 80-meter operation and visited 2BYM (8-meter man). VV is pushing 4-65A on 40 meters. FXX will take a 4-150A rig for 220 and 430 Mc. soon. WNRBU is new ARC member. STEN members recently received a letter of commendation from the FCC for excellent work done in an emergency. WN5TFW recently got General Class ticket. WN5W is active on 2 meters with good beam. DSB is active on Gulf Coast and MARA. It’s not too early to make your plans for the 1953 ARRL National Convention to be held in Houston July 10-11-12, 1953. Address inquiries to HARC Competition Committee, P.O. Box 175, Houston, Texas. 2 STBN held its annual picnic at Bellville Aug. 10th. A new club has been formed at Port Arthur Radio College called The Bill Burge Amatuer Radio Club. In honor of its sparkplug, A1A-6, who has been continuously licensed for 30 years. MISS is pres.; OR8T/hr., secy.; OUC, club reporter. Traffic: K5EPQ, W5HJN. 44T-65, W5FJSF f9, NIT 6, AOE 6, NFX 1.

NEW MEXICO — SCM. Robert W. Freymann, W5NXE — SCM; PL8-Ec; RM: NGK; FM: K8PZ. W7000: 7:30 AM, Thursday, 6:30 PM, and Saturday, 3838 kc. 8:00 PM, Monday, Wednesday, and Saturday, 3365 kc. The New Mexico Hamfest will be held at 6th and Central, Alamogordo, NM. On the 60-cl. band, the new jr. operators, WN5W1L now operates with 75 watts from Santa Fe. We regret to report Tom and Betty, R1L, are leaving the section. Both have been serving the c.w. net. 6F2M, one of the old SDN gang, now is ORS in Albuquerque. 7C2U, ORs, also moved to Albuquerque. GQ9Q now shares with the City of Los Angeles. K7HI has got new 8 in it. The latest AMC is on the v.h.f. map. MJQY is active on 20-75-meter phone with a Viking, BBX, QPE, VDX, and NAXS are new mobiles in Los Alamitos. K9F2N has joined the Navy, W1U, W2R, RQK, and RQK are OES in Albuquerque and Bandia Park. Overall, the number of streets in Albuquerque is causing a flood of “change of address” memos to FCC. It is too much to mention QSL headquarters. WN5VRC now is on the air from Las Vegas with 70 watts. New traffic net has handled its first legitimate message to the North Pole (Fletcheco Island).

CANADA MARITIME DIVISION

MARTINE — SCM. A. M. Crowell, VE6IQ — SEC: FQ, EC; EK, RM: OM, W666J. W8BNK visited some of the Halifax gang recently. KF, KI, and VI will spend the next year operating from VE6L at Nottingham Island. K8B9, K8B9Y, and K8B9Z are new visitor to OM. KF added a few new ones recently: 4W1MY, 4W2O, 4W1U, and 4W1F. K8B9M has a new rig on 75 meters. Congrats to R6 and OM, at the arrival of the new jr. operators. LQ and YQ had a visit from VE6BML. Ex-18JZ, from Chicago, recently visited the Halifax gang and while here his jr. operator went up to his ticket and passed with flying colors. AAX has his rig on 75 meters with T5S final. IL has been poorly ill and all are wished better a speedy recovery. Recently retired from the Royal Canadian Mounted Police, AAW is a new "phone station" on the Halifax Area. EMU is using a surplus FR-12 rig. Notes from the Federation say RQF is pleased that the gang came out ahead of the St. John gang on Field Day. GU is learning how to operate his new NC-138D, GJ is working on mobile rig. This report is being submitted by QF as is SCM’s way on his annual holiday trip. Traffic: VE6FQ 124, HC 90, SH 12, DB 7, LY 3.

ONTARIO DIVISION

ONTARIO — SCM. G. Eric Farquhar, VE83M — It is with sincere regret that we record the untimely passing away of LC. DAV was the Amateur Director for the Toronto Division of the Dept. of Transport and an old-timer whose communication career began with the days of spark. We extend our sincere sympathy to his family and the friends on the farm these days. Traffic originating from AAJ for the region, some 34 miles distant, went the long route. Handled by VE8X8G and VE8X8T, the message was received without any trouble. After making delivery, got an answer and via the return route the message was delivered back to AAJ five minutes after the first. The second was received in 4000 miles in 5 hours and 5 minutes. Distance lends enchantment. Official note from Dept. of Transport "Effective immediately licenses of amateur experimental stations with unattended operation and telephone privileges are authorized to use A3 and F3 emissions in the band 21,200 to 21,600 kc."

(Continued on page 108)
You Can't Work 'Em... If They Can't Hear You!

Isn't it about time you started enjoying the operating convenience, the fun and the thrill of a New Xmitter? You deserve the best! And naturally...

HARRISON HAS IT!

Viking II

Here's Johnson's new and improved version of their famous transmitter! Now fully shielded, filtered, and TVI suppressed. More power—180 watts CW input (but can be reduced for Novice use), 135 watts phone. New 6145 final tubes give high efficiency at lower cost. Viking II complete kit. With tubes, detailed yet simple assembly, wiring and operating instructions. Less only crystal, key and mike. $279.50

Laboratory wired and tested—$324.50

Johnsion Low-Pass Filter for coaxial output.............. $18.50
Johnson Viking VFO. Complete Kit........................ $42.75
Wired and Tested, with tubes........................... $60.40

It's New! It's Better! So—naturally—Harrison Has It... First! Order now, or ask for literature.

WHAT XMITTER DO YOU WANT?

<table>
<thead>
<tr>
<th>Xmitter</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>COLLINS KW-1</td>
<td>$3850.00</td>
</tr>
<tr>
<td>LYSCO 600</td>
<td>$143.95</td>
</tr>
<tr>
<td>COLLINS 32V-3</td>
<td>$775.00</td>
</tr>
<tr>
<td>LYSCO 600S</td>
<td>$189.95</td>
</tr>
<tr>
<td>GOMSET &quot;Commander&quot;</td>
<td>$124.50</td>
</tr>
<tr>
<td>EIDICO MT-2</td>
<td>$99.95</td>
</tr>
<tr>
<td>ELMAC A-84</td>
<td>$139.00</td>
</tr>
<tr>
<td>EIDICO TR75TV</td>
<td>$94.95</td>
</tr>
<tr>
<td>ELMAC A-54A</td>
<td>$149.00</td>
</tr>
<tr>
<td>EIDICO TR75TV Kit</td>
<td>$64.95</td>
</tr>
<tr>
<td>HARVEY-WELLS TBS-50C</td>
<td>$111.50</td>
</tr>
<tr>
<td>EIDICO TR-1TV</td>
<td>$499.95</td>
</tr>
<tr>
<td>HARVEY-WELLS TBS-50D</td>
<td>$137.50</td>
</tr>
<tr>
<td>EIDICO TR-1TV Kit</td>
<td>$379.95</td>
</tr>
<tr>
<td>SONAR M8-26</td>
<td>$72.45</td>
</tr>
</tbody>
</table>

HARRISON HAS THEM ALL!
Plus every accessory to complete your modern shack!

Prices?
Always the lowest at HARRISON!

Trades?
Certainly! Harrison guarantees to top or match even the wildest offer! Shop around, then visit or write us. You'll like doing business here.

Time Payments?
Easiest monthly terms at the lowest cost.

While The Weather Is Still Ideal
GET THAT TOWER UP!
We can make immediate shipment of all-steel, triangular self-supporting towers—the best and heaviest quality! 20, 30, 40 and 50-foot heights. Harrison's Special Prices are real BARGAINS. Write Now!

CLEARANCE SALE!
ENTIRE MONTH OF OCTOBER
To clear our shelves before taking annual inventory, we've SLASHED PRICES TO THE BONE on thousands and thousands of items in our New York and Jamaica stores!

Come Early...
Some quantities are limited!

Come Often...
New items added to sale every day!

SINCE 1925
HAM HEADQUARTERS
• COMPLETE STOCKS
• LOWEST PRICES

FREE! NEW HAM-A-LOG
Write for your copy TODAY! It's filled with the latest Amateur Equipment.
WYGJ visited AVS, BFE recently acquired a pole from the power company. Congratulate EAM on topping the list for Canada in the April CD Parade with a total of 10,240 points. Runners up were ATR, BUR, AVS, IA, and DU. We welcome to this section DXR, who is radio beacon operator at Hamilton Channel. DXR visited DU and HMQ at Southampton and Chessie Lake, respectively. AHU, all Toronto, has his call changed to NG. Congratulate extended the threshold of AITD by 1 point on the way.

QUEBEC DIVISION

QUEBEC — SCM, Gordon A. Lynn, V2G2L — CA reports that FAX and DXJ up this month and that he has worked several VKs, CD, flying holiday in Cape Breton. MC, eagerly awaiting approval of his operation of mobile rig, is now on board and reports seeing Official Bulletin, GL on his mobile receiver at that location. ADR reports from Anticosti Island, has an 813 on all bands, and is available for new groups or other services. No reports of DX chasing of LK, after having been paralyzed for two years or one-half year. New one of the old timers and now putting S on the air.

VANALTA DIVISION

ALBERTA — SCM, Sydney T. Jones, V6SMJ — Ed-

BA-116 .. Hand or desk model. Can be used with stand to work on tables. List $14.75.

BA-109 . . . Flat frequency response from 40 to 10,000 cps. Non-directional in the horizontal plane. Output of 56 db below 1 volt/dyne/cm².

BA-106 . . . Essentially flat frequency response from 40 to 6,000 cps. Output level 54 db below 1 volt/dyne/cm².

BRUSH Development Company
3405 Perkins Avenue • Cleveland 14, Ohio

Prairie Division

Saskatchewan — SCM, Harold R. Horn, V6HJR — The civil defense communication trial of the Fort Qu'Appelle was run on July 22nd and was quite successful despite summer conditions. JW was in charge, assisted by LG, GL and UQ. Mr. Froebe was quite impressed, as were the members of the Legislative Assembly who were present, by the way traffic was handled and the manner in which the communications could be made to any number of points should the need arise. The BC sends in a nice report as a good increase of AEC members. MC now is 8427, at Flin Flon, and likes the new QTH. DX also now is 8607. Seaweed from DD has returned from overseas, CV was transferred to Ottawa for a snail of duty. A contest is in the making for all VE6s. We refer you to the column for further details.

SAHR Bulletin. There are openings for appointments if you are interested. We need Official Observers badly. For further particulars ask or write the OC. Traffic: V6SMJ 30, QG 16, PT 12, TE 14, FG 11, GL 5, DS 3.

102
HENRY RADIO offers YOU:

**LOW PRICES:** You can't beat my wholesale prices.

**FAST SERVICE:** You get fast service. I have big stocks of Collins, National Hallicrafters, Hammarlund, RME, Johnson, Harvey-Wells, Lysco, Gonset, Morrow, Mallard, Eldico, Master Mobile, Hy-Lite, all other receivers, transmitters, parts at lowest prices.

**BIG TRADES:** I want trade-ins. I trade big. Tell me what you want—what you have to trade. Get my offer. I pay cash for receivers and transmitters too.

**TIME PAYMENTS:** Get what you want and pay by the month. I give you better terms because I finance all terms myself. Write for details.

**SATISFACTION:** Try any communications receiver ten days—if you return it your only cost is shipping charges. I want you to be satisfied. Ask any ham about Henry Radio.

**PERSONAL ATTENTION:** You get personal attention. Bob Henry, W6ARA, runs the Butler store. Ted Henry, W6OUU, runs the Los Angeles store. Bob Henry can be reached nearly 24 hours a day, 7 days a week. Write, phone, wire or visit either store. Send us your orders and inquiries. Export inquiries solicited too.

11240 Olympic Blvd.
LOS ANGELES 64
Bradshaw 2-2917

HENRY RADIO STORES
"LARGEST DISTRIBUTORS OF SHORT WAVE RECEIVERS"

Butler 1, Missouri
Phone: 395

103
"It Seems to Us. . ."

(Continued from page 9)

So try some of the contests this season. If necessary, you can always kid yourself as we did, and try a few calls just to see what happens.

There's much more activity than contests, of course. There are the CD Parties and Lot-nites, for League appointees and officials, the Code Proficiency Certificate qualifying runs, Frequency-Measuring Tests, special activities for v.h.f., Simulated Emergency Tests and later, the ever-popular Field Day. In between all these, you can be working toward your WAC, WAS or DXCC certificates. "Operating an Amateur Radio Station" tells you all about them.

Give some of these a whirl this operating season and see if you don't have a whale of a time!

A-1 OPERATOR CLUB


The A-1 Operator Club was designed to recognize and promote good operating in the amateur bands. To become a member one must be nominated for membership by at least two operators who already belong. An attractive certificate is awarded to each amateur who qualifies for membership. Every amateur should strive to make his operating merit nomination by following standard operating practices, by observing the rules of good "phone" operating, and by making his sending as clean and accurate as possible. Members should nominate every deserving operator after careful observation of his operating habits. The complete A-1 Operator Club rules may be found in the booklet Operating an Amateur Radio Station (sent gratis to League members upon request).

On July 31st, at W2HIIK of Belmar, N. J., W2CDU was tuning marine frequencies assigned fishing vessels. A distress signal was heard from small boatFloatie II as she stood by the flailing trawlerOreay off Belmar. The Floatie II reported two Oreay crew members in the water.

Noting the location, W2CDU telephoned the Coast Guard at Spring Lake and cutters were immediately dispatched to the scene. The men were rescued and the $75,000 Oreay blew up without loss of life. Well done, OMs!
LEARN RADIO
plus
TELEVISION
AND ELECTRONICS
LEARN IT THOROUGHLY! FROM AMERICA'S
COMPLETE HOME TRAINING SCHOOL!

You Get All The Parts
-Even Tubes- for this modern
Superheterodyne Receiver --- and lots of
other equipment. And you get to keep it!

BIG FREE
BOOK TELLS YOU HOW
Page after page—in COLOR—tells you
everything you want to know!
Mail the coupon. Get yours—today!
PLUS A FREE SAMPLE LESSON!

Today's Shortage of Trained Technicians
Gives Chance of a Lifetime For You!
Think of it: With guided mistakes, rules, and other
equipment so important to defense! And
with over 90,000,000 radios, over 12,000,000 TV
sets. With more than 1,000 radio stations, over
100 TV stations—and more building every day—
what an opportunity for you! If you act quickly!
Many are trained in Radio-Television-Electronics—
America's fastest-growing field—now! Good-paying
jobs—the kind you should have—can be yours!
Job Security! Big Money! For You!
In Today's Expanding Industries!
National Schools graduates—even just like you—
are earning good money all over the country. Why
not you? National Schools graduates have the
personal satisfaction of being highly-skilled tech-
nicians. Men who enjoy their work—rather than
having to drag along in just any old job. So can
you! Mail coupon today—find out how easy it is.

