What do you want in a MICROPHONE?

Check the features and characteristics for which E-V microphones have become favorites in every field. Then take your choice, and know you can expect performance that is guaranteed by E-V research-engineering. Here are 9 models of today's most complete microphone line.

Electro-Voice INC.
407 CARROLL STREET • BUCHANAN, MICHIGAN

*Patent No. 2,300,010
Two GL-813’s... better-built, better-shielded... will help you log those elusive contacts overseas.

- PLenty of Power—beam power, meaning low drive! It’s a GL-813 characteristic, as amateurs know. The r-f wallop that’s so desirable for DX hunting will be found in the 800-w phone input (ICAS max) of two GL-813’s, or 1-kw CW input. Yet you need only 8 to 9 w drive either way!

The Best-Built 813... in those details that save you time, trouble, and circuitry! One example of G-E superiority is the large ground-plane barrier that shields the tube internally. It helps protect from feedback—does away, in most cases, with the need to neutralize. Precision-made grid structures, special factory testing at every stage: these and other plusses give you a power tube that will serve as your dependable partner around the clock.

Ask Your G-E Tube Distributor to show you a GL-813! Study the tube for its superior features and workmanship. A pair will be a gilt-edge investment for your DX work this fall and winter. Tube Department, General Electric Company, Schenectady 5, New York.

Next Month:
Terms of the 1953 Edison Award!

- Tribute again will be paid to all radio amateurs by General Electric’s Edison Award for 1953. Terms of the Award will appear on this page in the September issue. The winner, in addition to a handsome trophy and a valuable gift, will receive national recognition for performing outstanding public service.

You can help to honor amateurs everywhere by proposing a suitable candidate for the Edison Award. Get ready to make your choice, in order to prepare and mail your nominating letter!
Designed And Constructed For Maximum Usefulness To The Amateur . . . The Mallory Midgetrol*

There is no question but what the physical size of a volume control, as well as the length, diameter and contour of its shaft, determine to a great extent its usefulness to the amateur for building new radio equipment or repairing old.

Mallory engineers very definitely recognized the importance of these factors when they designed the Mallory Midgetrol series 1/8" diameter carbon controls, for these controls were designed specifically for maximum usefulness to the amateur (and for that matter, to the industrial or professional radio service user as well).

Practical imagination plus good old-fashioned engineering ingenuity went into the Midgetrol to give you a versatile control whose physical size (1/8" in diameter) is small enough to fit the most miniature portable equipment, yet whose electrical characteristics make it entirely suitable for the largest communications set.

Far-sighted engineering has also given you a sensible, permanently fixed, plain round brass shaft, which may be altered quickly and effectively to accommodate standard "split-knurl" or "flatted" type knobs without sacrificing the highly desirable advantage of a stable, permanently fixed shaft. (Every round shaft Midgetrol is delivered complete with two unique steel "shaft-ends" which may be pressed permanently into the brass control shaft to accept common knob styles. No filing or unusual handling of the control shaft is required.)

In addition, the unique Midgetrol design has virtually licked the old and annoying problem of unsatisfactory AC switch installation, for an ingenious arrangement for locking the switch permanently and solidly into place has eliminated forever the annoyance of having to remove the control housing to attach the switch. Actually, a switch can be attached to a Midgetrol in much less time than it takes to tell about it.

When you go to see the Midgetrol at your Mallory Distributor's, don't expect a flashy, spectacular volume control, for the Midgetrol was not designed to be that kind of control. Instead, you're going to see a sensible control, designed to do the things a good volume control should do, and yet be as universal as possible without sacrificing a thing in good engineering fundamentals.

Frankly, we're extremely enthusiastic about the possibilities this round shaft Midgetrol has for amateur work, and we think you will be too, when you see it.

*Midgetrol—Trade Mark

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

TECHNICAL—

Low-Noise R.F. Amplifiers for 144 and 420 Mc.  
Edward P. Tilton, W1HDQ 13

Negative Feed-back Modulation  
Richard Clay, W9JRO/4 17

Eighty Watts on Six Bands......Donald H. Mix, WITS 20

An F.S.K. System for the Amateur Teletype Station  
F. A. Bartlett, W6OWP 23

Is Your Rig R.F.-Tight?...Otmar P. Schreiber, W2UH 29

Magnetostriction Devices and Mechanical Filters for  
Radio Frequencies — Part III  
Walter Van B. Roberts, W2CHO 32

The "Plain Ground-Plane" Antenna  
S. E. McCallum, W2ZBY 36

Adding a Bandspread Range to the BC-221 Frequency Meter  
Beverly Dudley 38

The Multiband Antenna Coupler  
George L. Thompson, W2JIT 40

Quick-and-Easy Chassis...S. Milton Thomsen, W2CGN 44

NOVICE—

A Four-Band Miniature 'Phone-C.W. Rig  
W. W. Deane, W6RET 26

OPERATING—

Results — Armed Forces Day Activities 45

June V.H.F. Party Results 60

GENERAL—

A Seafaring Kilowatt 31

"It Seems to Us ...." 11

Our Cover 12

In QST 28 Years Ago 25

YL News and Views 43

On the Air with Single Sideband 46

Happenings of the Month 48

Coming ARRL Conventions 49

Hamlet Calendar 49

Quiet Quiz 49

INDEXED BY  
INDUSTRIAL ARTS INDEX
Check the specs...  
Check the performance...  

AND YOU'LL CHOOSE

Do you know any better way, any other way, to judge SW equipment than to check the specifications and the performance? Frankly that's the only valid way we can think of to make sure you get your money's worth. Check these specs. Take a look at the selectivity curve for the S-76. It is typical of the outstanding value Hallicrafters offers in every price class.

**Model S-76**

Double conversion receiver. Broadcast Band 538-1580 kc plus three short-wave bands covering 1720 kc-34 Mc.

Calibrated electrical bandspread for easy tuning. Double superhet with 50 kc second i-f and giant 4-inch "S" meter. Five position selectivity, one r-f, two conversion, two i-f stages, temperature compensated. 3.2 or 500 ohm outputs.

Satin black steel cabinet. 18½” x 8½” x 9½” deep. Nine tubes, plus voltage regulator and rectifier.

For 105/125V. 50/60 cycle AC $179.50  
Use R-46 speaker . . . .  "$179.50
**Model SX-71.** Covers Broadcast Band 535-1650 kc plus four short-wave bands covering 1650 kc-34 Mc and 46-56 Mc.

Built-in Narrow Band FM one r-f, two conversion, and three i-f stages. Temperature compensated, voltage regulated. Three watt output (terminals for 500 and 3.2 ohms).

Satin black steel cabinet. 18 1/2" x 8 7/8" x 12" deep. Eleven tubes plus regulator, rectifier.

For 105/125 V. 50/60 cycle AC... **$224.50**

**Model HT-20.** T.V.I. suppressed 100 watt AM-CW transmitter with all spurious outputs above 40 Mc at least 90 db. below full rated output.

All stages metered; single meter with eight position meter switch; output tuning indication. Frequency range of 1.7 Mc to 31 Mc continuous on front panel control. Seven tubes plus five rectifiers.

For 105/125 V. 50/60 cycle AC... **$449.50**

**Models S-40B, S-77A.** Covers Broadcast Band 540-1680 kc plus three short-wave bands covering 1680 kc-44 Mc.

Electrical bandspread for easy tuning. One r-f, two i-f stages to draw in stations. Switches for automatic noise limiter, code reception and three-position tone control. CW pitch control and built-in speaker. Seven tubes plus rectifier.

S-40B For 105/125 V. 50/60 cycle AC **$119.95**

S-77A Same, for 105/125 V. AC/DC

32 lbs. **$119.95**

**Model R-46.** Marching 10" PM speaker for use with Hallicrafters communications receivers SX-71, SX-76, SX-73 or SX-62. 80 to 5000 cycle range. Matching transformer with 500-ohm input. Speaker voice coil impedance, 3.2 ohms.

Satin black steel cabinet matches all Hallicrafters receivers. Cloth covered metal grille. 15" x 10 7/8" x 10 7/8" deep. Shipping weight 17 lbs. **$19.95**
<table>
<thead>
<tr>
<th>State/Region</th>
<th>Call Sign</th>
<th>Name</th>
<th>Address</th>
<th>City, State</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ATLANTIC DIVISION</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eastern Pennsylvania</td>
<td>W1HIP</td>
<td>W. H. Wiland</td>
<td>1105 Rambler Ave</td>
<td>Pottstown, PA</td>
<td></td>
</tr>
<tr>
<td>Maryland-Delaware-D.C.</td>
<td>W1FK</td>
<td>Arthur W. Wood</td>
<td>1004 Normandy Road</td>
<td>Rehoboth Beach, DE</td>
<td></td>
</tr>
<tr>
<td>Southern New Jersey</td>
<td>W2HG</td>
<td>Herbert C. Brooks</td>
<td>801 Lincoln Ave</td>
<td>Rahway, NJ</td>
<td></td>
</tr>
<tr>
<td>Western New York</td>
<td>W2TV</td>
<td>Edward Graf</td>
<td>81 King St</td>
<td>Buffalo, NY</td>
<td></td>
</tr>
<tr>
<td>Western Pennsylvania</td>
<td>W3RD</td>
<td>R. M. Heck</td>
<td>RD 1</td>
<td>Pittsburgh, PA</td>
<td></td>
</tr>
<tr>
<td><strong>CENTRAL DIVISION</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Illinois</td>
<td>W9KQL</td>
<td>H. E. Lund</td>
<td>553 S. 8th St</td>
<td>Springfield, IL</td>
<td></td>
</tr>
<tr>
<td>Indiana</td>
<td>W9QGA</td>
<td>Clifford C. McGuire</td>
<td>1321 South Goverm St</td>
<td>Evansville 13, IN</td>
<td></td>
</tr>
<tr>
<td>Wisconsin</td>
<td>W9QCM</td>
<td>Reno W. Goyach</td>
<td>929 S. 7th Ave</td>
<td>Green Bay, WI</td>
<td></td>
</tr>
<tr>
<td><strong>DAKOTA DIVISION</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>North Dakota</td>
<td>W8VP</td>
<td>Everett E. Hill</td>
<td>1527 Fifth Ave, SO</td>
<td>Fargo, ND</td>
<td></td>
</tr>
<tr>
<td>South Dakota</td>
<td>W8RN</td>
<td>J. W. Sikora</td>
<td>1600 South Metric Ave</td>
<td>Sioux Falls, SD</td>
<td></td>
</tr>
<tr>
<td>Minnesota</td>
<td>W8MXC</td>
<td>Charles M. Bove</td>
<td>1611 E. Lake St</td>
<td>Saint Paul, MN</td>
<td></td>
</tr>
<tr>
<td><strong>GREAT LAKES DIVISION</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Michigan</td>
<td>W4TJT</td>
<td>Ivan C. Kelly</td>
<td>415 E. Mt. Vernon St</td>
<td>Somerset, MI</td>
<td></td>
</tr>
<tr>
<td>Ohio</td>
<td>W4KCC</td>
<td>Donald T. Allston</td>
<td>RDF 1, Box 2972</td>
<td>Cleveland 16, OH</td>
<td></td>
</tr>
<tr>
<td><strong>HUDSON DIVISION</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Western New York</td>
<td>W2LL</td>
<td>Stephen J. Neason</td>
<td>794 River St</td>
<td>Troy, NY</td>
<td></td>
</tr>
<tr>
<td>New York</td>
<td>W2OHU</td>
<td>George V. Cooke</td>
<td>88-0 299th St</td>
<td>Rockleigh, NJ</td>
<td></td>
</tr>
<tr>
<td>New Jersey</td>
<td>W2FQX</td>
<td>Lloyd E. Grumman</td>
<td>410 S 5th Ave</td>
<td>Jersey City, NJ</td>
<td></td>
</tr>
<tr>
<td><strong>MIDWEST DIVISION</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Iowa</td>
<td>WNW</td>
<td>William C. Davis</td>
<td>624 Roosevelt</td>
<td>Mitchell, IA</td>
<td></td>
</tr>
<tr>
<td>Kansas</td>
<td>WACV</td>
<td>Pearl N. Johnston</td>
<td>404 South Jefferson Ave</td>
<td>Topeka, KS</td>
<td></td>
</tr>
<tr>
<td>Missouri</td>
<td>WACBH</td>
<td>Clarence A. Arndt</td>
<td>209 W. 8th St</td>
<td>Joplin, MO</td>
<td></td>
</tr>
<tr>
<td>Nebraska</td>
<td>WACBH</td>
<td>Floyd B. Campbell</td>
<td>291 3rd St</td>
<td>Fremont, NE</td>
<td></td>
</tr>
<tr>
<td><strong>NEW ENGLAND DIVISION</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Connecticut</td>
<td>W1HVF</td>
<td>Roger C. Amundson</td>
<td>RDF 4</td>
<td>Ridgefield, CT</td>
<td></td>
</tr>
<tr>
<td>Maine</td>
<td>W1AP</td>
<td>Bernard Janison</td>
<td>73 Middle St</td>
<td>Wiscasset, ME</td>
<td></td>
</tr>
<tr>
<td>Massachusetts</td>
<td>W1AJL</td>
<td>Frank L. Baker, Jr.</td>
<td>91 Atlantic St</td>
<td>Newton, MA</td>
<td></td>
</tr>
<tr>
<td>Massachusetts</td>
<td>W1YH</td>
<td>Roger E. Carey</td>
<td>67 West Alan Ridge Road</td>
<td>Springfield, MA</td>
<td></td>
</tr>
<tr>
<td>New Hampshire</td>
<td>W1AG</td>
<td>Carroll A. Bell</td>
<td>1426 Belmont Ave</td>
<td>Manchester, NH</td>
<td></td>
</tr>
<tr>
<td>Rhode Island</td>
<td>W1BH</td>
<td>Merrill D. Randall</td>
<td>22 Annandale Road</td>
<td>Newport, RI</td>
<td></td>
</tr>
<tr>
<td>Vermont</td>
<td>W1PPS</td>
<td>Raymond N. Friend</td>
<td>7 Marbroo Ave</td>
<td>Brattleboro, VT</td>
<td></td>
</tr>
<tr>
<td><strong>ROANOKE DIVISION</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alabama</td>
<td>W4HLX</td>
<td>J. C. Geeslin</td>
<td>1514 Logan Ave</td>
<td>Charlotte, NC</td>
<td></td>
</tr>
<tr>
<td>Arizona</td>
<td>W4ANX</td>
<td>J. Hunter Wood</td>
<td>1702 North Rohn Ave</td>
<td>North Charleston, SC</td>
<td></td>
</tr>
<tr>
<td>California</td>
<td>W4IGN</td>
<td>H. R. Linder</td>
<td>Route 1, Box 348</td>
<td>Atmosphere, CA</td>
<td></td>
</tr>
<tr>
<td>Colorado</td>
<td>W4DXX</td>
<td>Karl Bruggeman</td>
<td>1945 Kearny St</td>
<td>Denver, CO</td>
<td></td>
</tr>
<tr>
<td>Utah</td>
<td>W4DFT</td>
<td>Floyd J. Estin</td>
<td>168 E 4th, North</td>
<td>Laramie, WY</td>
<td></td>
</tr>
<tr>
<td>Wyoming*</td>
<td>W7KFEV</td>
<td>Marion R. Neary</td>
<td>Box 215</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>SOUTHWESTERN DIVISION</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>New Mexico</td>
<td>KZ5NM</td>
<td>Nelson W. Magner</td>
<td>Box 173</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arizona</td>
<td>W6VJ</td>
<td>Howard C. Rollman</td>
<td>971 Mayo St</td>
<td>Los Angeles 42, CA</td>
<td></td>
</tr>
<tr>
<td>California</td>
<td>W6VR</td>
<td>Alpert Ebrach</td>
<td>15314 Price Ave</td>
<td>Escondido, CA</td>
<td></td>
</tr>
<tr>
<td>San Diego</td>
<td>W6KH</td>
<td>Edgar M. Cameron, Jr.</td>
<td>1505 So. Escondido Blvd</td>
<td>Santa Barbara, CA</td>
<td></td>
</tr>
<tr>
<td></td>
<td>W6ON</td>
<td>Vincent J. Hanger</td>
<td>1017 Indio Muerto St</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>WESTERN DIVISION</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oregon</td>
<td>W4PS</td>
<td>William J. Gentry</td>
<td>1504 Avenue O</td>
<td>Lubbock, TX</td>
<td></td>
</tr>
<tr>
<td>Washington</td>
<td>W4GW</td>
<td>Jesse M. Langford</td>
<td>2055 W, Umatilla St</td>
<td>Klamath Falls, OR</td>
<td></td>
</tr>
<tr>
<td></td>
<td>W5EJ</td>
<td>Tr. Charles Pergiguel</td>
<td>616 Medi-Cal Arts Blgd</td>
<td>Houston 2, TX</td>
<td></td>
</tr>
<tr>
<td></td>
<td>W5IP</td>
<td>G. Merren Sayre</td>
<td>Box 825</td>
<td>New Mexico Military Institute, Roswell</td>
<td></td>
</tr>
<tr>
<td><strong>CANADIAN DIVISION</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maritime</td>
<td>VE1DQ</td>
<td>A. M. Crowell</td>
<td>69 Dubli St.</td>
<td>Halifax, N.S.</td>
<td></td>
</tr>
<tr>
<td>Ontario</td>
<td>VE1A</td>
<td>G. D. Farnum</td>
<td>16 Emerald Crescent</td>
<td>Burlington, Ont.</td>
<td></td>
</tr>
<tr>
<td>Quebec</td>
<td>VE1G</td>
<td>Sweeney J. Jones</td>
<td>580, 3rd Ave</td>
<td>Ste. Genevieve de</td>
<td></td>
</tr>
<tr>
<td>Alberta</td>
<td>VE6AT</td>
<td>Peter McIntyre</td>
<td>10706-57th Ave,</td>
<td>Pierrefonds, P. Q.</td>
<td></td>
</tr>
<tr>
<td>British Columbia</td>
<td>VE6T</td>
<td>Leonard E. Cuff</td>
<td>268 Rutland St</td>
<td>Edmonton, Alberta</td>
<td></td>
</tr>
<tr>
<td>Yukon</td>
<td>VE6L</td>
<td>Harold R. Horn</td>
<td>1044 King St</td>
<td>Vancouver, B. C.</td>
<td></td>
</tr>
<tr>
<td>Manitoba</td>
<td>VE6R</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Saskatchewan</td>
<td>VE6R</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Officially appointed to act temporarily in the absence of a regular official.*
AIRCRAFT-MARINE
BROADCAST-POLICE
FIXED SERVICES
AMATEUR-DIATHERMY
FREQUENCY STANDARD
MOBILE-INDUSTRIAL

PETERSEN RADIO COMPANY, INC.
2800 W. BROADWAY • COUNCIL BLUFFS, IOWA

EXPORT SALES ONLY: Royal National Company, Inc., 75 West Street, New York 6, N. Y., U. S. A.
70E-8A Permeability Tuned Oscillator — The versatility, accuracy, stability and voltage coefficient that distinguish a good v.f.o. are standard in the 70E-8A. Every component is highest quality — meets strict specifications. 16 turns of the vernier dial cover the linear range of 1600 kc to 2000 kc. Use in exciter or measuring instruments for truly professional performance. You can depend on it to give you long service free from trouble.