National Schools Has Trained 1000's of
Successful Men! Why Not You?
In almost every state—and many foreign coun-
tries—National Schools graduates are filling big
jobs with national companies. Or running their
own successful businesses. What are YOU wait-
ning for? National Schools Ship-Method Home
Training is complete training. So when you gradu-
ate you can take advantage of today's great op-
portunities in Radio-Television-Electronics—fast.

You Train at Home—In Your Spare Time!
National Schools Shop-Method Home Training
gives you basic and advanced instruction in all
the phases of Radio-Television-Electronics.
You learn fast from hundreds of diagrams and
pictures. All instructions are written by experi-
cenced technicians who work in Radio and TV
every day. All instructions have been developed
and tested in National Schools' own big labs and
studios, which are equipped with the latest RCA
equipment. No wonder the National Schools
course is so up-to-date, practical, interesting... and
so easy to learn! And no wonder it is held in
such high regard by leaders of American industry!
What's more—this National Schools Shop-Method
Home Training is approved for eligible veterans.

We Teach You How To Make Welcome
Extra Money—While You Learn!
Many National Schools students—men like you—
make plenty of extra dollars in spare time! Fixing
neighbors' radios and appliances—and other ways
we teach you. You can earn while you learn! Let
us tell you the whole story. Mail coupon today.

LOOK! WE SEND YOU ALL
THESE PARTS!
Superheterodyne
Receiver
R. F. Parts

With famous National Schools Shop-Method
Home Training, you learn by doing—the easy,
practical, interesting way. The way you want to
learn. We send you many parts—all of modern
professional quality. You do lots of practical
experiments. You advance day by day, step
by step. The free book tells you all about it.
Answer all your questions. Use the coupon.
And do it now—while you're thinking of it.

MAIL THIS COUPON TODAY—WITHOUT FAIL!

NATIONAL SCHOOLS, Dept. NN-102
4000 South Figueroa Street
Los Angeles 37, California

Mail me FREE the book mentioned in this ad. Also a free sample lesson,
I understand no salesman will call on me and that there is no obligation.

NAME

ADDRESS

CITY

STATE

Mail to nearest branch or post office box.

Vestal Check here if released from service less than 4 years ago.

NATIONAL SCHOOLS
LOS ANGELES 37, CALIFORNIA • ESTABLISHED 1903
In Canada: 192 E. Hastings St., Vancouver, B.C.

NATIONAL SCHOOLS
output in such a way that the harmonic falls near the picture carrier frequency, and even then the interference is seldom observable unless the TV carrier strength is of the order of 100 microvolts or less at the receiver's antenna terminals. Only two modifications were made in the original wiring after checking in this fashion. It was found that there was a small amount of harmonic at the secondary terminals of the filament transformer (visible in a weak TV picture only when touching the terminals with a screwdriver serving as an "antenna") which originally were not by-passed. Installation of a 0.005-μfd. ceramic at each terminal eliminated this. The second modification was the installation of a 2-μh. choke in the high-voltage d.c. lead where it connects to the last plate-circuit by-pass condenser at the safety terminal, since it was found that weak interference was caused by a small amount of harmonic getting through this lead.8

The lead radiation and conducted harmonics are at such a low level that with the amplifier running at 750 watts input on a frequency just inside the low-frequency edge of the 28-Mc. band, delivering its power to a shielded dummy antenna, there is just-visible interference to a Channel 6 signal of less than 100 microvolts when a direct connection is made between the outside case of the system and one side of the TV Twin-lead transmission line. On one occasion atmospheric conditions were such that a signal just about strong enough to hold sync could be received on Channel 2 from New York City, and with the same test no interference could be seen. This is not mentioned by way of bragging about the performance of this particular amplifier, but to point up the fact that harmonic radiation from the transmitter itself can easily be reduced to a negligible point by the simple methods we have been talking about in QST for quite some time, and that it requires no prolonged testing nor elaborate measurements if the job is done properly in the first place. About the only excuse for a check on this particular phase of TVI reduction these days is to make sure that some error of omission has not occurred inadvertently to allow radiation leakage.

Part of the set radiation story is that the shielding about the r.f. circuits is fairly good. The shields are made from 34-inch aluminum with about 34-inch overlap between pieces, with fastenings every two or three inches. Good bonding is essential; an almost invisible gap between the top cover and wall at one corner of the shield around the grid circuit let out quite a bit of...
**The NEW Hallicrafter Transmitter**

A versatile, completely TVI-proof transmitter with commercial performance at amateur prices! Complete bandswitching 10 to 160 meters. 10-position crystal selector switch. Spurious radiation at least 90 db. below full output. Pi network output for 50 ohm coax with special low pass filter. OUTPUT of 115 Watts CW or 100 Watts phone at continuous operation rating. Provision for external VFO and many other new features.

HT-20 complete with all tubes .......................... $449.50

We regularly stock the complete line of Hallicrafter receivers.

---

**New NATIONAL HRO-SIXTY**

Here's the latest and the greatest of the famous NATIONAL HRO series! Features dual-conversion plus 12 permeability-tuned IF circuits! Many, many other newly designed features to make this the outstanding communications receiver value of the year!

- Matching Speaker .................................. $16.00
- NC 183D .................................. $369.50 Matching Speaker $16.00
- SW-54 Built-in Speaker .................................. $49.95

We regularly stock all National receivers, accessories and parts.

---

**New SONAR 3-BAND RECEIVER**

The complete 4-watt output receiver (not a converter) which has created such a sensation among the "mobile" gang! Covers 10-11, 20, 75 and 80 meters. Ten slug-tuned circuits, 8 tubes, with 200 KC IF's to give better than 1 microvolt sensitivity. Exceptional selectivity. Built-in BFO and ANL. Full 180° electrical bandwidth easily read on accurately calibrated full-view dial. Requires 250 volts at 80 Ma.

Complete with tubes, plugs and mounting bracket less power supply and speaker. 89.95

---

**ELMAC 50 WATT TRANSMITTER**

Fills a long-felt need for a moderately priced mobile transmitter with a real SOCK—or for a low-power regular or stand-by fixed station transmitter. 10, 11, 20 & 75 meter with crystal or with direct-reading VFO on all bands. 30 Watts input, hi-level plate modulation, built-in Pi antenna Network, compact measuring only 7½" x 7½" x 12" complete with tubes.

- A-54 for carbon mike .................................. $135.00
- A-54H for hi-imp. mike .................................. 148.00
- 110 VAC power supply .................................. 39.00
- 6 VDC dynamotor supply .................................. 87.50
- Electro-voice 210 carbon mike .................. 16.50
- Electro-voice 500D dynamic mike .................. 22.10

---

**The NEW GONSET 2-Meter XMTR-RECEIVER**

A complete 2-meter fixed-portal unit, the new GONSET provides an ideal unit for home, mobile and portable use!

- Crystal-control, 12-Watt xmtr
- TVI-proof
- Super-heat receiver
- Small size: 8½x10¼x6 D
- Universal power supply, 110 VAC-6 VDC
- Uses either crystal or carbon mike
- Needs only mike and antenna to go on air

---

**Terminal Radio Corp.**

New York's Dependable Radio Supply House

85 CORTLANDT ST., NEW YORK 7, N.Y.
phone: WOrth 4-3311

---

**Just Arrived!**

- and of course you'll see it at TERMINAL!

**The NEW Johnson Viking II Kit**

All the features of the famous Viking I plus TVI suppression in a special copper plated cabinet, up to 180 watts input to two 6L6 GZ tubes and with many other new features making this the most outstanding transmitter kit ever offered!

- Viking II complete with all tubes .................. $279.50
- Viking II complete with tubes, wired and air tested .................. 324.50
- Viking VFO Kit, worthy companion to the Viking II .................................. 42.75
- Viking Mobile Kit, up to 60 Watts input for that rig-on-wheels .................. 99.50
- Viking Low Pass Filter, 4 sections, 75 DB .................................. 16.50
- Universal power supply, 110 VAC-6 VDC .................................. 24.75
harmonic until a probe showed where the trouble was. More exact fitting of the pieces fixed it. The solid shielding is unquestionably superior to screening, and a reasonable thickness of metal contributes a good deal, too. If the r.f. output cable is disconnected and the amplifier is operated without load with normal plate voltage (not try any means a recommended procedure, but we tried it for a brief test) thus building up an intense field inside the box, it is impossible to get a reading with a sensitive crystal wavemeter at the fundamental frequency anywhere on the outside of the case except for a slight indication directly over the tube plate, where there are ventilating holes in the cover. Ordinary mesh screening will not stand such a test. Also, mesh screening becomes less effective as the frequency is increased, and therefore tends to deteriorate at the TV harmonic frequencies, while the reverse is true of solid metal shielding. These considerations are most important, of course, only under really difficult conditions, such as operation at the low-frequency end of the 10-meter band, a weak TV signal on Channels 2 or 6, and a separation of only a few feet between the transmitter and TV receiver. In most cases screening will be entirely adequate, and sometimes more convenient to use than solid metal.

Construction Notes

The amplifier layout follows the principles outlined in January QST insofar as available space and the physical characteristics of components permit. Some things we have liked to have done differently, but practical considerations got in the way. For example, it would be desirable to have the output terminal closer to the tube socket. However, it is even more necessary to have the output condensers of the network near the output terminal and to keep the switching leads reasonably short; at the same time there had to be a panel control for the switch. Even when you are willing to discard cathode principles in panel layout it is still impracticable to run a control shaft through a variable condenser or variable coil assembly, so the output terminal, condensers, and switch were put where a control shaft could be run through without interference. Complete dependence is placed on the chassis for ground returns. There is a school that argues for the grounding-at-one-point theory, and it seems like an eminently reasonable theory — so much so that at regular intervals over the past twenty years the writer has been banging his head against the stone wall of trying to make it work. Invariably it has led to trouble, principally in the form of instability in r.f. amplifiers that the method is supposed to help stabilize. Changing to chassis grounds has equally invariably straightened things out. Our present practice is to ground directly to chassis at the nearest possible point even if the "common" ground is only a half inch away. It is, in fact, difficult to have only one single ground on an r.f. circuit, and the difference in inductance between a chassis path and a

(Continued on page 110)
**LOOK STEINBERGS LOOK**

**IMMEDIATE DELIVERY**

3-BAND RADIO

**KARADIO MODEL 80-C**, 3-band mobile receiver for under-dash mounting. Covers broadcast band 540-1650 KC; 2.8-7.5 MC; 4.8-17.3 MC, which includes the 75 and 20 meter bands. 6 tubes: 6BA6 R.F., 6B66 Mixer, 6A66 1.F., 6A66 demod.-1st Audio, 6A66 output, 6X5GT rectifier. Vibrator power supply mounted in metal case with 6" PM speaker for fire-wall mounting. 3-ft. plug-in cable included. Receiver only 4 1/2" high, 6 1/2" wide, 6" deep. Mounting hardware, complete manual, fused battery lead, included. Front panel RF gain control, Audio, Band Switch, Tuning. Here's an excellent mobile receiver at a nice saving. Regular price is $110. We have just 10 to sell at $85.00. Standard 90-day RTMA warranty.

**ELMAC-A54**

Under-dash Mobile Xmtr.

VFO or Crystal control. Direct-reading VFO on all bands—75, 20 and 11, 10. • Plate modulation • Completely band-switching, fone or CW. • 50 Watts max. Input. Power required: 300-500 V.D.C. at 250 ma., 6.3 V AC or DC at 4.5A. • Uses 3-6AG5, 6AR5, 6C4, 12AU7, 256G6, 807 (included). • Only 7 1/4" x 7 1/4" x 12", 14 1/4 lbs.

For carbon Mike Input..................$139.00
For Dynamic or Crystal Mike..........149.00
Power Supply, 110 Volt AC..............30.00
ELCETO-VOICE 210 Mobile Carbon Mike..17.10
ELCETO-VOICE 600D Mobile Dynamic Mike..23.10

**NOW IN STOCK**

COLLINS 32V3 TRANSMITTER..................$775.00
VIKING 1 KIT, WITH 4D32..................229.95
VIKING 1 WIRE, WITH 4D32.................269.45
COLLINS 75A2, WITH SPEAKER..............440.00
HKO-60, WITH SPEAKER.....................499.50
NC-183-D, WITH SPEAKER..................385.50
NC-125, WITH SPEAKER.....................160.50
HQ-129-X, WITH SPEAKER..................214.00
RME-50, WITH SPEAKER.....................199.50
SK-71, LESS SPEAKER......................199.50

**USED EQUIPMENT**

SUPER PRO BC-779-B......................$180.00
HALICRAFTERS SX-42.....................150.00
BC-221, WITHOUT MODULATION............83.00
MILLER FINAL, WITH COAX................59.50

**LIMITED QUANTITY**

RG8/U coax, 12", plug each end...........$ .70
8315P standard coax plug.............. .60
Coax angle plug.......................... .45
3-conductor Kabel Kord, 6' ext........1.79
3-gang heavy 365 maf variable........ .60
4-prong stethette socket.............. .15
110V, relay, DPST 20 Amp contacts...5.95
13 Henry 50 Ma, filter choke........... .59

Minimum order $2.00.
Send 20% deposit with COD orders. Please include sufficient postage or instruct us to ship by Express Collector. Overpayment will be refunded by check.

Steinbergs

Phone Cherry 1880

633 WALNUT STREET • CINCINNATI 2, OHIO

Your order will receive my personal attention and will be shipped the same day order is received. We distribute all top-flight amateur lines — let us know what you need.

73, Jule Burnett, WS8WHE

109
"direct" wire lead is amazing, in terms of the cross couplings the wire lead can introduce. There may be times when the cross couplings are just right to give a desired effect, and perhaps we have been unlucky enough to have ours always work in the opposite direction. Nevertheless, we have the feeling that we know where we stand with a chassis ground, particularly when using metal of good conductivity such as aluminum.

The shields about the grid and plate circuits are both complete in themselves; no use is made of the panel for shielding. This is not to infer that the panel would be less satisfactory, but it was more convenient to do it that way since it was necessary to provide a lip at the top for fastening the top cover, and the separate front piece avoided the necessity for scraping the paint from the panel to get good contact. The two side pieces in the plate section have lips on all four edges, while the front and back pieces have lips only at the top; they overhang the chassis at the bottom and overlap the side pieces at each edge. To make a good bonding surface for the top cover these pieces should be accurately cut and bent. A sheet metal shop will do the job for you at little cost if you get the metal and mark it out exactly the way you want it fabricated. The shield about the grid circuit is constructed along the same general lines.

A 2-inch-deep chassis was used because, as the amplifier was originally planned, it allowed plenty of room underneath. When the fan was added later, it projected below the chassis and so some small pillars were mounted on the chassis to serve as legs when the unit is set on a flat surface such as a table. A chassis depth of 3 inches would be better. There is no bottom plate on the chassis because it is completely unnecessary; the shielded wiring takes care of any r.f. that might be underneath.