32V-3 VFO Transmitter — A bandswitching, gang-tuned amateur transmitter. Rated at 150 watts input on CW, 120 watts phone, this little receiver-size rig has the kick of a kangaroo, and its excellent audio provides extraordinarily good readability. The 32V-3 covers the 80, 40, 20, 15, 11 and 10 meter ham bands. It is thoroughly filtered and shielded to minimize the possibility of TVI.

KW-1 Transmitter — Engineered for maximum power allowed by your license. Its input is a full 1000 watts on phone or CW. The entire transmitter, including power supply, is in one attractive cabinet. Complete bandswitching of the exciter, driver and power amplifier by a single control on the front panel. It covers all bands from 10 through 160. TVI reduction is accomplished by well engineered shielding and filtering. It’s as easy to handle as a 32V-3.

AUTHORIZED COLLINS DISTRIBUTORS

ALABAMA
BIRMINGHAM
Ack Radio Supply Co. 2205 Third Ave., N.

ARIZONA
PHOENIX
Radio Parts of Arizona 214 S. 11th St.
TUCSON
Elliott Electronics, Inc. Box 5081 418 N. Fourth Ave.

ARKANSAS
LITTLE ROCK
Carlton Wholesale Radio

ARKANSAS-TXAS
TEXARKANA
Lavender Radio Supply Co., Inc. 520 E. Fourth St. P. O. Box 596

CALIFORNIA
BURBANK
Valley Electronic Supply 1502 W. Magnolia Blvd. Long Beach
Scout Radio Supply 266 Alamitos Ave. Los Angeles
Radio Products Sales Co., Inc. 1501 S. Hill St.

CONNECTICUT
NEW HAVEN
Dale Electronic Dist. 150 James St.

DELWARE
WILMINGTON
Radio Electric Service Co. of Pa., Inc. S.E. Corner Third & Tunnall Sts. Wilmington Electrical Spec. Co., Inc. 45 Delaware Ave.

DISTRICT OF COLUMBIA
WASHINGTON
Electronic Wholesalers, Inc. 2345 Sherman Ave., N.W.

FLORIDA
JACKSONVILLE
Kinkade Radio Supply 402 Laura St.

MIAMI
Electro-Medical Supply Co. 161 N.E. 9th St.
Waldman Radio & Appliance Co. 1800 N.E. 2nd Ave.

Tampa
Kinkade Radio Supply 1707 Grand Central

GEORGIA
ATLANTA
Specialty Distributing Co. 425 Peachtree St., N.E.

AUGUSTA
Specialty Distributing Co. 644 Reynolds St.

SAVANNAH
Specialty Dist. Co. 411 E. Broughton St.

ILLINOIS
CHICAGO
Allied Radio Corp. 833 W. Jackson Blvd. Newark Electric Co. 225 W. Madison St.

Ft. Wayne
Ft. Wayne Electronics Supply, Inc. 233 E. Main St.

INDIANAPOLIS
Graham Electronic Supply, Inc. 102 S. Pennsylvania St.

KANSAS
TOPEKA
The Oveton Electric Co., Inc. 522 Jackson St.

KENTUCKY
LEXINGTON
Radio Equipment Co. 480 Skain Ave.

LOUISVILLE
Universal Radio Supply Co., Inc. 533 S. Seventh St.

LOUISIANA
NEW ORLEANS
Radio Parts, Inc. 807 Howard Ave.

MARYLAND
BALTIMORE
Kan-Ellert Electronics, Inc. 9 South Howard St.

MASSACHUSETTS
BOSTON
DeMambro Radio Supply, Inc. 1111 Commonwealth Ave.

MICHIGAN
DETROIT
M. N. Duffy & Co. 2640 Grand River Ave., W.

MISSOURI
BUTLER
Henry Radio Co. 211 North Main

KANSAS CITY
Radiojab 1612 Grand Ave.

St. Louis
Walter Ash Radio Co. 1129 Pine St.

MINNESOTA
DULUTH
Lew Bonn Co. 228 E. Superior St.

Northwest Radio 125 E. First St.

MINNEAPOLIS
Lew Bonn Co. 1211 La Salle Ave.

St. Paul
Lew Bonn Co. 141-47 W. Seventh St.

CAMPBELL
Radio Electric Service Co. of Pa., Inc. 452 N. Albany Ave.

CAMPBELL
Radio Electric Supply Co. of Pa., Inc. 513-15 Cooper St.

NEW HAMPSHIRE
CONCORD
Evans Radio 10 Hills Ave.

NEW JERSEY
ATLANTIC CITY
Radio Electric Service Co. of Pa., Inc. 452 N. Albany Ave.

CAMPBELL
Radio Electric Service Co. of Pa., Inc. 513-15 Cooper St.
of Amateur Radio Equipment

75A-3 Receiver — Makes use of the new Collins mechanical filter which represents an entirely new approach to the attainment of selectivity. The 75A-3 is a double conversion superhetodyne for top performance on the 160, 80, 40, 20, 15, 11 and 10 meter bands. Only the band in use is shown on the slide rule dial. The bandspread dial is accurately calibrated directly in kilocycles. Vernier zero set control on front panel.

35C-2 Low-Pass Filter — Designed to reduce harmonic radiation. Can be used with any 52-ohm output transmitter though especially built for use with the Collins 32V-3. 35C-2 has coaxial fittings to make installation easy. Provides about 75 db attenuation at television frequencies with an insertion loss of only .18 db. The filter’s three sections are individually shielded and the use of low-loss capacitors insures excellent performance under all conditions.

AUTHORIZED COLLINS DISTRIBUTORS

NEW MEXICO
ALBUQUERQUE
L. B. Walker Radio Co.
114 W. Granite Ave.

NEW YORK
ALBANY
Pl. Orange Radio Distributing Co., Inc.
642-644 Broadway

AMSTERDAM
Adirondack Radio Supply
P. O. Box 88
32 Guy Park Ave.

JAMAICA
Harrison Radio Corp.
171-51 Hillside Ave.

NEW YORK
Harrison Radio Corp.
225 Greenwich St.
Harvey Radio Co., Inc.
105 W. 43rd St.

NORTH CAROLINA
GREENSBORO
Johannes Electric Co., Inc.
312-14 N. Eugene St.

OHIO
CINCINNATI
Steinberg’s Inc.
631 Walnut St.

CLEVELAND
Radio & Electronic Parts Co.
1235 Prospect Ave.

COLUMBUS
Universal Service
114 N. 3rd St.

DAYTON
SREPCO, Inc.
814 East Loa St.

SPRINGFIELD
SREPCO, Inc.
119 W. Main St.

TOLEDO
Electronic Supplies, Inc.
1013 Jefferson Ave.

OKLAHOMA
TULSA
Radio, Inc.
1000 S. Main St.

OREGON
EUGENE
United Radio Supply Co.
179 W. Eighth St.

PORTLAND
Pacific Stationery
Wholesale Radio Dept.
414 S.W. Second Ave.
United Radio Supply Co.
22 N.W. Ninth Ave.

PENNSYLVANIA
ALLENTOWN
Radio Electric Service Co.
of Pa., Inc.
1042 Hamilton St.

FARIX
Radio Electric Service Co.
of Pa., Inc.
916 Northampton St.

JOHNSTOWN
Cambria Equipment Co.
17 John St.

PHILADELPHIA
Radio Electric Service Co.
of Pa., Inc.
3412 Germantown Ave.
Radio Electric Service Co.
of Pa., Inc.
5930 Market St.
Radio Electric Service Co.
of Pa., Inc.
N.W. Corner 7th & Arch Sts.

PITTSBURGH
Camerado Co.
1211 Penn Ave.
The Tydings Co.
5800 Baum Blvd.

RHODE ISLAND
PROVIDENCE
W. H. Edwards Co.
94 Broadway

SOUTH DAKOTA
ABERDEEN
Burkhardt Radio Supply
P. O. Box 342

WATERTOWN
Burkhardt Radio Supply
P. O. Box 41

TENNESSEE
CHATTANOOGA
Currie Radio Supply
419 Broad St.
Specialty Distributing Co.
709 Chestnut St.

JACKSON
L. K. Rush Co.
P. O. Box 1418

MEMPHIS
Lavender Radio Supply
Co., Inc.
1014-16 Union Ave.

W & W Distributing Co.
639 Madison Ave.

TEXAS
AUSTIN
The Harris Co.
706 W. 6th St.

CORPUS CHRISTI
Electronic Equipment &
Engineering Co.
805 S. Staples St.

DALLAS
Crabtree’s Wholesale
Radio
2608 Ross Ave.

EL PASO
C. C. McNichols
811 Estrella

HOUSTON
Busacker Electronic
Equip. Co.
1721 Waugh Drive

SAN ANTONIO
Amateur Headquarters
& Supply
P. O. Box 5086

Beacon Hill Station
TYLER
Lavender Radio Supply
Co., Inc.
501 E. Oakwood

UTAH
Ogden
Iverson Radio Co.
265 — 25th St.

VIRGINIA
NORFOLK
Radio Equipment Co.
821 W. 21st St.

WASHINGTON
EVERETT
Pringle Radio Wholesale Co.
2514 Colby Ave.