The choke, RFC5, in the d.c. grid lead is not needed for harmonic filtering. The two-terminal strip was provided in case a combination of fixed and grid-leak bias was to be used, in which case the strip would serve as the mounting for the grid leak. So far we have used only fixed bias (from a supply using a VR-150) and the choke was used simply as an "extra-insurance" method of completing the d.c. circuit.

Tuning Pointers

With 150 volt bias a grid current of about 25 ma. seems to be optimum, although it is quite uncritical — values from about 15 to 30 ma. give very little difference in plate efficiency. Optimum screen voltage (from a fixed source in our case) is in the neighborhood of 400 with these driving conditions, and the screen current runs 50 to 75 ma., depending on the plate voltage.

(Continued on page 118)

9 The absence of a bottom plate has seemed to startle some visitors to Fig. who have seen the amplifier, as has also the absence of a conventional line filter for the a.c. supply to the filament transformer. But there is no point in using either if they are not needed — which is definitely the case with the construction described here.
BARGAIN SPECIALS

2 mfd. 1000V GE pyranol cond. ........................................... $2.95
2 mfd. 2000V GE pyranol cond. ........................................... $5.25
4 mfd. 3000V GE pyranol cond. ........................................... $9.95
15 mfd. 1000V oil cond. ........................................... 2.95
10 mfd. 600V oil cond. ........................................... 3.95
25 mfd. 1000V oil cond. ........................................... .50
Dexor watt rheostats 50 Ohm, Each ........................................... .25
Dexor watt dual rheostats 2000 ohm, Each ........................................... 2.50
120 watt non-inductive resistors 2500, 7500, 10000, 2500 and 50000 ohm either value, Each ........................................... 2.50
73 ohm 1 kilowatt twin lead polyethylene insulation ........................................... Per ft. .09
Per 100 ft. 5.00

RECEIVERS

Hallcrafters S-38C ........................................... $49.50
Hallcrafters S-81 ........................................... 49.50
Hallcrafters S-82 ........................................... 44.50
Hallcrafters S-83 ........................................... 99.95
Hallcrafters S-77A ........................................... 99.95
Hallcrafters S-53A ........................................... 79.95
Hallcrafters S-75 ........................................... 169.50
Hallcrafters S-77A ........................................... 199.50
Hallcrafters S-75 ........................................... 199.50
Hallcrafters S-35 ........................................... 199.50
Hallcrafters SX-65 ........................................... 269.50
Hallcrafters R-46 speaker for SX71, SX82, SX84 ........................................... 199.50
National SW-24 ........................................... 385.00
National NC-183 ........................................... 385.00
National HRO-607 with speaker ........................................... 499.50
RME-6P receiver with noise clipper and speaker ........................................... 75.00
Hammond LP-200X with power supply & speaker ........................................... 225.00
2 Webber Model 80 wire recorders, 40 ........................................... 50.00
Hallcrafters HT-9 transmitter with crystals ........................................... 300.00

TRANSMITTERS

Collins 32V3 less crystal or mikes ........................................... $775.00
EE Johnson Kitefeil II kit with twin lead, key & crystal ........................................... 299.50
Sonor MB-26 transmitter (specify band required) 2, 6 or 10 meter ........................................... 72.45
Web Jr, Ten meter 50 watt transmitter with 10 meter ........................................... 39.95
Lyco A140 CAP bandless tubes ........................................... 29.95
Lyco A175 pure metal bandless tubes ........................................... 29.95
Lyco B192 10 meter bandless tubes ........................................... 29.95
Eladio 2 meter transmitter less crystal or mike ........................................... 74.95
Eladio 2 meter transmitter kit form, less crystal or mike ........................................... 49.95
Harvey Wells TB500C Bandmaster Sr ........................................... 111.50
Harvey Wells TB500D Bandmaster Sr ........................................... 137.50
Elmac A-54 with VFO less carbonite or crystal ........................................... 139.00
Elmac A-54H with VFO less carbonite or crystal ........................................... 149.50
Hallcrafters HT-20 less crystal or crystal ........................................... 445.50
Lyco 600 transmitter less crystal or crystal ........................................... 149.50

USED EQUIPMENT

Collins 75A2 (Demonstrator) used very little ........................................... $390.00
Hallcrafters SW-28 with speaker ........................................... 175.00
Hallcrafters SP-77 portable, like new ........................................... 55.50
Grosset two meter converter, like new ........................................... 39.00
RME-6P receiver with noise clipper and speaker ........................................... 75.00
Hammond LP-200X with power supply & speaker ........................................... 225.00
2 Webber Model 80 wire recorders, 40 ........................................... 50.00
Hallcrafters HT-9 transmitter with crystals ........................................... 300.00
National HRO with speaker and power supply ........................................... $215.00
Meisner 150-8 Transmitter with full set of coils including buffer doubler stage and exciter—factory converted to 10 meter ........................................... 315.00
National NC-33 ........................................... 49.50
Collins 32V2 (Display model) slightly shop worn, never used ........................................... 710.00
WIRE FOR MORE COMPLETE LIST OF USED EQUIPMENT, This list changes daily. Contact us if you are looking for something or wish to swap. Generous trade-in allowances.

MISCELLANEOUS

Johnson VFO kit with tubes ........................................... $45.50
Johnson VFO kit with tubes wired and tested ........................................... 55.50
Johnson TVI kit for Viking II transmitter ........................................... 247.50
Lyco 381VFO-14 ........................................... 19.95
Lyco 401 modulator ........................................... 19.95
Eladio antenna scope kit ........................................... 21.95
Eladio antenna scope kit wired and tested ........................................... 29.95
Eladio grid dip oscillator kit ........................................... 29.95
Eladio grid dip oscillator kit wired and tested ........................................... 43.00
Allilan 5061 grid dip oscillator ........................................... 61.50
Morris Converter 10-75 meter bands with built-in noise clipper ........................................... $54.95
Morris Converter 10-75 meter bands with built-in noise clipper ........................................... 64.95
Gonset 3005 tri band converter, New model includes 15 meter band ........................................... 47.60
Gonset 3008 two meter converter ........................................... 44.50
Gonset 3002 2-3 meter converter ........................................... 44.75
Gonset steering post mounting adaptor ........................................... 3.90
Gonset noise clipper ........................................... 9.25

WE HAVE EVERYTHING! WHAT DO YOU NEED?

ALL PRICES F.O.B. ALBANY • Long Distance Phone: 5-1594 ALBANY
Foreign Trade Welcome • All Inquiries Answered • Cable Address: Uncle Dave
The tube works at good efficiency with a plate input of 1500 volts and 350 ma., but is a little better at higher plate voltages. For the most part we have operated it at 2000 volts and 300 to 350 ma. The highest voltage available is 2750, and with a full kilowatt input at this voltage the plate color shows just about the rated 250 watts dissipation.

It was mentioned before, and should be emphasized again, that there are two essential points in the operation of an amplifier of this or equivalent design: the coaxial line into which it works must be closely matched at its terminating end, and the variable inductance should be adjusted only with no or very small plate power. Not more than two or three hundred volts should be used at the most. Such a voltage is sufficient, after becoming familiar with the amplifier's operation, to determine the proper tank settings for the desired loading at full plate voltage. With fixed screen voltage the plate current does not increase in exact proportion to the plate voltage, so the plate current at 300 volts will be equivalent to, say, 300 ma. at normal plate voltage will have to be learned from experience. Provision should be made for reducing the screen voltage also, if the screen current with low plate voltage exceeds the rated maximum value of 100 ma.

It is advisable to operate with a tank $Q$ of about 10, or fairly close to that value. This means that the amount of “in-use” capacitance in the plate tank condenser will depend on the plate voltage and plate current actually used. The chart in the transmitting chapter of the Handbook, which is based on a $Q$ of 12, is close enough. Determine the proper value of capacitance and estimate the setting of the tank condenser based on the known values of maximum and minimum capacitance and the fact that the capacitance variation with rotor setting is practically a straight-line relationship. Then find the combination of output capacitance and tank inductance that resonates the circuit and provides the desired loading at or close to the predetermined value of tank capacitance. Increasing the output capacitance or increasing the tank inductance, or both, while maintaining resonance, will lighten the loading on the tube, and vice versa. At the extremes of the range it may not be possible to use the optimum values; at the low-frequency end, 3500 kc., practically all the coil and all the tank condenser will be needed to resonate the circuit, while at the high-frequency end the total input capacitance will not be enough even to reach the theoretically-required value even with the tank condenser at minimum. At this end of the range a low ratio of plate voltage to plate current is helpful, and one of the good features of the 4-250A is that it works well with a low ratio and at the same time has low output capacitance.

The neutralizing circuit, if used, should be adjusted for minimum reaction of plate tuning, under actual operating conditions, on the grid current. The approximate setting can be found with all voltages off by coupling a grid-dip meter.
STRIKE WHILE THE IRON IS HOT!

NOW is the time to trade for a new receiver or transmitter. Our stocks are complete—our prices are LOW. TAILOR-MADE TERMS
• LIBERAL TRADE-INS • COMPLETE STOCKS • PERSONALIZED SERVICE • WRL—"One of the World's Largest Distributors of Amateur Radio Transmitting Equipment."

We Finance Our Own Paper — No Red Tape — No Delays.
(Special attention given to foreign orders.)
Leo I. Meyerson W5GFQ
CU ON 10-20 & 75 METERS

ATTENTION HAMS—IT'S BRAND NEW!
THE WRL GLOBE SCOUT
(50 WATTS PHONE—CW)

The WRL GLOBE SCOUT is the latest triumph of the WRL engineering staff. It is a beautiful, compact XMT, completely self-contained, including power supply—811 X 1452W X BY/D. Contains new 6146 tubes in final; covers 160M thru 10M. Metering provided for final grid and final plate circuits. Complete kit includes all parts, chassis, panel, power supply, cabinet, tubes, meter and one set of coils. Can be used for mobile work with suitable power supply.
(Auxiliary socket provided.) An Ideal XMT for the novice or the experienced ham.

KIT FORM
(Incl. all parts and tubes) $89.95
WIRED (By our engineers) $99.95

GLOBE SCOUT ACCESSORIES
Coil sets available for 160, 80, 40, 20, 15 and 11-10, per each set. $3.00
Crystals 160, 80, or 40M (40M used on 10-20) each... $2.25
Quality crystal microphone and stand........... $10.17
Signal R-80 Key.................. $1.43

"I RECOMMEND THE GLOBE KING TO ANY HAM"

"Dear Leo,

I am very satisfied with my Globe King Transmitter; it was the best money I ever spent on radio. The Globe King surprised me, and also my friends who visited me, with its good modulation and clear quality. One of my friends, KP4MQ, ordered a Globe King from you and he is very happy with it. Now there are many Globe Kings in this country. I recommend the Globe King to any ham. It is compact and its modulation is perfectly clear and very good quality. I have had no trouble with my Globe King Transmitter; although I have had it for a long time and use it every day.

Signed, L. ESPASAS SIMO KP4BA, Hato Rey, Puerto Rico"

NEW WRL 400B GLOBE KING XMT
KIT FORM $475.00
WRL 165 WATT GLOBE CHAMPION XMT
KIT FORM (less accessories) $329.50
WIRED-TESTED $495.00
$349.50

WRITE FOR DETAILED SPECIFICATION EQUIPMENT SHEETS

World Radio Laboratories, Inc.
744 West Broadway
Council Bluffs, Iowa

PHONE
7795

World Radio Laboratories
COUNCIL BLUFFS, IOWA

RADIO REFERENCE MAP

FREE
1952 WRL CATALOG

160 METER CRYSTALS
1800-2000 K.C.
$1.50 each while they last

80 METER CRYSTALS
3500-3540 K.C. 99c each while they last
3600-3700 K.C. 3750-3990 K.C.

40 METER CRYSTALS
7020-7100 K.C.
7170-7425 K.C.

All crystals mounted in FT-243 holders and checked for activity before shipment. Crystals will only be furnished within the range of frequencies shown above. Will furnish as close to desired frequency as possible. When these are gone, no more available. Buy now!

World Radio Laboratories, Inc.
744 West Broadway
Council Bluffs, Iowa

Please send me:
☐ New Log Book
☐ New Catalog
☐ Radio Map
☐ ELMAC-AS4 Info
☐ Globe King Info
☐ Globe Champion Info
☐ Used Equipment List

Name _____________________________
Address _____________________________
City _____________________________ State _____________________________

113
oscillating at the operating frequency, to the plate tank coil and checking the grid coil with a crystal wavemeter. The condenser should be adjusted for minimum r.f. in the grid circuit with the plate and grid tanks resonated. Final touching up can be done after checking the operation with voltages applied to the tube. A value of 220 μfd. at C1 proved to put the neutralizing-condenser setting in the right range. If neutralizing is not used, this condenser may be increased to 0.001 μfd. or more for better by-passing at the lower frequencies.

SS Secrets
(Continued from page 17)

larly at various hours of the day for a couple of weeks prior to the contest — making note of propagation conditions and in general determining what bands could be expected to be “hot” at what hours of the day. Most important, however, seemed to be the scheme of working against an average, with a change in band indicated whenever the average wasn’t maintained.

Do you believe in “work-them-as-they-come,” or do you fill up on sections first? Or, when do you begin looking for sections?

Work as many stations as fast as you can was the consensus. Don’t worry about missed sections until the latter part of the contest. Of course, if you happen across a rare section, it may pay off to wait and try to nab him. Some of the ‘phone men mention that they keep an eye on net frequencies in order to pick up the rarer sections.

Do you work a particular section of each band, or do you believe in cruising up and down?

Without exception, everybody cruises up and down the bands.

Do you believe in calling CQ SS repeatedly, or do you go looking for those who are calling CQ?

While these fellows all admit that someone has to answer CQs, they feel that the way to run up a big score in the SS contest is to call CQ continuously. Indirectly, this leads you back to the equipment discussion — in order for your CQs to pay off you’ve got to have a good signal which, of course, requires an efficient transmitter and a respectable antenna system.

How long are your operating sessions? How do you decide when you are “saturated” either for a particular band or for a particular operating session?