SEATTLE
Western Electronic
Supply Co.
741 Dexter

SPOKANE
Northwest Electronic Co.
N. 102 Monroe St.

TACOMA
C & G Radio Supply Co.
2502-E Jefferson Ave.

WISCONSIN
MADISON
Satterfield Radio Supply,
Inc.
326 W. Gorham St.

MILWAUKEE
Central Radio Parts Co.
1725 W. Fond du Lac

For the best in amateur radio, it’s . . .

COLLINS RADIO COMPANY, Cedar Rapids, Iowa
11 W. 42nd St., NEW YORK 36
1930 Hi-Line Drive, DALLAS 2
2700 W. Olive Ave., BURBANK
THE AMERICAN RADIO RELAY LEAGUE, INC.,

is a noncommercial association of radio amateurs, bonded for the promotion of interest in amateur radio communication and experimentation, for the relaying of messages by radio, for the advancement of the radio art and of the public welfare, for the representation of the radio amateur in legislative matters, and for the maintenance of fraternalism and a high standard of conduct.

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

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

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

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

Past Presidents
HIRAM PERCY MAXIM, W1AW, 1914-1936
EUGENE C. WOODRUFF, W8CM, 1936-1940
GEORGE W. BAILEY, W2KH, 1940-1952

Officers
President .......... GOODWIN L. DOSLAND, W9TSN
                 Moorhead, Minn.
First Vice-President .... WAYLAND M. GROVES, W5NW
                 P.O. Box 586, Odessa, Texas
Vice-President ........ FRANCIS E. HANDY, W1BDI
38 La Salle Road, West Hartford, Connecticut
Secretary ................. A. L. BUDLONG, W1BUD
38 La Salle Road, West Hartford, Connecticut
Treasurer ............... DAVID H. HOUGHTON
38 La Salle Road, West Hartford, Connecticut

General Counsel ........ PAUL M. SEGAL
816 Connecticut Ave., Washington 6, D.C.

Technical Director ........ GEORGE GRAMMER, W1DF
38 La Salle Road, West Hartford, Connecticut

Technical Consultant .......... PHILIP S. RAND, W1DBM
Route 5B, Redding Ridge, Conn.

Assistant Secretaries:
JOHN HUNTOON, W1LVQ
JOHN E. CANN, W1RWS
38 La Salle Road, West Hartford, Connecticut

DIRECTORS
Canada
ALEX Reid, VE2BR
240 Logan Ave., St. Lambert, P. Q.
Vice-Director: William W. Butel, W1VQ

Atlantic Division
ALFRED C. BECK, W3OEG
516 Cedar Ave., Sharon, Pa.
Vice-Director: Charles C. Hubbell, W3LYF
725 Garden Road, Glenville, Pa.

Central Division
WESLEY E. MARRINER, W9AND
441 Galena Ave., Dixon 7, Ill.
Vice-Director: Harry M. Matthews, W9UQT
Box 1165, Springfield, Ill.

Dakota Division
ALFRED M. GOWAN, W7QPHR
725 Medio Ave., Sioux Falls, S. D.
Vice-Director: JAMES W. WATKINS, W4FLS
220 N. Howell Ave., Chattanooga, Tenn.
Vice-Director: George S. Adron, W5BMM
Main Dealing, L a.

Great Lakes Division
JOHN H. HRAHN, W8STP
Vice-Director: Harold F. Stricker, W8WZ
237 W. 56th St., Marysville, Ohio

Hudson Division
GEORGE V. COOK, JR., W2OBU
88-31 150th St., Bellerose 26, N. Y.
Vice-Director: Thomas J. Krav, W2NKD
1092 Anna St., Elizabeth 4, N. J.

Midwest Division
WILLIAM J. SCHMIDT, W60ZN
306 N. Yavapai, Wichita, Kansas
Vice-Director: James E. Mckin, W8NIVG
1404 S. Teutha, Salina, Kansas

New England Division
PERCY C. NOBLE, W1YVR
57 Broad St., Westfield, Mass.
Vice-Director: Irwin L. Baker, Jr., W1ALP
14 Atlantic St., North Quincy 71, Mass.

Northwestern Division
R. REX ROBERTS, W7CPY
287 Park Hill Drive, Hillsburg, Mont.
Vice-Director: Kurt W. Waehlzen, W7DG
1219 N. 24th St., Torrana 7, Wash.

Pacific Division
KENNETH E. HUGGETT, W8CB
2580 Crescent Drive, Sacramento, Calif.
Vice-Director: Richard F. Czajkowski, W6ATO
2111 Colton Ave., San Francisco 12, Calif.

Roanoke Division
P. LANIER ANDERSON, JR., W4MWH
425 Maple Lane, Danville, Va.
Vice-Director: Gus M. Browning, W4BED
135 Broughton St., S. E., Greensboro, N. C.

Rocky Mountain Division
CLAUDE M. MAER, JR., W8BC
740 Lafayette St., Denver, Colo.
Vice-Director: LAMAR HILL, W4BOL
164 Myrtle St., Marathon, Ga.
Vice-Director: Richard L. Herr, W4WUR
911 Rosemary Ave., SW, Atlanta, Ga.

Southwestern Division
JOHN R. GREGGS, W5KWK
1520 Couture Ave., Phoenix 16, Calif.
Vice-Director: Walter R. Joos, W6KAM
1315 S. Overhill Drive, Indio Wooden, Calif.

West Gulf Division
A. DAVID MIDDLETON, W5CA
9 Bay Road, Tifton, N. M.
Vice-Director: Carl C. Drummer, W5EOC
5842 N. W. 5th St., Oklahoma City 12, Okla.
"It Seems to Us..."

QSL BUREAUS

Since 1933 — just twenty years ago — the ARRL QSL Bureaus have been serving amateurs in the United States, its possessions, and Canada — League members and non-members alike. A minimum of six times a year since, QST has carried a running announcement of how the system works and what to do to get cards. Yet there is evidence of unfamiliarity and misunderstanding of the system. Our QSL Managers tell us of the stacks of unclaimed cards in their files, and some of the QSLs are mighty juicy. The W2 QSL Manager recently estimated that unclaimed cards in his bureau form an impressive stack some forty-one feet high. Perhaps we’re more anxious than some of you are that these paste-boards reach their destinations! Anyway, here goes with a summary of how our QSL Bureau system operates. We hope that the sale of No. 10 envelopes skyrocketed shortly after this issue of QST reaches the membership.

Cards arriving at headquarters in bulk from foreign countries are sorted by U.S. call areas, Canadian provinces, and U.S. possessions, and then packaged and mailed to the various QSL Managers, one for each call district. Upon receipt of these cards, or others mailed directly to them by foreign amateurs and societies, the QSL Managers sort them by call letters, placing them in the envelopes filed by you amateurs. Envelopes are mailed out when a sufficient number of cards have accumulated to make use of the postage affixed to the envelopes.

Our QSL Managers are a busy bunch, volunteering their time to help guys like you and me obtain the necessary cards for WAC or DXCC. Some of them handle thousands of QSLs each month, leaving little time for hamming. It will be to your QSL Manager’s advantage, as well as your own, to follow these simple rules. If you work any DX at all, place an envelope on file with your QSL Manager. Use a standard No. 10 envelope with postage affixed, with your full name and address written on the front and with your call letters typed or printed in the upper left-hand corner. If you have ever worked DX under another call, make sure that an envelope is filed with the QSL Manager of that district, also. Some of the gang keep two or three envelopes on file.

The important thing to remember is that you should replace each envelope used by your QSL Manager in forwarding your QSLs. Alternate issues of QST list our QSL Managers under the heading of ARRL QSL Bureau.

The present QSL Bureau system is the result of a very successful experiment performed back in 1932 and 1933. Originally, when amateur radio had first spanned the Atlantic and DX QSLs made their first appearance, headquarters acted as the distributor for all QSLs not mailed directly to the addressee from a foreign amateur. In those days QSL cards and SWL cards were not too numerous. As more and more DX QSOs took place and more cards came into headquarters, we were finally forced to discontinue the forwarding of SWL cards in 1932. This was when we were really beginning to feel the "squeeze" from the work necessitated by a rapidly increasing number of foreign cards. At the same time we realized that sooner or later we would be facing a serious problem in our QSL forwarding. A system was conceived that looked like a good solution to the problem. We had carried on some correspondence with a W2 on this QSL business, and when he happened to drop by for a visit, the idea was explained. It involved a system of district QSL Managers who would receive cards from headquarters, sort them, and mail them to amateurs who had supplied them with self-addressed envelopes. The W2 agreed to give it a whirl, and all League members in the second district were written a letter which explained the plan and requested them to mail an envelope to W2AEN if they wished to receive their DX cards. If the test case worked we would ask for volunteers in other districts. During ten months of trial, the operation was completely successful.

Twenty years ago, the March, 1933 issue of QST carried an announcement of the new ARRL QSL forwarding service. The new service wasn’t the granddaddy of our present QSL Bureau system — it was the same system we have today, and for twenty years it has been ticking like clockwork. In that early issue of QST our first volunteer QSL Managers were listed. One of them was H. W. Yahnel, W2SN, and since that date W2SN has handled a fabulous number of cards. "Hank" had done a terrific job through the years in forwarding
the cards that have brought fancy DX certificates into many a W2 ham shack. Another pioneer of the QSL Bureau system is W. Bert Knowles, VE3QH, who signed up as soon as the service was extended to Canada in August of 1933.

Our QSL Managers appreciate a word of praise now and then, and they deserve every bit of it. Additionally, they appreciate the kind of cooperation that makes their job a little easier and at the same time increases the efficiency of the system. We like to help them as much as possible, but the main help can come only from you. The best thing you can do for your QSL Manager, and for your own countries confirmed tally, is send in that envelope. In all probability, there are some cards waiting for you at your QSL Bureau.