(Continued on page 116)
It’s Here... at NEWARK
National’s New HRO 60
The Latest and Greatest of a Famous Series

MODEL HRO-60. Features dual conversion on all frequencies above 7 mc, plus 12 permeability-tuned IF circuits. Coverage: 50-430 kc, 480 kc-35 mc and 30-54 mc. Edge-lighted scale with one range in view at a time. Switching is done automatically when coil set is plugged in. Sensitivity of 1 μv or better at 6 db signal-to-noise. Selectivity variable from 8 kc overall to about 1200 cps at 40 db. Voltage-regulated HF oscillator and S-meter amplifier. Negligible drift after warm-up. Provision for crystal calibrator unit. High-fidelity push-pull audio (± 2 db, 50-15,000 cps) with phone jack. Accessory socket for Select-O-Ject. Size, 19¾x10⅞x16½". With 4 coils, less speaker. Wt., 84 lbs. 98F323. NET..........................483.50
98F307, HRO 60TS 10" speaker NET........16.00

FOR EXCEPTIONAL SELECTIVITY AND SENSITIVITY

MODEL 183D. All-new receiver with dual conversion, sharp IF and new miniature tubes. Continuous coverage from 540 kc to 31 mc plus 48 to 56 mc for S-meter reception. Features 5 tuned RF stages, 3 stages of IF, voltage regulated osc. and BFO. Main tuning dial covers range in five bands. Six-position crystal filter. New-type noise limiter. High fidelity push-pull audio, Size, 19¾x10⅞x16¼". Less speaker. Wt., 55 lbs. 98F311. NET..........................369.50
98F305, Model NC-183TS 10" speaker. NET........16.00

MODEL NC-125. Covers 560 kc to 35 mc in 4 bands. Features edge-lighted scale with Amateur, police, foreign, ship frequencies clearly marked. Sensational National "Select-O-Ject" built-in. Exceptional sensitivity on all bands. S-meter reads 59 at 50 μv signal. AVC, ANL jack for phone or NBFM adapter. Voltage regulated, stabilized oscillator. Audio flat to 10,000 cps. Size, 18½x11½x8½". Less speaker. Wt., 36 lbs. 98F300. NET..........................149.50
98F301, Model NC-125TS 6" speaker. NET........11.00

MODEL HFS. Versatile unit for fixed or mobile operation. Can be used as complete receiver in itself or as VHF converter with any receiver tuning to 15.7 mc. Covers entire HF spectrum from 25 mc to 290 mc in 6 bands—receives AM, FM and CW. Two-gang main tuning condenser, panel-controlled antenna trimmer condenser and 6 sets of plug-in coils tune the receiver. Requires power supply. Size, 16¾x10½x10¼". Wt., 25 lbs. 98F316. NET..........................142.00
98F316, Model 5886 AC power supply. NET........22.43

MODEL SW-54. Outperforms receivers twice the size and twice the price. Covers entire frequency range from 540 kc to 30 mc in 4 bands. Features sensitive and selective superhet circuit, using new miniature tubes. Slide-rule general coverage dial with police, foreign, Amateur and ship bands clearly marked. Unique, plastic bandspread dial is adjustable to assure logging accuracy over entire range. Built-in speaker and power supply. Size, 11x7x7½". Wt., 15 lbs. 98F318. NET..........................49.95

For Fast Efficient Service Order From Dept. T-10

Write now... if you are not on our catalog mailing list

NEWARK ELECTRIC COMPANY
223 W. MADISON STREET
CHICAGO 6, ILLINOIS

115
Most of the champs let the length of an operating session and length of time spent on an individual band be determined by that QSOs-per-hour average. However, many of them also follow the policy of operating for 50 minutes and then resting for 10. Some of them use this 10-minute rest period for having a cup of coffee and glancing over their log and check-lists. Apparently no one ever relaxes completely!

Do you concentrate your activity in the congested areas of the bands, or do you deliberately stay away from the QRM?

Generally speaking, the fellows stick with the congested areas, but try to stay out from under the really heavy QRM. A few, knowing they have exceptional signals, pay no attention to the status of the QRM but blast away wherever there are contacts to be made. The lower-powered gang works the edges of the congested areas.

Sound easy? Well, that’s how last year’s winners said they did it! And if this information helps your score at all this year, you should give thanks to WIATE, W3DGM, W3LTU, W4KFC, WBCUF, W9QIEU, W7PNGX, W7PUM, W8IOP, and W9RQM—all of whom contributed generously to this symposium.

B.F.O. for Mobile

(Continued from page 85)

the subchassis wiring of automobile receivers is pretty darned compact and since the whole thing is subject to vibration, you should make sure your shielded wire is held down at suitable spots so it won’t jar over and ground one of the internal receiver circuits. Spotting solder here and there on the braid to ground points will keep it from moving around.

After installation, you’ll need to trim the i.f. transformer in the auto receiver; since it is thrown off when you add the net reactance of the b.f.o. unit to the rectifier diode plate. This can be done by ear; tuning in a signal and peaking the trimmer on the i.f. transformer; or with a meter on the a.v.c. line. Then you should make final adjustment of the b.f.o. frequency by switching on the converter and receiver, tuned off any signal; switch on the b.f.o. and set its frequency by means of the screwdriver adjustment in the top of the can. You’ll hear a "swish" as you tune through the frequency; set the trimmer to the center of this "beat." Variation of the frequency during operation offers no advantage here as it does in a communications job, since there isn’t enough selectivity to make use of off-center b.f.o. tuning.

If you’re interested in figures, the following apply to the present installation, using a 20,000 ohms/volt meter to measure a.v.c. voltage. With no signal, only noise output from the converter, and b.f.o. off, the voltage is about 1.2. Switching on the b.f.o. with the "gain" control at maximum

(Continued on page 118)
J. F. D. Zoom-up Mast
Zinc-plated seamless, 16 gauge steel, telescoping antenna on post and 130 watts output on 600 ohm load. Supplied with guy rings, clamps and insulation hardware (less guy wire).
ZU12-20 30 ft. mast $7.35
ZU123-30 30 ft. mast 12.98
ZU1234-40 40 ft. mast 20.41
ZU12345-50 50 ft. mast 33.38

NEW JOHNSON VIKING II
The Johnson Viking II transmitter kit incorporates all the desirable features of its predecessor plus those required for effective TVI suppression. 100 watts output on phone and 130 watts on CW on all bands 600 thru 10 meters. New final amplifier uses parallel 6L6s tubes. All parts supplied, including complete plating system, chassis, wiring harness, all hardware and tubes. Complete construction and operation manual also supplied. Viking II Transmitter Kit............ 279.50

JFD YAGI ANTENNAS
The new ten element JFD Yagi antennas provide 50% more gain than conventional d. e. element Yagis. The balanced line provided by the "Balanced" insures an efficient match between the antenna and 300 ohm input. The elements are precision cut to each TV channel for maximum gain with nulls 8000 band width. A narrow beam width insures a high signal to noise ratio and sharp directionality. Quick pivot element design and factory assembled makes installation simple. All aluminum construction with stainless 1 1/4" OD crossarm. Supplied with mast. Single, ship weight: 10 lbs., stacked—20 lbs.

SINGLE ARRAYS

<table>
<thead>
<tr>
<th>Type</th>
<th>Channel</th>
<th>List</th>
<th>NET EACH</th>
</tr>
</thead>
<tbody>
<tr>
<td>10V2</td>
<td></td>
<td>31.85</td>
<td>18.72</td>
</tr>
<tr>
<td>10V3</td>
<td></td>
<td>28.45</td>
<td>16.73</td>
</tr>
<tr>
<td>10V4</td>
<td></td>
<td>24.30</td>
<td>14.00</td>
</tr>
<tr>
<td>10V5</td>
<td></td>
<td>20.70</td>
<td>11.80</td>
</tr>
<tr>
<td>10V6</td>
<td></td>
<td>17.50</td>
<td>9.50</td>
</tr>
<tr>
<td>10V7</td>
<td></td>
<td>15.85</td>
<td>8.14</td>
</tr>
</tbody>
</table>

STACKED ARRAYS

<table>
<thead>
<tr>
<th>Type</th>
<th>Channel</th>
<th>List</th>
<th>NET EACH</th>
</tr>
</thead>
<tbody>
<tr>
<td>10VS</td>
<td></td>
<td>12.85</td>
<td>7.11</td>
</tr>
<tr>
<td>10V8</td>
<td></td>
<td>10.70</td>
<td>6.10</td>
</tr>
<tr>
<td>10V9</td>
<td></td>
<td>9.00</td>
<td>5.00</td>
</tr>
<tr>
<td>10V10</td>
<td></td>
<td>7.83</td>
<td>4.33</td>
</tr>
<tr>
<td>10V11</td>
<td></td>
<td>6.78</td>
<td>3.78</td>
</tr>
<tr>
<td>10V12</td>
<td></td>
<td>5.83</td>
<td>3.33</td>
</tr>
<tr>
<td>10V13</td>
<td></td>
<td>5.00</td>
<td>2.88</td>
</tr>
</tbody>
</table>

A Static PICKUP ARM & CARTRIDGE

<table>
<thead>
<tr>
<th>Type</th>
<th>Channel</th>
<th>List</th>
<th>NET EACH</th>
</tr>
</thead>
<tbody>
<tr>
<td>10V14</td>
<td></td>
<td>3.85</td>
<td>2.15</td>
</tr>
</tbody>
</table>

AUDAX PICKUP ARM & CARTRIDGE

<table>
<thead>
<tr>
<th>Type</th>
<th>Channel</th>
<th>List</th>
<th>NET EACH</th>
</tr>
</thead>
<tbody>
<tr>
<td>L-10</td>
<td>10</td>
<td>9.50</td>
<td>5.25</td>
</tr>
<tr>
<td>L-15</td>
<td>15</td>
<td>7.50</td>
<td>4.13</td>
</tr>
<tr>
<td>L-20</td>
<td>20</td>
<td>6.75</td>
<td>3.75</td>
</tr>
<tr>
<td>L-25</td>
<td>25</td>
<td>6.00</td>
<td>3.30</td>
</tr>
</tbody>
</table>

LAFAYETTE — HEADQUARTERS FOR COMMUNICATIONS RECEIVERS

Now that we're all getting ready for another big season of DXing, rag chewing, rebuilding, equipment we'll need. Many such items are stock. Drop us a line or drop in and talk over your future requirements.

Paul Vasquez WN2N1J

Lafayette has been the Headquarters for fine communications receivers for 12 years. All the latest models are available as soon as released by the manufacturers. Be sure to check Lafayette before you buy your new receiver.

HALLICRAFTERS

<table>
<thead>
<tr>
<th>S-N</th>
<th>Model</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>S-38C</td>
<td>49.50</td>
<td></td>
</tr>
<tr>
<td>S-40B</td>
<td>98.50</td>
<td></td>
</tr>
<tr>
<td>S-83A</td>
<td>78.50</td>
<td></td>
</tr>
<tr>
<td>SX-62</td>
<td>285.50</td>
<td></td>
</tr>
<tr>
<td>SX-71</td>
<td>385.50</td>
<td></td>
</tr>
<tr>
<td>SX-73</td>
<td>395.00</td>
<td></td>
</tr>
<tr>
<td>S-76</td>
<td>185.50</td>
<td></td>
</tr>
</tbody>
</table>

NATIONAL

<table>
<thead>
<tr>
<th>S-N</th>
<th>Model</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>SW 54</td>
<td>49.50</td>
<td></td>
</tr>
<tr>
<td>NC 125</td>
<td>149.50</td>
<td></td>
</tr>
<tr>
<td>NC188D</td>
<td>385.50</td>
<td></td>
</tr>
<tr>
<td>HRO 60</td>
<td>485.50</td>
<td></td>
</tr>
<tr>
<td>HPS</td>
<td>485.50</td>
<td></td>
</tr>
</tbody>
</table>

HAMMERUND

<table>
<thead>
<tr>
<th>S-N</th>
<th>Model</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>HQ-120X</td>
<td>199.50</td>
<td></td>
</tr>
</tbody>
</table>

Goodmans

Made in England

A 12" high fidelity speaker with a frequency response all to 15,000 CPA. Features a twin ellipse lea diaphragm, 1 1/2" voice coil impedance 15 ohms, 15 watt capacity. Excellent speaker for home Hi-Fi installations.

Lifestyle $65....Special $28

Lafayette Radio

Radio Wire Television Inc.

NEW YORK 13, N. Y.
100 SIXTH AVENUE
RECTOR 2-8600

BOSTON 10, MASS.
110 FEDERAL STREET
HUBBARD 2-7850

NEWARK 2, N. J.
24 CENTRAL AVENUE
MARKET 2-1661

BRONX 58, N. Y.
542 E. FORDHAM RD
FORDHAM 7-8613

117
The popular “Sonodyne” Multi-Impedance Dynamic Microphone is being used more and more by veteran Hams throughout the world. The “51” Sonodyne is a rugged unit, will give you year-in, year-out brilliant performance under even the most difficult conditions. The “Sonodyne” provides high speech intelligibility, and will faithfully reproduce your natural voice.

The Multi-Impedance switch of the “Sonodyne” gives you your choice of either low, medium or high impedance!

YI News and Views

(Continued from page 41)

were W6s BKG DUR EUG RQG NCF PWN QXR RMH SPT TSE TXQ URT VNR KZ5AC and K5GQ... W2CDQ enjoyed a visit from HACD, the first Italian amateur to contact the U.S. on 100 meters in 1925... Some new YLs are WIVXO, June, Rumford, R.I.; WNSYVY, Jewell, El Dorado, Ark.; WTHOD, Ethel, Springfield, Mo.; W9ERGR, Clay, Urbana, Ill.; and WNS6PN, Roe, Beloit, Wis.... W6FIP reports that a check of members of the Sandia Base Radio Club and other Albuquerque area amateurs revealed two husband-and-wife teams and two YLs who haven’t yet converted their OMs. W6s BKG FT71 IPR N1B LTR RWX and TSE attended the Seventeenth Annual Convention of the South Texas Emergency Net. WSTSE won the big prize—a mobile transmitter. W6GCO, Alice, is now KHB71... While traveling with her famous OM, Tom (W3CRED), W3E1HR, Marguerite Beneke, has been enjoying FB QSos with her little three-watt transmitter. Such cross-country touring gives Marguerite many opportunities to meet YLs.

Miscellany

Our query in July re YLs eligible for the Extra Class license via the “grandfather clause” approach was misinterpreted by some. Haven’t heard about any YLs accordingly eligible, but we are finding out how many of the girls are actually grandmothers.

Continuing the project launched in the September issue, we are pleased to introduce Madeline Greenberg, W2EEO, YLRL Chairman of the Second District. Licensed in 1950, Madeline was elected president of the N.Y.C. YLRL this year, and her OM, Arthur, W2CYK, was elected to the same office in the N.Y.C. Radio Club. Daughter Sylvia, W2FX, and son Martin, K2ADM, make the Greenbergs another all-ham family (see p. 49, August QST), with the prospect of an “addition,” Sylvia’s fiancé, KN2AAO. Madeline works 20, 75, and 80 in her Bronx QTH, using a rig cleverly concealed in cabinets in the living room. In the summer she operates portable from Wading River, Long Island. The second-district YLs are finding W2EEO a competent and enthusiastic chairman.
HT-20 TRANSMITTER
Approx. shpg. wt. 125 lbs. Only $449.50

And what a delight to operate is this newest and greatest engineering triumph by Hallicrafters. Best of all, a new HT-20 can be yours at an amazing saving when you trade in your used (factory-built) test or communication equipment. Get our “Surprise” Trade-in offer and see for yourself. Wire, write, phone or use the handy coupon today.

Walter Ashe’s Surprise TRADE-INS ARE
REALLY OUT OF THIS WORLD, TOO!