ARRL ELECTIONS

As part of its democratic structure, the League provides for an annual election of directors and vice-directors. Elections are staggered, half of our sixteen divisions holding elections one year and half the following year. Each director and vice-director is elected for a two-year term. A director, as the representative of the amateurs in his division, is responsible for soliciting their opinions and suggestions and bringing them to the attention of the other directors in session at their annual meeting. From the letters you fellows write your directors, from the suggestions you offer at club meetings and hamfests and conventions, League policy is formulated. Your new idea may be responsible for a change in Board policy — that is, if the fifteen other directors feel that your suggestion is good. And how they feel depends on how their amateurs feel.

We would like to have a penny for every letter we have received intimating that the headquarters staff decides ARRL policy. This is not true. None of the headquarters personnel has a vote at Board meetings. You people are the policy-formers and when we on the staff carry out the policies of the Board, we're carrying out your orders.

Elections for director and vice-director are coming up in half of our divisions this fall. This is to remind you that careful consideration should now be given your present directors and vice-directors as well as likely candidates for these important posts. Supporters of directors and vice-directors now in office should see to it that petitions nominating these gentlemen for re-election are filed. Those who intend to back new candidates should circulate petitions to insure that such candidates are nominated. Don’t wait for someone else to start the ball rolling. You may be disappointed.

Each nomination for director or vice-director must be in the form of a petition signed by at least ten Full Members of the League. And all petitions must be received at headquarters not later than noon, September 20th. A detailed explanation of nominating procedure may be found on page 48 of this issue. By all means, read it. If you’re inclined to do any nominating, get started with a petition now. And when election time rolls around in a couple of months, vote for the man of your choice.

OUR COVER

If you like to build your gear in experimental fashion first, you’ll appreciate the ease and speed with which you can “snip and solder” a form-fitting chassis of “hardware cloth.” W2CGN gives several examples of this technique on page 44 of this issue.

Strays

Clipped by W4IJM from a UP dispatch in the Miami Daily News concerning ARRL’s summer-scheduled TVI-clinic tour: “The tour will . . . . end in Indianapolis, July 23rd. Nearly every city with low-brand channels will be covered.” [Italics ours.]

Two of W8NAF’s QSLs were carried from Wright-Patterson Air Force Base, Ohio, to Washington, D. C., and back on the 30th of May by the first jet-carried U.S. mail. Time of departure at Dayton was 3:54 p.m. and time of arrival, Washington, 4:48 p.m.

Five v.h.f. stations, seven microwave stations and 75 mobile units help keep traffic moving over the 118-mile New Jersey Turnpike. Each mobile station carries a fixed 2-element Yagi beam, the directivity of which can be reversed by merely throwing a dashboard toggle switch. This was among aspects of the turnpike’s complex communications system discussed by Paul F. Godley — “Paragon Paul” of 1930s’ amateur Transatlantics fame — at a summer meeting of the American Institute of Electrical Engineers.

The latest (third) edition of the popular booklet titled Television Interference is now available, as announced by Remington Rand’s Laboratory of Advanced Research. Its collection of articles, many newly added, are arranged chronologically. Television Interference deals with all phases of TVI and its preface suggests certain sections for study by the TV viewer, TV serviceman, TV engineer, radio amateur, power company engineer and industrial engineer. Since the appearance of the first edition in 1951, material for which was compiled through the efforts of Phil Rand, W1DBM, now ARRL Technical Consultant, the booklet has become an invaluable reference on the subject of TVI. For your copy, send twenty-five cents in coin to cover postage and handling charges to: Miss Anne Smith, Remington Rand, Inc., 315 Fourth Ave., New York 10, N. Y.
Low-Noise R.F. Amplifiers for 144 and 420 Mc.

Using New TV Tubes for Improved V.H.F. Receiver Performance

BY EDWARD P. TILTON, W1HDQ

- The mass demand created by television has resulted in the development of new tubes that are capable of surprising performance at 144 Mc. and higher frequencies. Here are r.f. preamplifier designs that will bring v.h.f. and u.h.f. reception up to a level that was impossible with any moderately-priced tubes we've had heretofore.

Television has been blamed for many things, but we should not overlook the fact that mass acceptance of TV as an entertainment medium has brought certain benefits to amateur radio. Today we find ourselves with new or improved tubes and ingeniously-designed components that might never have been made had it not been for the demand created for them in the TV field.

Among the more recent dividends of this nature have been several new tube types designed especially for u.h.f. TV applications. The 6A4J, 6AM4, and 6AF4 are particularly interesting to the ham who is striving for better reception at 144 Mc. and higher. These tubes were developed for use as r.f. amplifier, grounded-grid mixer and oscillator, respectively. As we were interested in r.f. amplifier service, only the first two types were tested. They are 9-pin miniatures, identical as to base connections, and similar as to operating conditions, so trying either one is done readily enough. The 6AF4 has a 7-pin base, and is a low-

Two experimental amplifiers were built. One is a two-stage preamplifier using the series cascode circuit for operation on 144 Mc., the other a grounded-grid single-stage job for 420 Mc. Both show performance that will be of interest to anyone who is trying to improve weak-signal reception on these bands. The 2-meter amplifier has a slight edge on anything tested here previously. It is capable of bringing converter performance up to the point where external noise is the principal factor in weak-signal reception, even in a quiet location. The grounded-grid 420-Mc. amplifier showed a noise figure well below that of an earlier design built around a 6J4.1

The superiority of these new tubes begins to be evident around 144 Mc., and it increases with

1V.H.F. Editor, QST.
1Tilton, "R.F. Amplifiers for 420 Mc.," QST, Jan., 1952, p. 28.

Two-meter preamplifier using two 6AJ4 tubes. Adjustments are (left to right) input tuning capacitor, slug of neutralizing winding, and the plate tuning capacitor of the second stage.

frequency. At 50 Mc., for instance, a noise figure under 3 db. is obtained quite readily with a triode-connected 6A5K working into a grounded-grid 6J6, as shown in QST 2 and all recent editions of the Handbook. This combination works well at 144 Mc., but if we try to go to 220 with it there is a considerable drop in effectiveness. A 6BQ7, 6BK7 or 6BZ7 will give somewhat better results than the 6AK5-6J6 combination at 144 Mc., and is markedly superior at 220 Mc. (These three dual triodes were developed to enhance the performance of TV tuners that cover the range 54 to 220 Mc.) Since the 6AK5-6J6 cascode is capable of such good performance at 50 Mc., there is no point in going to the newer tubes at that frequency unless aims such as greater circuit simplicity are served.

At 144 Mc. nearly all of our tubes are beginning to hit the downward slope of their noise-figure/
to the grid side of $R_3$, and Pin 1 was by-passed by $C_4$.

**Adjustment**

There is only one simple way to adjust a low-noise r.f. amplifier and be sure of what you are doing. That way is to use a noise generator. The writer has found this out before, but never more forcibly than in working with the project herein described. An experimental r.f. amplifier was built and tested, using conventional signal-generator methods. Innumerable adjustments were made and various components tried, but with highly confusing results.

Making adjustments for maximum gain is satisfactory in the early stages of work with v.h.f. amplifiers, but when you get down to the real objective, the best possible signal-to-noise ratio, it is well-nigh impossible to rely on signals or signal generators in making final adjustments. Our r.f. amplifier work was interrupted while we got something in the nature of a reliable noise generator going. 2

With the noise generator approach only a few minutes' work was needed to get the r.f. amplifier project on the right track. Adjustment of the neutralizing winding and the tuning of the input circuit of the first stage were accomplished in short order, with results far superior to the best that was done in endless fiddling with these circuits previously. The principal reason for this is the fact that optimum signal-to-noise ratio (lowest noise figure) is not closely associated with maximum gain in low-noise circuits. The

![Schematic diagram](image)

Fig. 1 — Schematic diagram and parts list for the low-noise preamplifier.

- $C_1$, $C_2$ — Plastic trimmer, 1 to 8 p.f.d. (Ferro style 532-10).
- $C_3$, $C_4$, $C_5$, $C_6$ — 0.001 µfd, disk ceramic.
- $R_1$ — 28 ohms, 1/2 watt, carbon.
- $R_2$ — 0.47 megohm, 1/2 watt.
- $R_3$ — 370 ohms, 1/2 watt, carbon.
- $L_1$ — 4 turns No. 16 tinned, 3/4-inch diam., spaced 1/2 inch, tapped at 1/2 turns from ground end.
- $L_2$ — 4 turns No. 24 on 3/4-inch slug-tuned form.
- $L_3$ — 5 turns No. 18 enam., 3/4-inch diam., spaced half diameter.
- $L_4$ — 2 turns insulated wire wound over cold end of $L_2$.
- $J_1$ — Coaxial antenna fitting.
- $P_1$ — Coaxial plug on cable of suitable length to reach converter input.
- $RFC_1$ — 22 turns No. 22 enam., 3/8-inch diam., close-wound.

grid-dip meter method of adjusting circuits cannot be relied upon, either, as the input circuit is not resonant in the band at the point where the noise figure is best.

It is possible to adjust for best signal-to-noise ratio using signals or a signal generator, but take it from one who knows, that's the hard way! If, after all this noise-generator sales talk, you still think you're going to do the job without one, here's how to go about it — but don't blame us if you're dissatisfied with the results.

Using a signal, peak the plate circuit of the second stage for maximum response, assuming that the preamplifier doesn't oscillate. Should oscillation occur, adjust the slug in the neutralizing winding to stop it. The input circuit, \( L_1C_1 \), must be peaked for best signal-to-noise ratio.