All prices f. o. b. St. Louis
Phone Chestnut 1125

WALTER ASHE RADIO COMPANY
1125 Pine St., St. Louis 1, Missouri

☐ Rush “Surprise” Trade-in Allowance on _________________________________ (show make and model number of used equipment) for new Hallicrafters HT-20 Transmitter.

☐ Send new 1953 catalog.

Name ________________________________
Address ________________________________
City_________ Zone____ State__________

119
What Price Precision?
(Continued from page 38)

2) Rotate $C_4$ through its range and see if the standard can be zeroed to WWV. If it can, that's all there is to it.
3) If $C_4$ is all in, and zero with WWV not yet reached, pad up $C_5$ with additional silver-mica fixed values.
4) Conversely, if $C_4$ is all out, and zero with WWV not yet reached, reduce the value of $C_4$.

Generally, the set-up shown will correct for crystal errors of as much as 2 cycles at 100 kc. Further, it will do this if the rock is either high or low. $L_6$, $C_5$ and $C_6$ are arranged in such a manner that they series-resonate at 100 kc. with a total of 420 $\mu$fd. in use. At this point, zero correction is exerted on the crystal. If the crystal is high, increasing $C_5$ makes the circuit inductive and drops the crystal frequency. If the rock is low, decreasing $C_5$ makes the circuit capacitive and raises the crystal frequency. With a 4-millihenry coil in $L_5$, corrections through 5 cycles high are possible, providing the $C_5-C_6$ combination is increased to about 0.0018 $\mu$f. Similarly, 5 cycles low can be corrected by eliminating $L_4$ and adjusting the $C_5-C_6$ combination until the rock zeroes in.

Normally, DT-cut 100-kc. crystals are supplied within plus or minus 2 cycles. It is wise, if possible, to have them 2 cycles high as delivered because DT cuts generally age low, and will then come closer to 100 kc., flat, as they reach maturity. The crystal used in the final version of the W0EG standard is a James Knight type G9 DT cut, oriented for zero temperature coefficient at 60 degrees C, and ground for a flat 100 kc. at exact series resonance. It is sealed into an evacuated 6V6 envelope, and costs in the neighborhood of $30.00.

Temperature Control

As stated before, stable operation of any standard cannot be realized unless the crystal, and possibly the frequency-correcting components, are maintained at a constant temperature. Thermostatically-controlled ovens are the most common means of doing this, and the "starve and feast" variety, where heater power is either on or off, are the most common. The W0EG standard uses a two-stage oven — actually an oven within an oven. The crystal is mounted in the inner oven, with $L_6$, $C_5$ and $C_6$ being mounted in the outer chamber, which also contains the entire crystal compartment.

Mercury-contact thermometers, $K_1$ and $K_2$, Fig. 5, are used as thermo-sensitive controls for turning the heat off and on. These units are preset at 60 degrees C. (140 degrees F.) and look like short laboratory thermometers, except that they have no temperature scale, and fine wire contacts spaced about 1/4 inch extend through the wall of the capillary tube into the center hole. As mercury rises in the tube, the contacts are short-circuited, and heater power is turned off.

(Continued on page 182)
CONCORD \[your BEST BET for HAM VALUES!\] 

**GOOD PRICES ON TRADE-INS**

### JOHNSON VIKING II TRANSMITTER KIT

- **150 Watts CW, 100 Watts AM**
- **Phone Output:** Full output on 160, 80, 40, 20, 15, and 10 meter bands.
- **Incorporates all desirable features of predecessor Viking I, plus:**
  - **VTVM and RF wattmeter section.**
  - **6A6G Osc. 6AQ5 buffer doubler.**
  - **6A16 output amp. Modulator, 811A plate.**
  - **PD 807a, 6A6G speech amp.**
  - **5Y9G rect., 6A16 driver, 811A RF rect., 6V6G.**
- **Lo-volt, high-speed, panel-mounted, high-quality circuitry.**
- **Particularly useful for 115 Volt 50-60 cycle operation.**

### VIKING VFO KIT

**Designed for maximum operational flexibility with Viking I or similar XMitter.**
- **Only two controls:** Frequency control drives 0.05 dial calibrated in 10,000, 0, 40, 20, 15 and 10 meter bands. Also Bandswitch. Viking I style, tuned as used as K.P. Amplifier or dial switch. Clean tuning and stability.

### TUBE BARGAINS

**ALL NEW — GUARANTEED — FAMOUS BRANDS**

<table>
<thead>
<tr>
<th>Part</th>
<th>Description</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>6L60</td>
<td>807</td>
<td>$1.75</td>
</tr>
<tr>
<td>6L61</td>
<td>811</td>
<td>$1.25</td>
</tr>
<tr>
<td>6A16</td>
<td>811A</td>
<td>$2.75</td>
</tr>
<tr>
<td>5Y9G</td>
<td>815</td>
<td>$2.75</td>
</tr>
<tr>
<td>5871</td>
<td>6AK5</td>
<td>$2.25</td>
</tr>
<tr>
<td>5875</td>
<td>6AK6</td>
<td>$2.50</td>
</tr>
<tr>
<td>5879</td>
<td>6AK7</td>
<td>$2.50</td>
</tr>
</tbody>
</table>

### BRAND NEW DUAL BLOWERS

Each $14.85

- **AC Shaded pole motor, 2850 RPM.**
- **850 RPM operation.**
- **Dual multi-blade fans.**
- **Dust-free.**
- **Black lacquer finish.**

### SELF SUPPORTING TOWERS

**Absolute safety without guy wires!**
- **When installed according to specifications, safety factor is so great that it can actually support weight of 12 men.**
- **Readily accepted by one of world's largest liability insurance companies.**

<table>
<thead>
<tr>
<th>Tower Type</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 Ft. Tower</td>
<td>$87.50</td>
</tr>
<tr>
<td>10 Ft. Mid. Sec.</td>
<td>$16.25</td>
</tr>
<tr>
<td>20 Ft. Gin Pole</td>
<td>$8.75</td>
</tr>
</tbody>
</table>

---

WRITE FOR FREE CATALOG

CONCORD RADIO 54 Vesey St. NY 7 Dept. Q-102

Gentlemen: Send at once a copy of your great new 1953 BUYER’S GUIDE TO;

NAME: ........................................

ADDRESS: ......................................

CITY: .............................. STATE: ............
Raise Your Phone Power 8 Times with

SINGLE SIDEBAND

HARMONIC TVI VIRTUALLY ELIMINATED


SIDE BAND SLICER MODEL A Receiver Adapter, Selectable Single Sideband reception of SSB, AM, PA, & CW. Reduces heterodyne & interference at least 50%. Eliminates fading distortion. For receiver if 430-500kc, Wired & Tested $69.50. Kit $47.50.

PS-1 PLUG-IN prealigned 90° phase shift network & socket $7.50.

Send for Literature

Central Electronics, Inc.
2125 W. Giddings Street
Chicago 35, Illinois

MORE SIGNALS PER DOLLAR
From Money Invested in an Antenna

Self Supporting STEEL TOWERS
For Rotary Beams, FM, TV

ATTRACTIVE—NO GUY WIRES!

- 4-Post Construction for Greater Strength!
- Galvanized Steel—Will Last A Lifetime
- SAFE—Ladder to Top Platform
- COMPLETE—Ready to Assemble
- Easy to Erect or Move
- Withstands Heaviest Winds

EASY MONTHLY PAYMENTS
Up to 12 Months to pay

Width of Base Equal to 1/5 Height

Vesto Towers are available in a wide range of sizes to meet requirements of amateurs and commercial users alike. Note the low prices for these quality lifetime towers: 22'-$347.75, 25'-$415.75, 28'-5155.75, 32'-5187.75, 36'-5217.75, 48'-5279.75 100'-51060.00. Towers are shipped to your home knocked down, FOB Kansas City, Mo. 4th class freight. Prices subject to change . . . . so order now. Send check or money order . . . or write for free information.

VESTO CO., Inc.
20th and Clay
North Kansas City, Mo.

by the control relays $K_2$ and $K_4$. These relays are of the so-called “sensitive” type, and will operate on a direct current of 1 milliamper through a 1000-ohm coil. The operating current is actually 3 ma. to insure positive functioning. The relay contacts will handle 1/4 ampere at 115 volts.

The half-wave instrument rectifiers $D_1$ and $D_2$ are spark eliminators, protecting the thermostats. They are polarized across the relay coils to present maximum resistance when control voltage is applied. They then short-circuit the reverse-polarity voltage generated by the collapsing magnetic field present immediately after the control voltage is removed. These rectifiers damp out all “contact opening” spark in the thermostats and permit 3 ma. to pass through the mercury column with no bad effects. More than 3 ma. per relay at 3 volts should not be used.

Pilot lamps $I_1$ and $I_2$ are across the oven heaters, and wink on and off as these circuits operate. The bridge rectifier supplies d.c. for operation of the heater relays. Any good dry-disc unit delivering about 1/4 ampere at 3 volts will do. Resistor $R_{17}$ is a heavy bleeder which keeps the d.c. output quite constant, and permits independent operation of both heater relays from a common supply. Condenser $C_{16}$ flattens the peaks of the rectified voltage enough so the control relays won’t chatter.

The temperature boxes are made of heavy metal, 3/8-inch aluminum, with the heaters wound around the outside. An inch of thermal insulation is used on all sides of these boxes, and the thermostats are mounted tight against the heater windings, and let into channels sawed into the sheets of thermal insulation (Celotex). Outside dimensions of the crystal chamber are 6 inches wide, 6 inches high, and 6 1/2 inches deep. Inside dimensions of the outer chamber are 8 inches high, 10 1/2 inches long and 8 1/2 inches deep. The entire standard is mounted on a 10 1/2 X 19-inch relay rack panel and extends 14 inches behind it. It weighs approximately 40 pounds.

In operation, the interior of the outer chamber is maintained at 58 degrees C., plus or minus 0.05 degree, over an ambient temperature range of 10 degrees to 35 degrees C. The heater serving this chamber operates at a cycle of approximately 15 seconds on and 15 seconds off. The interior of the crystal chamber stays at 60 degrees C., plus or minus 0.01 degree, over the same variations in ambient temperature. Its heater operates on a cycle of approximately 20 minutes on and 5 minutes off. The heavy metal boxes filter out the heat cycle and maintain the interior of the boxes free from any material temperature variations from that source.

Conclusion

As presently constituted, the W9EAG standard has been well worth the work put into it, and frequency stability is such that variations in WWV transmissions introduced by instability of

(Continued on page 184)
MUSIC-LOVERS FROM COAST TO COAST
HAVE THANKED US FOR THIS BARGAIN

PILOT FM-AM TUNER

REGULARLY $89.95  $42.95

CLOSEST COMPAREABLE MODELS ARE $30 to $50
HIGHER and lack several of the features of this
never-to-be-duplicated value — offered at far less
dealer's cost! We've sold hundreds at this low price
(which allows you to spend more on your amplifier
and speaker). Compactely designed and exceptionally
well built, the set contains separate tuning condensers,
built-in antennas and pilot lights for AM and FM.
Superhet AM circuit, radio detector FM with
225 kc wide linear response, 10 tubes, AC operation.
30-15,000 cycle output to any amplifier, radio or TV
set. Four position selector switch: FM/AM/PH/TV.
11 x 6 x 9 1/2" Shipping wt. 9 1/2 lbs. Immediate delivery.
Just 200 left!

'STANDARD COIL' TV BOOSTER SALE!

LIST
$35.00

Sale
$12.95

CORNER HORN ENCLOSURE $132.50

Folded corner horn cabinet for
music lovers and laboratories who
desire the utmost in low fre-
cuenczy reproduction. This is the first
time a genuine Klipsch designed
enclosure of this type has been
offered within $50.00 of this low
price. Finished in a medium brown
mahogany lacquer, hand-rubbed,
alcohol and heat resistant. Front
and top are first quality 5-ply
selected gunwood, 39 x 27 x 32".
Wt. 150 lbs. Model RS-1.
*Add $15.00 for crating for ship-
ment.

KLIPSCH LICENSED

Model RS-1A top enclosure shown
in photo, for housing mid-range
horn, crossover and tweeter. De-
signed and finished to be mounted
on top of RS-1. Add $19" to
height of enclosure. Complete
frame and top ready for attach-
ing grille cloth.

$20.00

BARGAIN-PRICED

15" COAX SPEAKER

2 lb. ALNICO MAGNET

Model B-41 Standard Coil TV booster — by the makers
of the world's most widely used TV tuners. Factory
cartoned and sealed, fully guaranteed. Top quality
single stage booster with printed high frequency cir-
cuits for improved performance on all channels.
Aver-
age gain 6 to 7 volts on low channels and 5 or 6 volts
on high channels. Extremely low noise factor. Con-
tinuous one-knob tuning; channel selector switch for
off-on and by-passing 300 ohm lead-in to set. 6AK5
tube employed as a tuned input, tuned output RF
amplifier, selenium rectifier in power supply. Modern
design, dark brown plastic cabinet, 8 x 4 1/8 x 4 1/2".
110V, 60 cycle AC. Ship. wt. 5 lbs. ONLY 75
AVAILABLE.

$19.95

IF YOU'RE NOT ON OUR MAILING LIST,
write today for Radio Shack's 1953
30th Anniversary CATALOG — JUST
PUBLISHED!

224 pages, profusely illustrated, with full
specifications and technical information.
Cross-indexed for easy reference. The most
complete and informative catalog in our 30
years of mail order service.

RADIO SHACK
CORPORATION
167 Washington St., Boston 8, Mass.
the ionosphere are readily detected. Most of the crystal aging worked out during the first 60 days of operation, and drift settled to a more or less constant rate of minus 2 parts in 50 million per week, at the end of four months. The total cost of the unit, a large percentage of which was Government surplus, was approximately $150.00.

From the foregoing, it will be seen that one can spend as much or as little as he desires on a frequency standard, and that the cost of generating the ultimate in precise radio frequencies is considerable. Further, it will be seen that the law of diminishing returns accounts for the fact that a standard capable of holding one part in a hundred million costs somewhere between ten and a hundred times more than one capable of holding one part in one million. However, it will also be seen that adequate precision can be attained for a comparatively small cash outlay, plus some careful work.

Inasmuch as some rather uncommon items were used in the final construction, a list of dealers carrying such equipment is appended:

1) The 60-degree fixed mercury-contact thermometers used in the WBEG standard are obtainable from Herbach & Rademan, Inc., 1204 Arch Street, Philadelphia 7, Pa. These people can also supply sensitive relays adequate for temperature-control purposes. Both items are Government surplus, and cost approximately $1.00 per item. Precision thermometers spreading 4 degrees, 58-62 degrees C, over approximately 4 inches are also available from this company.

2) Mercury-contact thermometers, 40 degrees C, are available from TAB, 6 Church Street, New York 6, N. Y. These people are also a possible source of sensitive relays.

3) Special mercury-contact thermometers, made to the customer’s specifications, are obtainable from Mac Electrical Devices, Wyncote, Pa., and cost from $7.00 to $15.00 each.

4) The iron-dust core for L1 is obtained from the Lenkurt Electric Company of 1105 Old County Road, San Carlos, Calif. It is known as their Type P1750-12A assembly; cost, $2.64 each.

**A Novice Test Meter**

(Continued from page 33)

Resistance can be determined by the formula

\[ R_m = 100 \frac{1 - 0.75}{0.75} = 100 \frac{0.25}{0.75} = \frac{100 \times 0.333}{0.75} = 333.3 \text{ ohms} \]

The accuracy will depend upon the accuracy of the 100-ohm resistor and the reading of the meter.

I made the 1008-ma., shunt with No. 18 wire wound around a pencil as a form. After removing the pencil, I fed each end of the wire back through the inside of the coil to add stiffness. The wire for the other two shunts can be scumble-wound around a pencil and doped with Duro cement to hold the turns in place. Be sure to remove the pencil before the cement sets.

(Continued on page 186)
NEW DELUXE TRANSMITTER KIT
JOHNSON VIKING II
100 WATTS ON PHONE
130 WATTS ON CW

Every desirable feature has been included in this outstanding transmitter, BAND-SWITCHING to all amateur bands, from 160 through 10 meters...TVI suppression...100% All modulation...PARALLEL OUTPUT 6146 tubes...PUSH-PULL 807 MODULATORS. Supplied complete with pre-wired chassis, copper-plated steel cabinet, tubes, hardware, assembly instructions, and all necessary parts and components.$279.50

McINTOSH PHONO PREAMPLIFIER and EQUALIZER

Model C104

An extremely flexible unit designed for the most discriminating and acute listener. Provided with five inputs and selector switch, it accommodates crystal pickup, FM-AM tuner, low level microphone, as well as high level and low level magnetic pickups. A 3-position switch selects the correct compensation to match the three recording characteristics most often used. In addition, the C104 features treble and bass boost and attenuation, each with separate controls. Connectors are furnished for obtaining power from the main amplifier. A master power switch and volume control completes the attractive brown hammeerton panel. Supplied complete with tubes and connectors.

In Mahogany-finish Cabinet.............$57.50
Less Cabinet ..................................49.50

NOW READY!

HARVEY'S NEW HIGH FIDELITY AUDIO CATALOG

Write for this FREE 36 page comprehensive directory to Dept. Q 102

HARVEY IS YOUR COLLINS HEADQUARTERS
Complete Stocks Always On Hand for Immediate Delivery

COLLINS 70E-8A Variable Frequency Oscillator

$975

COLLINS 75A-2 Communications Receiver with Speaker $440

less speaker $420

speaker $20

COLLINS 32V-3 Transmitter

$775

COLLINS KW-1 Transmitter

$3,850

Write for complete data and specifications

THE ORIGINAL WILLIAMSON HR-15 AMPLIFIER KIT

The famous, original Williamson HR-15...still acclaimed the leader...in kit form, with the original Partridge output Transformer. Assemble this kit, and in 3 hours or less, enjoy the finest sound you ever heard. Optional parts from a tuner, phone-preamplifier, crystal pick-up, or other signal source. Absolute gain is 70.8 db with 20 ohms feedback. Frequency response: +0.5 db, from 10 to 10,000 cps. Output impedances to match all speakers from 1.7 to 109 ohms. Kit is complete with 5 tubes (15-V4, 2556N7, and 2558) (or 2557 if requested), 2-Punched Chassis, 2-Resistor Mounting Strips, Sockets, Partridge WWFB Output Transformer, Assembly Instructions, and All Other Necessary Parts for Amplifier and Power Supply...$76.50.

HR-15, as above, but with Partridge CF8 Output Transformer (Hermetically Sealed) ..................$99.00

PARTRIDGE OUTPUT TRANSFORMERS - Available Separately. WWFB.$26.00 CFB.$40.00

HR-1ST WILLIAMSON Kit - Furnished as above, with TRIAD Transformers and Chokes ..................$69.50

NOTE: HR-15 and HR-1ST Kits may be had with British KT-66 Output tubes for $3.00 additional.

SUPERIOR POWERSTATS

Smooth, efficient voltage control, 0-135 volts output for 15 volts AC line. Models also for 230 volt input. Write for free literature. Models for table and panel mounting.

Type 20, 3 amp..................$12.50
116, 7.5 amp, table model...$23.00
116U, 7.5 amp, panel model...$18.00
1126, 15 amp..................$26.00
1156, 45 amp..................$118.00

The Model 10 is a new, compact unit measuring only 3" in diameter and 2 1/16" deep. It is rated at 1.25 amps. (150 watts/165VAC), and is continuously variable to deliver 0-122 volts with 120 volt 60 cycle input..........................$8.50

Complete Stock Always On Hand For Immediate Delivery

NOTE: In view of the rapidly changing market conditions, all prices shown are subject to change without notice and are Net, F.O.B., New York City.

VISIT THE AUDIO- TORIUM. Come in and visit our new sound department. Most of these items are not on our current display at all times.
Calibration for voltage and current should not be necessary if the resistors are accurate. It is merely a matter of multiplying the reading by the appropriate factor, i.e., 1, 10, 100 or 1000. However, a calibration chart for the resistance readings will be needed, as described in the Handbook. The high-resistance range goes up to about 0.5 megohm, while the limit of the low-resistance range is approximately 1000 ohms. On the low-resistance range, the zero-adjust rheostat, R4, should be adjusted so that the meter reads full scale with the test prods open, before making a resistance measurement. On the other hand, for measurements in the high-resistance range, the adjustment should be for a full-scale reading with the test prods shorted.

The unit can be dressed up by labeling the switch positions and the pin-jack terminals with decals. A pair of test prods with leads at least 3 feet long and 'phone-tip plugs for the prod wires and battery leads finish up the job.

Eliminating Intersignal Noise

(Continued from page 87)
of the receiver and the a.v.c. terminal of the codan to the receiver a.v.c. line. Tune in a station that is just above the noise level, and set the level control so that the codan just passes a clean signal. Now detune the receiver slightly, and the signal will cut out. Retune, and the signal will return. Interrupting the carrier by shorting antenna and ground will also silence the a.f. With a little practice, it will be possible, most of the time, to tune any band from top to bottom, with the receiver silent except when a carrier of predetermined height above noise level is tuned in. When a signal fades very badly, it will be necessary to set the codan at the lowest intelligible level, or to disable it, to prevent interruptions in the transmission. Although designed for 'phone work, a codan is sometimes helpful in c.w. work also, provided the a.v.c. system has a sufficiently-long time constant. It is sometimes possible, by very careful setting, to adjust the codan so that it will pass only modulation peaks of the incoming signal, rejecting all the rest. This difficulty, which is common with triode-controlled codans, and uncommon with pentode types, can be remedied by slight readjustment of the codan level.

Performance of this codan leaves little to be desired. During nine months of operation, it has needed no servicing, and still contains the original tubes. It is of particular value on the higher frequencies, where intersignal bedlam tends to be quite severe. When used with a stable receiver and carefully adjusted, it is a great aid to accurate tuning. It does not, however, cause any real increase in selectivity.

Although designed for use on a.m. signals, this codan works well with n.f.m. signals, and, with slight readjustment, on standard f.m. transmissions.
Heathkits are completely engineered instruments supplied unassembled. Every kit goes together smoothly and easily. All drilling, punching, and painting has already been done for you.

It's easy and fun to build a Heathkit. All parts are furnished and are of highest quality for years of trouble-free, dependable operation.

Save money by constructing your own. All expensive wiring and assembly costs are completely eliminated.

Detailed construction manual shows clearly where each wire and part goes and tells exactly how to build the kit. Write for free catalog.

HEATH COMPANY
BENTON HARBOR 9, MICHIGAN

EARN UP TO $7500 A YEAR!!
with the AIRLINES • STEAMSHIPS • TV STATIONS

... as a Radio, Radar, Television Operator (FCC). No Previous Experience Required Because You Learn from the Beginning in One of America's Finest Electronic Specialized Training Schools—a School That Provides PHOTOSOUND Training Aids to the U.S. Armed Forces and One of the Very Few Civilian Schools in America Licensed by U.S. Gov't. FCC to Own and Operate Its Own Radar Station.

ETI
Also Conducts Short Intensive Courses in RADAR & TV SERVICING

ETI conducts Day Classes, Evening Classes, and Home Study Extension Training.

ELECTRONIC TECHNICAL INSTITUTE
970 W. Manchester, Inglewood, California
(Approved for Veterans)
Phones: ORegion 8-5134 ORchard 7-7086

ETI
970 W. Manchester, Inglewood, Calif.

Gentlemen: Please send me Free Booklet "Your Career in Electronics."

Name .................................................
Address .............................................
City ................................................. State
Sugar-Coated S.S.B.
(Continued from page 39)

the 'scope is coupled to the output as in carrier-type a.m. As pointed out in numerous articles, the final pattern with a single-tone modulation should resemble an a.m. carrier without modulation.

To sum up, you might consider single-sideband this way: Take any voice frequency—say, 1000 cycles—and let this represent the human voice. Feed it to a mixer to "convert" it to 3000 kc. That would make the net frequency 3001 kc. Now remove the r.f. carrier, but leave the audio signal up there at 3001 kc. We have now accomplished what single sideband does. The receiver picks up the signal at 3001 kc., adds a 3000-kc. carrier from the h.f.o., "converts" or "detects" it down to 1000 cycles, and you hear it in your 'speaker. Now, I ask, how simple can you get?

A final paragraph might be written to deal with the "die-hard" 'phone man who says, "To heck with all this. I'm not going to junk my expensive carrier rig just for a silly fad!" And believe me, there are plenty of guys on the bands who say just that. Well, take it from this die-hard: Two months ago I was one of you. And I had my eyes opened. You will, too. No matter what you may say today... just as surely as the sun rises and sets, the day is not far off when a carrier will be an illegal part of a 'phone signal... especially since the spirit, if not the letter, of present FCC regulations prohibits the transmission of useless energy. The carrier has got to go. The carrier is dead. Long live the sideband.

Rectifiers
(Continued from page 48)

type has two anodes and a single cathode or filament. Most types for voltages above 500 are of the half-wave type. Rectifier filament may be supplied by a separate step-down transformer, as shown in Fig. 6A, or, in the case of lower-voltage supplies, from an appropriate winding on the high-voltage transformer, as Fig. 6B.

The pulsations in the d.c. output shown in Figs. 2B and 3B can be smoothed out by the use of a filter consisting of chokes and condensers.

---Answer to QUIST QUIZ on page 10---

Please send me complete technical literature and delivery information on the following Lampkin Instruments:

1. Type 205 FM Modulation Meter
2. Type 105-B Micrometer Frequency Meter (0.1 to 175 mc)

Name ____________________________
Address __________________________
City ____________________________ Zone ________ State ________
These bifilar balun inductors are specially designed for use with Collins 32-V series and similar transmitters—see "The Impedance Matcher" as described in CQ Magazine for May 1951. Two coils mounted on an 8" square plate serve as a compact, highly efficient all-band (80-10 meters) unit for matching feed line systems to both transmitters and receivers. Full instructions included with each inductor.
40-Meter Vertical

(Continued from page 40)

The exact dimensions of the broad-band vertical are: outside elements, 30 feet 4 inches; center element, 30 feet 3 inches; with the elements spaced 15 inches and in the same vertical plane. The tops of the three conductors are tied together with a 1-inch aluminum strip, and the two outside elements are tied together at the bottom with another strip. The feed point is the 1-inch gap between the center element and the bottom strip, as can be seen in the photograph.

One thing should be pointed out. Anyone constructing a similar antenna, and using wire or different-diameter tubing, will find that the elements must be longer to resonate in the 7-Mc. band. The thinner the elements, the more closely the length will approach that given by the formula for a quarter-wavelength antenna.

---

A close-up view of the base of the vertical shows the 300-ohm line in its garden-hose housing.

---

Astrays

As one little electron said to another little electron when they bumped into each other on the grid: “I don’t know you from atom!”

— Hoffman Transmitter

W9LQP would remind mobileers that serious burns can result if gas escaping from an unsealed storage battery were accidentally ignited.

To prevent damage while soldering, VE3AOZ wraps water-soaked pipe cleaners around the pins of polystyrene coil forms or the leads of crystal rectifiers.

Call Book editor...

“It’s DL6SN when one hasn’t a DL6ZS to exchange at a DL9EJ for a DL6N of DL6ZD. With everything in DL9FT and nothing left in the DL6UF, there’s no chance for a DL6XN!”

---
HYPERNOMATOMEKIA
means
Unusually Long Name
TOPNOTCH TECHNICAL ARTICLES
means QST

Whether you are a beginner or old timer you will find QST's technical articles to your liking. Articles on radio theory literally paint word pictures for easy and thorough understanding of the subject...construction articles on equipment you want clearly illustrated with pictures and diagrams...technical topics to bring you the latest information on radio progress and theory affecting amateur radio...all written and edited by amateurs for amateurs.

QST and ARRL Membership • $4.00 in U.S.A.
$4.25 in Canada • $5.00 elsewhere

The American Radio Relay League, Inc.
West Hartford 7, Conn.

RADIO • TELEVISION • ELECTRONICS
In all Technical Phases
New Courses (Day & Evening) Start
FREE PLACEMENT SERVICE for GRADUATES
For Free Catalog write Dept. ST-32

RCA INSTITUTES, INC.
A Service of Radio Corporation of America
350 WEST 46TH ST., NEW YORK 18, N. Y.

Semi-Automatic Key
Twice as easy as hand sending

5 models to choose from, priced from
$12.95 to $22.95

Order Yours Today!
No other key takes the strain and effort out of telegraphing like the Vibroplex. It brings to you the ease of semi-automatic action, simplicity of operation and advantage of mechanical speed. The use of patented jeweled movement assures smoother, easier operation and longer life. Don't wait for signs of arm trouble. Start using the Vibroplex today and see how easily and effortlessly you send...no straining effort...no strain. Everyone will notice the improvement in your keying. Whether you choose the Super Deluxe Presentation with 24-K gold-plated base top and super-speed control main-spring that lets you send from dead slow to top speed, and requires no additional weights for slowed sending — or one of the other models — you'll get the finest key your money can buy. ORDER YOURS TODAY! Left-hand models, one dollar more. At dealers or direct.

FREE catalog.

Headquarters for NEW portables, all models and styles of type. Also, REBUILT standard and portable typewriters with ALL CAPITAL letters and other styles of type. Immediate delivery. Get our prices before you buy.

THE VIBROPLEX CO., INC.
533 Broadway New York 12, N. Y.

ATTENTION
MOBILE HAMS

Complete mobile package — nothing else to buy. Outstandning mobile signals use motorola equipment — backed by years of communication equipment experience — World's largest producer of 2-way mobile equipment.

A mobile transmitter with a double feature — mount new antenna $23.13
FM or AM at flip of the switch, the MOTOROLA FMT-30-DMS
(27-30 MHz) ... $130.00

New Gm-set Tri-Band Spread $47.60
Converter...