This can be done, though tediously, by using the receiver S-meter, provided the system has enough gain so that the meter reads on noise alone. Best noise figure is obtained with the input circuit detuned on the low-frequency side of the maximum-gain point. The best setting of \( L_2 \) can be found in the same manner, by watching the rise in signal over noise, not the meter reading on the signal alone.

This sounds simple, but the trouble lies in the insensitivity of the S-meter as an indicator of small changes for better or worse. The noise generator will show you any small change, either way, so clearly that arriving at the optimum settings is a simple matter. Adjustment of the tap position on \( L_1 \) is critical. The best point at which the noise figure will be up on the coil somewhat from the point where maximum signal is obtained.

Here, again, this is a noise-generator job.

The 420-Mc. Job

The grounded-grid amplifier for 420 Mc., was patterned after one described some time ago in QST,\(^1\) and appearing in recent editions of the Handbook. The earlier model used a 6J4, of which the 6AJ4 is an improved and less expensive offshoot. It is built on a frame of flashing copper that serves as combined chassis and tank circuit.

The whole assembly is 10 inches long and \( \frac{1}{2} \) inches square, except for the bottom, which is about \( \frac{1}{3} \) inches wide. Edges are folded over with lips \( \frac{1}{4} \) inch wide which slide into a bottom cover made from a sheet of copper \( 2\frac{1}{4} \) by 10 inches in size, with its edges bent up \( \frac{1}{3} \) inch wide on each side.

The plate circuit is a half-wave line of \( \frac{1}{4} \) inch copper tubing tunned by a copper-tab capacitor at the far end from the tube. Plate voltage is fed in at the point of minimum r.f. voltage, which in this instance is about 5 inches from the open end. The antenna is connected to the cathode through a coupling condenser. The input impedance of the grounded-grid amplifier is so low that nothing is gained by using a tuned circuit at this point. The cathode and heater are maintained above ground potential by small air-wound r.f. chokes. Output is taken off through a coupling loop placed at the low-voltage point along the line.

The tube socket is two inches in from the end of the trough, and is so oriented that its plate connection, Pin 5, is in the proper position to connect to the line with the shortest possible lead. A copper shielding fin is mounted across the interior of the trough \( 2\frac{1}{4} \) inches from the end, dividing the socket so that Pins 3, 4, 5, and 6 are on the plate side of the partition.

Minimum grid-lead inductance is important. This was insured by bending all the grid prongs down against the ceramic body of the socket, and then making the mounting hole just big enough to pass this part of the socket and the prongs. They were soldered directly to the wall of the trough.

Input and output connections are coaxial fittings mounted on the side wall of the trough. B-plus and heater voltage are brought into the assembly on feed-through capacitors mounted on the same side of the trough as the tube. Connection to the inner conductor of the line is made with a grid clip, so that the point of connection can be adjusted for optimum results.

The copper tubing is slotted at the plate end with a hack saw to a depth of about \( \frac{3}{4} \) inch, and a strip of flashing copper soldered into this slot to make the plate connection. A copper tab about the size of a one-cent piece is soldered to the other end of the tubing to provide the stationary plate.
of \( C_4 \). The line is supported near the low-voltage point by a \( \frac{1}{4} \)-inch-thick block of polystyrene. This is centered at a point \( 5\frac{1}{8} \) inches in from the tube end of the trough assembly. The hole for the B-plus feed-through is \( 4\frac{1}{8} \) inches from the same end.

The movable plate of \( C_4 \) is attached to a screw running through a nut soldered to the upper surface of the trough at a point \( \frac{3}{8} \) inch in from the open end. If a fine-thread screw is available for this purpose it will make for easier tuning, though a 6/32 thread was used in this model. This made a rather wobbly contact, so a coil spring was installed between the top of the trough and the knob to keep some tension on the adjusting screw.

Adjustment of the 420-Mc. amplifier is also made easier if a noise generator is used, though it is not as important as in the case of the 2-meter job. If the amplifier is working properly there will be an appreciable rise in noise as the plate circuit is tuned through resonance, and it may break into oscillation if operated without load. When connected to a following stage, with a reasonably-matched antenna plugged into \( J_1 \), the amplifier should not oscillate unless the coupling loop, \( L_2 \), is much too far from the inner conductor.

When the amplifier is operating stably, and tuned to a test signal (or to a peak of response to a noise generator) the next step is to locate the optimum position for feeding the plate voltage into the line. This may be done by running a pencil lead slowly up and down the inner conductor, until a spot is found where touching the lead to the line has little or no effect on the operation of the amplifier. The plate voltage clip should be placed at this point and the process repeated, moving the clip slightly until it is at the minimum-voltage point precisely. This adjustment should be made at the midpoint of the tuning range over which the amplifier is to be used.

![Image of an amplifier](Image)

**Fig. 2** — Schematic diagram of the 420-Mc. r.f. amplifier.

- \( C_1 = 500\mu\text{ufd. ceramic.} \)
- \( C_2, C_3 = 1000\mu\text{ufd. ceramic feed-through (Erie style 2404).} \)
- \( C_4 = \text{Copper tabs } \frac{3}{8}\text{-inch diam.; see text and photographs.} \)
- \( R_1 = 150\text{ ohms, } \frac{1}{2}\text{ watt.} \)
- \( R_2 = 470\text{ ohms, } \frac{1}{2}\text{ watt.} \)
- \( L_1 = \frac{1}{4}\text{-inch copper tubing, } \frac{3}{8}\text{ inches long, tapped } \frac{23}{32}\text{ inches from plate end.} \)
- \( L_2 = \text{Loop of insulated wire adjacent to } L_1 \text{ for } \frac{3}{4}\text{-inch.} \)
- \( J_1, J_2 = \text{Coaxial fitting.} \)
- \( R\text{FC}_1, R\text{FC}_2, R\text{FC}_3 = 9 \text{ turns No. 22, } \frac{3}{8}\text{-inch diam., spaced one diam.} \)

The position of the coupling loop should then be adjusted for best signal-to-noise ratio. This will probably turn out to be with the insulated wire lying against the inner conductor for a distance of about \( \frac{3}{4} \) to 1 inch, starting at the minimum-voltage point we have just located.

**Results**

Using the 5722 noise generator described in \( QST \) for July, the noise figure of the 2-meter pre-amplifier was checked at under 4 db. This is a shade better than the best r.f. amplifier tested that has served at W1HDQ for the past three years it made a perceptible improvement in

(Continued on page 104)
Negative Feed-back Modulation

Reducing Distortion in the 'Phone Transmitter

BY RICHARD CLAY,* W9IRO/4

There are basically two types of electrical systems. One is the "open loop" or calibrated system, and the other is the "closed loop" system. An amplifier without feed-back is an open-loop system, and a feed-back amplifier is an example of a closed-loop system. Most modulation systems at present are open-loop systems, and they depend on inherent linearity in the modulator itself to provide a faithful output. This requirement of linearity can be relaxed a great deal if the modulator forms part of a closed loop.

There is a system of closed-loop modulation which is currently popular in amateur circles. It is called the Rothman system¹ and utilizes a portion of the transmitter output to provide the power for modulation. This system has several advantages. One is its high efficiency, and another is the ease with which a transmitter may be tuned up when using this system.

There is a serious disadvantage, however. The feed-back has a positive sense. This means that the system is regenerative and exaggerates non-linearities. This can easily be understood by imagining that the modulator saturates at the peak of a modulation cycle. There will be proportionally less output power and therefore less available modulator power. This will increase the effect of the original saturation.

This situation can be remedied by reversing the polarity of the feed-back. When this is done the feed-back voltage has the wrong polarity to be used directly in the modulator. It is now used in an entirely different manner. It is compared with the audio signal to determine any departure of the transmitter output from what it should be. This error signal is then amplified and used to modulate the transmitter. A block diagram of this system is shown in Fig. 1.

If the modulator tends to saturate at the peak of a modulation cycle there will be less negative feed-back voltage and the resultant error signal will be larger. This provides greater modulator power and tends to compensate for the saturation. Thus when negative feedback is used there is not such a great need for linearity in the modulator itself.

![Fig. 1 — Block diagram of negative feed-back modulation.](image)

Linearity is needed only in the demodulator. This can be a simple diode detector. There is negligible power involved, so a small diode is sufficient for an amateur transmitter of any size. Voltage breakdown is the only consideration, and this is a problem only in high-power transmitters.

Good frequency characteristics are necessary only in the audio stages prior to the comparison

---

*RCA Engineer, Box 372, Cocoa Beach, Fla.

An experimental low-power transmitter was used to test the negative feed-back principle.

---

August 1953
point. This is true because the loop closure tends to minimize the error and this causes the output to follow the signal injected at the comparison point. Hence the frequency characteristics of the circuit following the comparison are of less importance. This does not mean to imply that any circuitry should be designed carelessly.

It might appear from the above that it would be best to make the comparison at a very low level stage. This is not advisable in a high-power transmitter because of the high gain that follows the comparison. This is inside of the closed loop and will almost invariably lead to oscillatory instability.

There is an easy way to determine the point at which the comparison should be made. It is based on a fundamental property of electronic regulating systems. The error in such systems is approximately the reciprocal of the gain inside the closed loop.

For amateur work a linearity of 1 per cent would be considered more than adequate. This means that the comparison would be made at a point in the audio amplifier such that the total gain is 100 from that point onward. This includes any attenuation in the demodulator and coupling link. If 2 per cent linearity is satisfactory, a gain of 50 will suffice.