3-30 famous Gm-set converter complete to connect to the P-69-13 or P-69-13 or
18-ARS receiver with special noise limiter $47.75 for use with any converter having 1440-
3000 K.C. ....... $60.00
P-327-E Fire wall $7.50
load speaker...

The above comes complete with all necessary accessories and mounting hardware. Order direct or through the Motorola National Service Organization member in your area.

Note: This Receiver and Transmitter is equipment which has been returned from the field, modified and rebuilt for Amateur Service.

For further information write to:
MOTOROLA INC.
Amateur Sales Dept. QST — October
1327 W. Washington Blvd. Chicago 7, Illinois
Attention: Harry Harnon, WPLLX, Tel. Taylor 9-2200 Ext. 161
PHILMORE NOVICE XMTR KIT
6V osc. — 6L6 final — 80 & 11 meters 25 watts input. — complete with tubes, punched chassis, coil forms, coil wire, power supply, key, complete easy to follow instructions, less tax... $29.40

Special Purchase FM Radio Chassis
88-108 MC
Complete with 6 tubes. Built-in antenna and speaker. Product of Famous Radio & TV Manufacturer whose name we promise not to mention... $16.95

Two Station Intercom System
Consists of master & remote station, 30 ft. of wire cable, 115 V operation A.C. or D.C. Extra wire $.50 per ft. $17.95

SUN RADIO
OF WASHINGTON, D.C.
938 F STREET, N. W. WASH. 4, D. C.

What
Are you looking for?
See P. 116

50-Mc. Antenna Coupler
(Continued from page 88)
If the transmitter is well designed as to TVI prevention, the antenna coupler may be all that is needed in many locations. If the TVI problem is severe, the installation of a low-pass filter in the line between the rig and the coupler may be necessary. Most filters now on the market are not satisfactory for 50-Mc. use, as their cut-off frequency is lower than this. Filters for the v.h.f. man will be treated in a subsequent issue of QST.
— E. P. T.

Bottom view of the 6-meter antenna coupler.

DX Contest Results
(Continued from page 88)

CRYSTALS
1.5 Mcs. to 15.0 Mcs.
Stable, High Activity
Manufactured by Current Precision Methods to Military Standards
20 Meter Crystals $3.75 Postpaid
40-80-160 Meters $2.75 Postpaid
Graphical calibration curve with each crystal available on request.

ELECTRONIC SPECIALTIES COMPANY
OF MARYLAND
2024 Maryland Avenue Baltimore 18, Md.
BUY OF A LIFETIME!
TRIED AND PROVEN THE WORLD OVER

LETITINE MODEL 240
TRANSMITTER WITH MOBILE CONNECTIONS AND A.C. POWER SUPPLY

This outstanding transmitter has been acclaimed a great performer throughout the world. It is excellent for fixed station, portable or mobile operation, even if you have a transmitter of your own, we'll afford you the chance to combine this wonderful bay, direct from our factory, ready to operate.

The 240 is a 40 watt, Phone-CW rig for 160 to 10 meters, complete with: (8 x 4 x 8) cabinet, self-contained A.C. power supply, MOBILE connections, meter, tubes, crystal and coils for 40 meters. Tubes: 1 U-08 o.c., 09F front, 087 crystal mix amp., 6N7 phase inverter, 2 GLO's mod., 514AG rect. Weight 55 lbs. TVI instructions included, 90 day guarantee. Price $79.95.

$25 deposit with order — balance C.O.D.
30, 20, 10 meter coils $2.91 per coil, 160 meter coils $3.95. Also for CAP, Broadcast, MARS, Marine, State Guard.

LETITINE RADIO MFG. CO.
2 Berkeley Street
Va Hey Stream, N. Y

Q-H-5 ELEMENT NON-ROTATING BEAM
IN KIT FORM

By popular request in kit form. Bending operations, difficult for average ham shop, done by us. To assemble, all you need is a drill and hacksaw. Complete with waterproof relay assemblies, clamps, bakelite insulation, etc. Working drawings and instructions supplied. Wooden spreaders, operating switches and wiring not supplied.

10 Meters $55.50
20 Meters $98.50

F O B Wakefield, Mass.

CALAMAR
18 RICHARDSON AVE.
WAKEFIELD, MASS.

EASY TO LEARN CODE

It is easy and pleasant to learn or increase speed the modern way—with an Instructionograph Code Reader! Excellent for the beginner or advanced student. A quick, practical and dependable method, available in the form of instructions in the alphabet to typographical messages on all subjects. Speed range 5 to 40 W.P.M. Always ready, no Q.R.M., beats having someone read to you.

ENDORSED BY THOUSANDS!
The Instructionograph 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 "mastered the code" with the Instructionograph System. Write today for full particulars and convenient rental plans.

INSTRUCTIONOGRAPH COMPANY
4799 SHERIDAN ROAD, CHICAGO 42, ILLINOIS

NEW ENGLAND
Connecticut
WIOD 242-22-17-B-18
WTVX 180-5-7-E-1-C
WIFLX 5-5-3-B-2

Massachusetts
WAFZ 184-82-41-3C-70
WAKA 5840-40-80-B-24

W. Massachusetts
WCHQ 33,055-55-200-B-39
WCLR 4152-20-13-B-12

New Hampshire
WINF 12720-41-77-A
WIZQ 3629-35-74-B

NORTHWEST DIVISION
Oregon
WTHM 269-45-183-C-40
WTHV 3165-37-25-B-24
WYNN 1071-37-51-C-53
WXKQ 3541-11-31-B-3

Washington
WTHL 11-406-20-26-C
WPSR 3152-23-51-B-30
WTAQ 45-20-17-5-B-3
WTHD 2810-21-37-B-28

PACIFIC DIVISION
Nebraska
WTHU 18-638-42-86-C-30
WITH 3999-13-60-B-22

Santa Clara Valley
WXY (Way Xylophone, ADF, C.A.P., etc.) 51,068-15-58-C-24

East Bay
WNSG 10251-65-375-C-98
WBYZ 114-12-30-B-20
WSFY 3624-2-392-C-35
WJRL 7920-26-58-C-26
WYDI 2652-31-64-C-28
WCMK 2652-31-65-C-28
WBCN 1800-15-60-B-17
WJGJ 185-4-6-B-4
WIVQ (WQQC, XWQ, KQF, XWQ) 282-32-168-C-14

San Francisco
WQAT 1235-16-31-C-15
WGGP 75-4-5-B-2

San Joaquin Valley
WBYT 305-18-12-B-2

ROANOKE DIVISION
No. Carolina
WGRZ 4520-35-51-B-8
WCENC 4250-25-59-B-16
WKNR 105-19-12-C-0
WAEHP 76-9-B-6

Virginia
WESK 149,517-114-C-0
WOM 135,936-86-235-C-75
WAYN 37,223-65-201-B-50
Wlas 129-16-1A-7
WGGL 323-12-6-B-15
KAVC 195-11-6-C-1

ROCKY MOUNTAIN DIVISION
Colorado
WINW 15,142-46-109-B-50
WSKH 11,462-40-105-C-40
WAZT 650-10-15-C-4

SOUTHEASTERN DIVISION
Alabama
WHIA 201-34-53-1-C-18
WFMV 60-4-5-L-4

E. Florida
WAD 128-11-16-B-8
WATX 62-12-7-B-24

W. Florida
WBCQ 35,457-49-131-B-55
WATKX 74-9-L-3

Georgia
WBNY 1355-18-34-B-30

SOUTHWESTERN DIVISION
Los Angeles
WGAM 60,430-78-272-C-41
WEBB 50,105-10-41-C-17

WASHINGTON
WSOF 723-10-24-C-01
WBBP (WFOF) 702-12-24-A-6

Arizona
WPZP 1215-11-27-B-12
WLED 1215-11-29-C-12
WIENA 51-3-4-6-A

San Diego
WCTY 25,138-15-12-B-19
WBB 7329-30-12-B-20

WEST GULF DIVISION
Northern Texas
WSBGF 35,115-6-68-13-13
WUSU 3130-27-68-C-29
WJH 3124-8-81-11-3
WPSTY 1968-18-71-B-20
WSAW 1721-10-12-C-6

Oklahoma
WSALF 16,137-33-161-B-36
WJZK 3509-21-28-C-26
WJMR 1359-16-25-B-7
WJTF 348-2-6-12-1

Southern Texas
WSBNI 2339-28-38-19
WJKR 1556-19-23-B-7
WJFN 352-6-1-3-5
WLSLLG 144-6-4-A-2
WSTWMPH (WGNV) 1021-27-28-5

New Mexico
WSF 199-37-46-C-25

CALIFORNIA
Ontario
VE3UB 14-5-1-4-4-8
VE9HQ (VE9LZ, CKM) 30, 21-12-16-4-A

Quebec
VE2BV 3782-32-21-B-10
VE2GD 339-3-18-4-1
VE2HR 835-15-19-B-4

Canadian
VE4CV 357-18-10-10
VE2Z 357-15-18-10
VE2APC 321-9-13-1-5

British Columbia
VE7OY 37,1114-6-1-C-22
VE3B 16,574-58-15-B-50

Manitoba
VE4O 31,112-65-133-C-50

Saskatchewan
VE3CX 56-3-6-A-4

AFRICA
SAE 5152-12-42-A-2

French Morocco
CN6FX 700-3-5-A-1

Tangier
KTIOD 10,556-115-B-2-22

Union of South Africa
ZS0DW 31,540-35-161-C-1

ASIA
Japan
JAR 14-1-11-C-1
JADDY 36-2-6-4

Turkey
TA3EFA 126-6-6-2-5-7

EUROPE
Belgium
OQ4TB 3118-9-63-A-7
ON4CC 972-7-35-A-3

Denmark
OZ7SM 5890-11-16-A-11
OZ7TC 772-10-6-1
OZ7EC 304-7-13-A-2
OZ7AE (OZ1EC) 4275-15-9-A-18

England
G2PU 15,000-32-200-B-15

Finland
OH1HHN 510-9-20-A-1

France
F8X 14,841-17-9A1-45
FTAG 94-6-4-C-0

(Continued on page 158)
MAKE THIS YOUR HOME FOR IMPORTANT WORK UNDER IDEAL CONDITIONS

- TV RECEIVER DESIGN ENGINEERS
- ELECTRONICS ENGINEERS
- FIELD ENGINEERS
- TEST & INSPECTION ENGINEERS
- LAB. TECHNICIANS


YOU BENEFIT AT BENDIX RADIO:
from high wages, a modern, air-conditioned plant, paid vacations and holidays, group insurance and a good chance for advancement.
Housing immediately available in the beautiful suburban and country areas that surround the Bendix Radio plant.

Write, Wire or phone
MR. E. O. COLE, DEPT. K

Bendix Radio
DIVISION OF BENDIX AVIATION CORPORATION
BALTIMORE-4, MD. Phone: TOWSON 2200

TELEVISION • RADIO ELECTRONICS
Training in all branches of television, radio and electronics. FCC exam. preparation. Write for free catalog.
COMMERCIAL RADIO INSTITUTE
(Founded 1930, Apptd. by MD. Board of Education)
Dept. B, 38 West Biddle Street Baltimore 1, Maryland

Evans RADIO
Service to hams. "YOUR FRIENDLY SUPPLIER" by hams. Nationally accepted brands of parts, tubes and equipment. Trade-ins and time payments. Write W1BFH.
10 HILLS AVENUE • CONCORD, N. H.

Master Mobile
"THE FINEST" ANTENNAS and MOUNTS EVERY TYPE MOBILE CAR or TRUCK
PRECISION MANUFACTURED
POPULARLY PRICED
INSIST ON "MASTER"
AT LEADING JOBBERs

Master Mobile Mounts, Inc.
P.O. BOX 1817 • LOS ANGELES 36, CALIFORNIA
WAREHOUSE AND SHIPPING ADDRESS: 1306 BOND STREET

PIioneer CHASSIS PUNCHES

PIONEER TOOL CO.
LOS-ANGELES 16, CALIFORNIA
RAZOR SHARP SELECTIVITY
FOR FIXED-MOBILE OPERATION
with the New
GONSET
"Signal Slicer"

Only
$29.95

FEATURES
• 3.5 KC selectivity
• Built-in noise clipper
• Can be used with almost any auto* or fixed radio using 455 KC I.F.
(262 KC model available shortly)
• Broad-Sharp position switch
• Adaptable for any converter
• Easily installed
• Compact: only 6 1/2" wide x 5 1/2" high x 3" deep
* Except radios with signal seeking tuner

GONSET CO. 801 S. Main St. Burbank, Calif.

RADIO ENGINEER
Trans World Airlines
Radio Engineer having commercial or government radio transmitting and receiving station experience for ground radio field maintenance, trouble-shooting, shop and laboratory procedures.

TRANS WORLD AIRLINES Employment Manager Kansas City 5, Mo.

We Carry a Complete Line of Amateur Equipment Including:

National • Hallicrafters • E. F. Johnson Co. • Bud- Barker & Williamson, etc.

VARIETY ELECTRIC CO., INC. 468-470 Broad Street Newark, 2, New Jersey

Fourth high 'phone score from outside W/VE, 98,869 points, came from Enrique Lobo y Lobo, XE2W, whose transmitter ran only 120 watts to 807ts.

Germany
DL4OV .................. 5970 12- 135-B-20
DL4UL .................. 7620 12- 47-C-2
DL4LW .................. 1122 11- 24-B-12

Iceland
TE6FP .................. 636 12- 64-A-

Hawaii
IB4DY .................. 15,776 17-311-B-

Netherlands
PB6RGR ................ 162 6- 9-A-15

Portugal
CT4QO .................. 10,010 10-151-B-20
CT5UO .................. 1701 15- 15-A-

Spain
EACCA .................. 7012 14-169-A-

Sweden
SME5W .................. 2246 15- 61-B-9
SMEPA .................. 630 16- 21-B-
SMTBV .................. 132 6- 11-A-

NORTH AMERICA

Alaska
KL2W .................. 5918 19- 51-B-12

Barbados
VSRSD .................. 157,999 61-384-B-72
VSR6R .................. 57,723 41-408-A-

Costa Rica
T16TGR ................ 18,311 33-593-C-

Cuba
CO2SC .................. 2212 12- 77-A-8

Guantanamo Bay, Cuba
K3GAF .................. 15,148 16-351-C-16

Guatemala
TG3AD .................. 66,801 57-393-A-11

Greenland
OEX4X .................. 2370 15- 50-A-15

Mexico
K3XW .................. 25,560 59-538-A-21
EXQGQ (XEUQ) .......... 20,030 43-241-A-29

Puerto Rico
K4PDU .................. 21,141 25-212-A-60
K4PBD .................. 1906 5- 18-A-1

Virgin Islands
KVAO .................. 24,352 35-212-A-

OCEANIA

Australia
V6KFP .................. 5083 13-131-A-19

VK3LN ................. 6914 13-126-A-30
VK3LC .................. 1470 10- 50-A-6
VK3CE .................. 1320 11- 61-A-1
VK3FQ .................. 1132 11- 34-A-3
VK3AL ................. 970 10- 22-A-9
VK3HD ................. 441 7- 21-A-4
VK3JE .................. 9 1- 3-A-

VK3LH ................. 9 1- 3-A-

VK3LI ................. 9 1- 3-A-

K4AA .................. 500 12- 50-A-

New Zealand
ZL3HT .................. 11,976 24-202-A-19
ZL3AQ .................. 11,976 24-202-A-19

Niu Island
ZK3AA .................. 1332 16- 59-A-

SOUTH AMERICA

Argentina
L4UKE .................. 1500 15- 24-A-6
L4GAM .................. 315 15- 7-B-

Brazil
V8PK .................. 1708 22-135-C-13

V8KB .................. 2520 10- 54-A-8

V8YOL .................. 3528 12- 84-C-

V8YAI .................. 3104 11- 104-B-8

Chile
CE6B6 .................. 6 24-A-5

Colombia
HK1KD .................. 2300 17- 65-A-

HK1FE .................. 135 9- 10-A-

British Guiana
VP1HAG ................ 7756 14-184-A-

Peru
OA1IE .................. 519 7- 49-A-11

Uruguay
V4XMB .................. 103 7- 9-A-2

V4XBA .................. 100 5- 14-A-1

V4XBB .................. 50 4- 8-B-

1/WARA operator, 2/ WSJL operator, 3/ WISNDT operator.
* Operating 27 or 28 Mc. or both.
CASCODE PRE-AMPLIFIER
for 2 meter receivers*
the New
GONSET
"Gainer"

Only
$19.95

FEATURES
• 10 db gain over entire 2 meter band
• Noise figure 5 db
• Coax input and output
• Uses low noise 6BG7 cascade tube
• Power easily furnished by receiver
• Only 3” wide x 3 1/2” high x 3 1/2” deep

Available for spot commercial frequencies
on special order
GONSET CO. 801 S. Main St. Burbank, Calif.

WANTED
1000 HAMS
To the first thousand hams who write
and request it we will send G.E. Ham
News for 1 Year.

You just can't beat G.E. Power tubes
for long life and dependable service. All
types and sizes in stock for immediate
delivery.

ADIRONDACK
RADIO SUPPLY
32 Guy Park Avenue, Amsterdam, N. Y.
Tel. 73 — P.O. Box 88

AMAZING NEW TRAINING PLAN
PUT YOUR RADIO KNOW-HOW TO WORK IN
TELEVISION
1 TRAIN YOU AT HOME WITHIN MONTHS!

EXTRA FEATURES THAT MEAN MORE
MONEY FOR YOU!
Thousands of new job opportunities will be
available for you right in your own state, with
the lifting of government restrictions on new
TV stations. We are offering our successful method
that will prepare you now to take your place in
America's booming TELEVISION and electronics
domains. The complete course in TV can be
completed in one year; the first year being spent
as a full-fledged TV Technician — where you
can write your own ticket and choose from
dozens of fascinating careers — I don't stop
there! I continue to train you — AT NO
EXTRA COST — to qualify for even better pay
in the new field of demand. You'll receive
FCC licenses with my ...

FREE FCC COACHING COURSE
PREPARE YOU AT HOME FOR YOUR
FCC LICENSE
FREE JOBS IN TV AND RADIO
Required for an FCC License
Earn EXTRA MONEY IN SPARE TIME
Make as much as $25.00 a week in your spare
time while earning a rewarding Radio-TV
income. Many of my students pay for their en-
tire training from spare time earnings almost
from the very beginning...

MAIL COUPON TODAY
NO SALESMAN WILL CALL

ADVANCED FM-TV TRAINING
For Men Who Know Radio
Prepares You in a Few Months
COMPLETE theory and practical work
in advanced FM and TV, including
large- and small-signal receiver.
FCC License Coaching Course Included FREE.

VETERANS!
If eligible under new G.I. Bill
(discharged after June 27, 1920) — CHECK COUPON
BELOW!

137
POPULAR NATIONAL DIALS

For years, National dials have been the popular choice of amateurs, experimenters and commercial users because of their smooth, velvety action, easily-read scales, and quality construction.

Many dials, like the N and ACN dials shown, can be specially calibrated or supplied with blank scales for commercial application. Write for drawings and prices.

How's DX?

(Continued from page 67)

Bill's XYL sports the tag KH6AQZ and she sends her talents to the Honolulu end of QSL. When W4AF suggests that KH6CB be IALY (21L), W4BAT and W4RD found W4FV1 calls attention to the fact that KH6OF and W4FV1/KX6 were manned by AAC and ATC personnel and he found it impossible to take along the logs or make transcribed copies of same when he left the state. Bill suggests QSL-troubled parties drop a line to a currently active KX6 in the event that whereabouts of said logs may still be ascertainable. He emphasizes that he maintains a strict 100-watt QSL policy while lounging in the Marbells —— VR2AS got back on the air with the W6OKK contact after repairing extensive station damage wreaked by an itinerant typhoon. W6OKK says W5 should appreciate a source of steady juice.—SJLAHA's power company customarily knocks off for maintenance at odd hours of the day or night.

Europe — G8KP came up with the highest non-OZ score in May's Danish Jubilee Contest sponsored by BDR, OZ7BG took home-country honors. OH2ZV, OH4HI, SMIDW, PA8DVY and P90DW gave G8KP his stiffest competition. —— LZ1DP's letter to W2APU contains data on Bulgarian amateur radio. There are three classes of license: Class C (10 watts, U.E. e.w.); Class B (50 watts, all-band e.w.); and Class A (250 watts, all-band c.w. and 'phone) — but very few licences. There are no Class A yet because the first exams for the classification are set for this month. LZ1DP will take the test for his...

...Time to set your sights for the Sixth All-European DX Contest to be held in early December — details next month. —— W1APA had a 4G7Q delivered personally to K8QA. Q8's neighbor, father of W4 QAQ and W4QV, visited Paris and took the bottle along. —— WA8 AM and WA1AP report the most gracious hospitality extended by hosts of eight European countries visited.

...Sorry we can't accept U.S.R. SWL cards, still looking through, for DXCC credit. One received by W3AQI gives the date and time of his only U6G QSO. —— DL4AQ finds that LA1H, who has worked over 600 Ws on 10' phone, is on the engineering staff of widely heard Radio Luxembourg. —— LF2Z closed down in Norway and is back in Va. Charlie welcomes QSL queries to the "Where?" box for there should be few. He'll undoubtedly add a W4 call to these formerholds: W5QLM, W4FZQ, W4JHIS and W2APL.

South America —- This CE7Z business receives clarification by way of an RCC (Chile) letter to W4RWS. All Chilean stations in the Antarctic region were set up off Palmer Peninsula — at O'Higgins Base or Gonzalez Velasquez Base (65°13'S-57°56'W and 64°48'S-62°50'W, respectively). O'Higgins stations with licenses now effective are CE7ZS and CE7ZV; Gonzalez Velasquez, CE7ZJ, CE7ZV and CE7Z. QSL cards from all CE7Z stations via the Chile Club of Chile. —— W6BAY, W3LI and the rest of us regret to hear of CE7DZ's serious ill health. Alfredo's outstanding signal is an "old reliable" on DX bands — we all mail for an early recovery, OM. ———— Hereabouts — Even a daily gazette would have trouble keeping up with developments on St. Pierre. Everybody and his brother have been visiting the place and therefrom savvoring about the ham bands. W4AWR reports that curiosity got the better of one native there who procured his own call, FP8AP, to become the first year-round FP8 since FP8BX. As noted by WARRP, Gus runs 20 watts to an 807 on crystal frequencies 7032 and 14,094 kc. W6EAY found three different 650s here, having written to each of such ever on 20 one day. —— Charlie "C. W." Clemens, W4DZJ and ex-K5ZCW, will be remembered by traffic pushers of the old school as a crank op at WAR, W1LM, W4ZE and W3CXL. —— Don't give up on W7HJ and W3QLA — mail may just be a bit slow down there. W1APA's HH2LBD card came through after almost three years waiting. —— Shut-in W1KHW reports a bad break. Al's logs and QSLs were destroyed by fire over a thousand 10-meter DX QSLs went up in smoke.

Jeeves wonders if authorities on St. Pierre aren't somewhat suspicious of ordinary tourists who arrive strangely unencumbered with the usual radio paraphernalia.
The Radio Amateur's
LICENSE MANUAL

...now, complete with the
EXTRA-CLASS
typical questions and answers
plus — license data and com-
plete study guides for all
amateur exams — and still
50¢ postpaid

The American Radio Relay League — West Hartford, Connecticut

AN/APR-4 COMPONENTS WANTED
In any condition. Also top prices for: ARC-1, ARC-3, APR-1,
APR-5A, etc.; TS-24 and other "TS," and standard Lab Test equip-
ment, especially for the MICROWAVE REGION; ART-13, BC-345,
BC-221, LAF, LAF, LAC, and other quality surplus equipment;
also quantity Spares, tubes, plugs and cable.

ENGINEERING ASSOCIATES
434 Patterson Road
Dayton 9, Ohio

RADIO COURSES
- RADIO OPERATING
- CODE
- RADIO SERVICING
- FM TELEVISION
Preparation for Civilian, Maritime, Army and Navy
license requirements.
Personal Consulting Services for Veterans
Write for Catalog T.Q.

TRADE & TECH. SCHOOL
229 W. 66 St., N.Y. 23
Indicott 2-8117

EAZON
Z Match Antenna
Connector
A mechanical aid to good
electrical matching. The
type ZWA is dimensioned to
allow the coax and center of
the antenna to form a nat-
ural match when assembled. See the improvement over other
methods of assembly. Types 1W and 4W make ideal junctions
for stubs or harmonic traps. Made to fit RG/8U or 11/U.

Wi: 4 oz.
Type 3WA (see cut) Antenna Match $1.60 Net
Type 4W Cross connector ....... $1.60 Net
Type 3W Tee connector ....... $1.60 Net

DALLAS C. AKERS CO.
33 Greenwood Ave. • East Orange, N. J.

3-BAND MOBILE CONVERTERS
designed by RME

Two
the
MC-53
2-6-10/11
the
MC-H4
10-20-75, 80

Examine them
Hear them
See them
Write for literature

RME
RADIO MFG. ENGINEERS, INC.
Pearsie 6, Illinois, U.S.A.
**FREQUENCY & MODULATION MONITOR**

the JK FD-12

Monitors any four frequencies anywhere between 25 mc and 175 mc, checking both frequency deviation and amount of modulation. Keeps the "beam" on allocation, guarantees more solid coverage, too.

**CRYSTALS FOR THE CRITICAL**

The H-7 crystal is in common use with two-way police radio systems. Frequency range: 3 to 20 mc. Water and dust-proof, it is pressure mounted, has stainless steel electrodes. Just one of many JK crystals made to serve EVERY crystal need!

**Time-Saver to Prowl Cars, Life-Savers to Thousands!**

In a split second your police station and the farthest cruising prowl car can respond as one man! Such "safety at your doorstep" is possible only through compactly efficient two-way radio. JK crystals and monitors are in constant use to keep police radio frequencies reliably "on the beam."

THE JAMES KNIGHTS COMPANY
SANDWICH 6, ILLINOIS
NEW MOTOROLA 460 MC. WITH A.F.C.

20 FULL WATTS* of Mobile Transmitter Output at 460 Mc.

AUTOMATIC FREQUENCY CONTROL
Motorola’s new crystal controlled A.F.C. system provides positive barriers so that the receiver cannot jump to a strong adjacent channel signal.

This new Motorola A.F.C. technique is fortified with extraordinary system stability. The A.F.C. crystal controlled oscillator provides a full 10 to 1 correction ratio and keeps the receiver tuned on the nose to the distant transmitted carrier.

The new U. H. F. tuned circuits and research design cavities for ground grid amplifier operation provide phenomenal circuit stability, spurious rejection and extraordinary efficiency.

TRANSMITTER
The Motorola 460 Mc. system with 9 tuned circuits provides 18* to 20* Watts with Efficiencies of more than 65%.

SILVER PLATED SEALED TUNED CAVITIES
By use of silver plated line sections, high standards of selectivity protect the receiver from high power U.H.F. TV intermodulation.

Motorola
Communications & Electronics Division
4545 Augusta Blvd., Chicago 51, Illinois
Rogers Majestic Electronics Ltd., Toronto, Canada
great news
to hundreds who
want maximum
selectivity
at minimum cost!

NC-125

the only receiver
with the famed
select-o-ject
built in!

NOW AVAILABLE FOR
IMMEDIATE DELIVERY

Covers 550 kcs. — 36 mc's. in 4 bands.
Voice, CW, NFM (with adapter). Edge-
lighted, direct-reading scale. Amateur,
police, foreign, ship frequencies clearly
marked. National Select-O-Ject built-in
.rejects any selected audio frequency 45 db
— boosts 38 db). Three microvolt
sensitivity (for 10 db signal/noise ratio on
10-meter band), 5-meter, AVC, ANL, ant.
trimmer. Variable CW pitch control.
Separate R.F. and audio gain controls.
Volt. reg., stabilized oscillator. Jack for
phono or NFM Adapter. Audio essentially
flat to 10,000 c.p.s.

Now at last, you can get immediate delivery on
the receiver that gives you more selectivity per
dollar — the only receiver with the famed Select-
O-Ject circuit built in! And that's only one of the
many fine features that make the NC-125 tops
in receiver value!

NC-125................. $149.50*
NC-125TS (matching spkr.).... 11.00

*Slightly higher west of the Rockies.
These rugged, RCA-developed VHF beam power tubes have no equals for mobile or emergency rigs. Because of their high efficiency and high power gain, they require less drive and deliver more output at lower plate voltage, than any other similar types of comparable price range. Translate these advantages into practical results and they spell power economy, more watts per dollar, and compact transmitter design.

The RCA 5763 miniature beam power tube is ideal as the final in a low-power rig, as a frequency multiplier, and as the driver for an RCA-2E26 or 6146. As a final it will handle 17 watts input on cw and 15 watts on phone with a simple 300-volt power supply.

The RCA-2E26 beam power tube will handle a full 40 watts input on cw and 27 watts on phone ... and can be modulated with a 6N7 Class B operated. It also makes an excellent driver for the new RCA-6146.

The RCA-6146—the tube that's tailor-made for "2" —will take 64 watts on cw and 48 watts on phone at 150 Mc ... yet it's only a trifle larger than a 2E26!

Ask your RCA Tube Distributor for the full story on these VHF beam power tubes ... or write RCA, Commercial Engineering, Section JM48, Harrison, N. J.

TUBES FOR THE PROFESSIONAL
...PRICED FOR THE AMATEUR

The dependability of commercially proved RCA Tubes costs you no more. Buy genuine RCA Tubes and you buy the best. See your local RCA TUBE DISTRIBUTOR.