In a practical application, it is wise to provide a gain control in the demodulator so that it is possible to vary the effective loop gain. The gain inside the closed loop should be adjusted well below the value that causes oscillation in the modulation system. It is necessary to provide a feedback circuit of a difference amplifier, gain control in the audio stages prior to the comparison in order to adjust the modulation level.

Probably the easiest way to compare the feedback signal with the audio signal is to use a difference amplifier. This consists of a dual triode circuit, as shown in Fig. 2. The signals are placed on the two grids and the output is taken from one of the plates. The output at the plate of the triode into which the audio signal is placed will be the feedback signal minus the audio signal. The output at the other plate will be the audio signal minus the feedback. These outputs are 180 degrees out of phase so the proper one can be selected in order that the over-all feedback will be negative.

**A Practical Transmitter**

A small transmitter has been built to demonstrate the above principles. It operates in the 80-meter band — the circuit is shown in Fig. 3. The r.f. portion consists of a 6AQ5 crystal oscillator and 807 power amplifier. This arrangement was used for simplicity. The r.f. section of any well-designed transmitter would be satisfactory if it is adaptable to a modulation system.

In this circuit another 6AQ5 is used as a re-
sistance-coupled modulator for the 807 screen. This is a rather small tube for this purpose, and its ability to perform favorably without the benefit of the negative feed-back might be questioned. A 12AU7 is used as the difference amplifier. A 6H6 with both sections in parallel is used as a diode detector to demodulate the r.f. output and develop the feed-back signal.

The antenna link is used as the r.f. source for the feed-back signal. This causes no harm, since the demodulator presents a high impedance and offers virtually no loading on the antenna, but it means that the loop gain depends on the amount of antenna coupling. The attenuator in the demodulator must be adjusted whenever the position of the antenna link is changed. In the experimental model a fixed link was used, but this is not recommended because of its inflexibility.

It is observed that an increase in potential at the output plate of the difference amplifier causes the grid of the 6AQ5 to go negative, driving the plate positive. This increases the transmitter output. Since the diode rectification yields a voltage in the negative sense when connected as shown, the increase in r.f. causes the feed-back grid of the difference amplifier to go negative. This signal is the opposite of that which would produce the increase in plate potential which was assumed. Therefore the feed-back is negative as required.

The maximum loop gain was measured experimentally and found to be around 30. This value causes the closed loop to oscillate, however, and the maximum usable gain is around 20. This limits distortion to around 5 per cent.

Adjustment

The adjustment of the transmitter is relatively simple. The gain control in the demodulator is set at zero and the r.f. portion of the transmitter is tuned as usual. The antenna is then coupled properly. The gain control in the demodulator is advanced until the modulation system oscillates and is then brought back considerably below this level. If the modulation system shows no tendency to oscillate, the gain may be left at the maximum value. The setting of this gain control is not at all critical.

The audio signal is then introduced, and the audio gain is adjusted to provide the proper level of modulation. This must be checked by normal procedures. The transmitter is then ready for operation. This same procedure would be followed in adjusting any transmitter using negative feed-back modulation. In the unit shown a few volts of audio input is necessary to modulate the carrier 100 per cent.

Laboratory tests have been performed on this circuit to determine the effectiveness of the feed-back. It is possible to disconnect the demodulator and operate the system as an ordinary open-loop system. The photograph shows the results of these tests. The top photograph shows the appearance on an oscilloscope screen of the demodulated carrier when the system was operating as an open loop and the audio signal was a pure sine wave. The distortion is quite obvious. The middle photograph shows the comparable closed-loop performance. The linearizing effect of the negative feed-back is apparent. The bottom photograph shows the appearance of the modulated carrier when using negative feed-back.

Scope pictures showing the effect of negative feed-back modulation. A pure sine-wave input to the audio system without feed-back resulted in a demodulated signal as in the top picture, while the same input signal with negative feed-back modulation gave a demodulated signal (center) and r.f. picture (bottom) with very little distortion.

There is no great advantage in applying negative feed-back modulation to existing transmitters that have well-designed and reasonably-linear modulation systems. The disadvantage of the possibility of instability in the modulation system will most likely outweigh the advantage of increased linearity.

Negative feed-back modulation offers the greatest opportunities for amateurs who use screen grid, suppressor grid, or some other type of modu-

(Continued on page 104)
Eighty Watts on Six Bands

A Bandswitching Rig Using Subassemblies

BY DONALD H. MIX,* WITS

The "Bandbox" single-control frequency-multiplier unit described in QST for April, 1952,1 was designed as a basic unit—a subassembly—that, once built, could be placed in any transmitter line-up, or removed, much as a single component might be handled, according to the builder's fancy. Therefore, little consideration was given, at the time, to anything specific in the way of associated units. However, subsequent response showed that there were many who would like to see some definite suggestions or a suitable oscillator and output stage to be used with the multiplier unit—particularly something built along the shielded-unit idea.

Accordingly, a VFO2 and a multiband 6146 amplifier3 were described in later issues of QST. But, it seems that the job wasn't finished. There were still quite a few who wanted further information on power supply and control circuits. It is true that sometimes unforeseen problems arise when an attempt is made to combine units to form a complete transmitter.

In the photographs, the three units mentioned above have been assembled to make up an 80-watt bandswitching transmitter complete with power supplies and control circuits. By reducing

---

1 Mix, "The "Bandbox"—A Single-Control Frequency-Multiplier Unit," QST, April, 1952, p. 11.
2 Mix, "Simple Remote Tuning for the VFO," QST, Jan., 1953, p. 27.

An 80-watt 6-band bandswitching transmitter built around VFO, frequency-multiplier and output-stage units described in earlier issues of QST.

---

* Assistant Technical Editor, QST.

---

The convenient multiband rig is made up of units described in earlier issues of QST. Covering all bands from 10 to 80, it is complete with power supply and control circuits. It can be operated at inputs up to 80 watts on c.w. and 60 watts on phone. Provision is made for the connection of an external plate modulator.

---

the output coupling by means of the panel control on the variable output link, the input can be reduced slightly to comply with the power limitations applying to the Novice. In operation, the rig works very smoothly. After setting the VFO for the desired frequency, and the multiplier switch for the desired band, it is only necessary to resonate the single control of the multiplier for desired amplifier grid current and tune the amplifier stage to resonance.

Circuit Considerations

Fig. 1 shows the circuit external to the individual units. High voltage for the 6146 amplifier is obtained from an inexpensive t.r. transformer, T4, working into a bridge rectifier. This arrangement is similar to the "economy" power supply described in the November, 1952, issue of QST.4 The supply delivers 550 volts at a full load to the amplifier of 150 ma. on a.c. A choke-input filter is used with this supply, and the 6X5GT rectifier

---

QST for
filaments are operated from the 6.3-volt winding of this transformer. The required filter-condenser voltage rating is obtained by connecting 500-volt electrolytics in series. A supply voltage of 350 for the VFO, frequency multiplier, and the screen of the 6146 is obtained from a second supply using a condenser-input filter. All transmitter-tube heaters are operated from the 6.3-volt winding of the low-voltage transformer.

A comparison between Fig. 1 and the original circuit for the amplifier will show that the biasing battery voltage has been increased to 45. This was done from the consideration that 45-volt batteries are more generally available than the 22.5-volt units. A corresponding reduction in amplifier grid-leak resistance should be made — to 12,000 ohms. Otherwise, there is no objection to the use of the original values.

Provision is made for the external connection of a plate modulator. There are Millen safety terminals at the rear for connecting in the output of the modulator, and an audio choke is included for the screen circuit. Also, an a.c. outlet and switch, $S_4$, are available for the modulator power supply.

The rotary switch, $S_5$, performs, in a single operation, the combined duties of power control and meter switching. In the mid-position, the meter is switched to read grid current, plate voltage is removed from the 6146, and the screen is grounded. While the switch is in this position, the VFO may be set to frequency and the frequency multiplier tuned for the desired amplifier grid current without putting a signal on the air. When the switch is thrown to the right, plate and screen voltages are applied to the amplifier, and the meter reads plate current with a 10-times shunt across the meter. This is the operating position for c.w.

For 'phone operation, the switch is thrown to the left, instead of to the right. In this position, the modulator-input terminals are connected in the plate circuit of the 6146, and the choice, $L_1$, is inserted in the screen lead.

**Construction**

The components are assembled on a 13 × 17 × 3-inch steel chassis, with a 3/4-inch aluminum rack panel 8⅞ inches high. An aluminum chassis could be used, but is not necessary since the units

---

**Fig. 1 — Power and control circuits for the 80-watt multiband transmitter.**

C1, C2, C3, C4 — 16-μfd, 500-volt electrolytic (e.g., Aerovox P85-16).

R1 — 100 ohms, 1/2 watt.
R2 — 10-times shunt for 25-ma. meter (No. 30 wire wound on 1-watt resistor of 50 ohms or more and connected to its terminals. Adjust turns to give required multiplication — see ARRL Handbook).
R3, R4 — 20,000 ohms, 10 watts.

L1 — 35-hy. 15-ma. choke (e.g., Thordarson T-20C51).
L2 — 2-hy. 150-ma. filter choke (e.g., Halldorson G-5027).
L3 — 10.5-hy. 110-ma. filter choke (e.g., Stancor 1001).

MA1 — 3-inch d.c. milliammeter, 25-ma. scale (e.g., Triplet 327A).

P1 — Octal male connector (Amphenol 86-PF-8).
P2 — Female cable connector to fit VFO connector (Jones S-304-CCT).
P3 — Female cable connector to fit multiplier connector (Jones S-304-CCT).
P4 — S.p.s.t. toggle switch.
P5 — 4-wafer 3-position rotary switch, bakelite insulation (e.g., Centralab 1427, or assembled from Switchkit parts).
T1 — Power transformer: 375-0-375 volts r.m.s., 150 ma.; 5 volts, 3 amp.; 6.3 volts, 4.7 amp. (e.g., Thordarson 24R06U).
T2 — Power transformer: 360-0-360 volts r.m.s., 120 ma.; 5 volts, 3 amp.; 6.3 volts, 3.5 amp. (e.g., Halldorson P-9315).
Two power supplies are sandwiched in between the individually-shielded units. Along the rear are modulator-input terminals, a.c. input connector, and an outlet for an external modulator power supply.

Shafts have been cut short, however, it will be necessary to move the unit farther back to make room for shaft couplings.

The VFO unit is mounted in the rear left-hand corner of the chassis, with the remote-tuning-cable connector toward the left.

All three units are fastened down to the chassis with self-tapping screws from the bottom. If a steel chassis is used, the aluminum cover plates of the multiplier and amplifier units should be used between the chassis and the bottoms of the boxes, the self-tapping mounting screws going through both the chassis and the covers into the lips of the boxes. The paint on the chassis should be removed in the areas to be covered by the units, so that the shielding will make good electrical contact with the chassis. This operation can be made easier by using an application of paint remover, being careful not to allow the remover to creep beyond the limits of the edges of the units and thus spoil the appearance of the chassis. Allow a safety margin of 9/16 to 1/2 inch when applying the remover.

The low-voltage transformer, $T_2$, is centered between the two larger units, and placed as far to the rear as possible. A flush-mounting transformer happened to be on hand, but a vertical type is easier to mount, since it requires no large cutout on the chassis. The 5V3GT is placed to the rear of the amplifier box, in such a position that it will not interfere with the power plug.

The high-voltage transformer, $T_1$, is mounted in front of the low-voltage unit with a space of about 1/4 inch between the two. The two 6X5GTs are, in turn, mounted forward of the high-voltage transformer, spaced about 3 inches apart, center to center. The 5V1G is in front of the right-hand 6X5GT, leaving space for the meter.

Bottom view of the 80-watt six-switching transmitter. The low-voltage power-supply components and screen audio choke are in the upper left-hand corner. Below, at the center, are the filter components for the high-voltage supply. The biasing battery is held in place by an aluminum cleat and a pair of long machine screws. The power-control switch is at the lower left.

QST for
An F.S.K. System for the Amateur Teletype Station

Using the Reactance-Tube Modulator for Controlling Carrier Shift

BY F. A. BARTLETT,* W6OWP

"... (C) When frequency-shift keying (type F-1 emission) is utilized, the deviation from the mark signal to the space signal, or from the space signal to the mark signal, shall be adjusted as nearly as possible to 850 cycles and, in any event, within the range 800 to 900 cycles per second" [new Section 12-107 of the FCC Rules Governing Amateur Radio Service.]

S reads the official FCC requirement for amateur f.s.k. An additional stipulation — agreed upon by amateur teletype groups — is that the higher frequency of the F-1 signal shall be the mark frequency for teletype work. Translating this information — dealing with what up to now has been a strictly commercial phase of radio — to circuits suited to amateur use is a problem facing every newcomer to the RTTY ranks. The purpose of this article is to describe a simple system for amateur teletype transmisson using f.s.k. keying. No tone circuits, v.t. keyers or auxiliary relays are required. The normal transmitter output frequency becomes the teletype marking frequency and the space relay. When idle, the circuit is closed, with marking current flowing from the d.c. supply through the keyboard contacts and the signal winding of the line relay. Depressing a letter on the keyboard causes a selector-cam contact mechanism to interrupt the circuit for precisely-timed intervals. The line relay responds and energizes the printing unit.

In adapting the machine for radio, an f.s.k. receiving converter is used. If the converter is the on-off (single-ended) type, it may be connected as a direct replacement for the f.s.k. supply of Fig. 1. When receiving radio signals, current in the signaling circuit will be interrupted by the space keying of the incoming f.s.k. transmission and the machine will print. When no transmission is being received, operating the keyboard will produce local printing just as the machine did with the d.c. supply of Fig. 1.

A more common type of f.s.k. converter employs both the marking and spacing signals to energize the teletype line relay. This converter replaces the d.c. supply of Fig. 1, but requires addition of a d.p.d.t. switch to permit local keying. The actual circuitry will be covered later.

A Twofold Problem and Its Solution

Up to this point, the printer is one-way only — it will receive radio signals but makes only monitor copy when the keyboard is operated. The problem is to make the d.c. pulses in the local signaling loop perform the f.s.k. keying function in the transmitter. This is a two-step procedure. First, a means must be built into the transmitter to produce a controllable shift of frequency with applied d.c. voltage. Secondly,
a connection into the local signal circuit must be established.

Step No. 1 is not difficult. Frequency-shift keying is essentially f.m. applied to radiotelegraphy. The f.m. reactance tube modulator is just the thing for the controllable shift of frequency that f.s.k. requires. Fidelity, in the audio sense, is not necessary. The reactance stage for f.s.k. may be reduced to its simplest form. Fig. 2 shows the circuit applicable to most amateur VFOs. A miniature 6C4 triode is used. Its small size and the few components needed should simplify installation problems. Positive voltage applied to the input terminals will produce a downward shift in frequency. The magnitude of this shift is controllable (for a fixed setting of $C_1$) by adjustment of $R_1$.

Heterodyne exciters operating on the difference-frequency beat require an upward shift in the station VFO is already equipped with a reactance-tube stage for n.f.m., simple alteration to permit d.c. drive to the modulator grid should prove satisfactory. Use the circuits of Fig. 2 for the basic hook-up.

Now let's tie the reactance shifter to the tele-type keyboard. Referring back to Fig. 1, if a voltmeter is connected between points $X$ and $Y$, it will read voltage whenever the keyboard contacts interrupt the circuit; i.e., at spacing intervals. This voltage will be positive with respect to ground and equal to the supply voltage. In the mark condition, the voltage obviously will be zero. Basically, the voltage existing from $X$ to $Y$ on the spacing function is the source of reactance-tube drive. Two requirements, however, must be satisfied:

1) The voltage must be stable to assure a constant shift range.

2) A click-suppression circuit must be installed to wipe out the transfer clicks produced by the keyboard contacts.

**Working Circuits**

The circuits diagrammed in Figs. 3 and 4 meet these requirements. The first shows connections with an on-off type converter. The second illustrates use of the mark-space type unit. In both cases, the line relay is a WE2185A or WE255A. In the on-off circuit (Fig. 3), the relay bias winding is supplied with a 15-ma. current at all times. This current is shown taken from the converter power supply. If desirable, however, it may be supplied from a d.c. source within the printer.

In Fig. 4, when $S_2$ is in the send position, the bias winding of the relay is provided with a 15-ma. current while the signal, or mark winding, draws 30 ma. This marking current is interrupted by operation of the keyboard and the relay responds by virtue of the current in the bias, or space winding. $S_1$ is used to open the signaling loop when adjusting the shift range.

Voltage stabilization in both circuits is provided while in the space condition by a VR-105. Resistor $R_4$ should be chosen to allow approximately 20 ma. through the VR tube with the circuit on space. This minimizes the voltage drop on the heavier-current marking condition. Speaking in general terms, the loading is such that the VR tube normally fires only on space. This is no drawback because stabilization is unnecessary on the marking portion of the keying cycle.

"Simple but effective" describes the click-suppression circuit made up of $RC$ network $R_3C_2$ and the neon bulb $NE$. The $RC$ time constant is just sufficient to prevent the short-duration contact-transfer pulse from firing the neon bulb. This blocks the unwanted clicks from the reactance-tube input.

**Adjustment Notes**

It is suggested that $C_1$, the reactance tube coupling capacitor, be set to provide a maximum of 850 cycles shift at the lowest operating frequency. This will make adjustment of $R_1$ (Fig. 2)
less critical when doubling to higher bands. Keep in mind that the effectiveness of the reactance tube changes with oscillator tuning. When a change of 50 kc. or more is made in operating frequency, readjustment of the shift range may be required.

It is worth mentioning at this point that a calibrated b.f.o. control on the receiver is a handy means of setting the shift range. A good audio oscillator is recommended for the initial calibration which, for the RTTY station, need only include a zero reference point and two check points. One of these will be 850 cycles high; the other, 850 cycles low. Most communications receivers have sufficiently stable b.f.o.s to rely on these settings. Values shown for the click-suppression circuit (Figs. 3 and 4) may vary in different installations. Tune in the space side of the transmitted signal (mark frequency at zero beat) and operate the teletype "letters" key. If clicks are heard, increase the capacitance of C₃ until the signal is clean. Values up to 0.25 µfd. may be used without serious distortion of the keying pulses. If the clicks still persist, trouble in the keyboard contacts is indicated. The 0.025-µfd. value shown was worked out on a machine equipped with an r.f. filter. Keyboards not so equipped appear to require increased capacitance.

If a tape distributor is available, its signaling contacts may be series-connected with the keyboard in Figs. 3 and 4. No switching of the signal wiring is necessary, since continuity through the nonoperated unit is automatically established in the idle position. The value of C₂ may have to be altered slightly to accommodate the keying characteristics of both keyboard and tape distributor.

No provision has been made for telegraph f.s. keying. Amateur RTTY under the new regulations is too new for establishment of set pro-

Fig. 3 — "Adapted-for-radio" printer-signaling circuit working from an on-off type f.s.k. receiving converter. Local copy and f.s. keying voltages are provided automatically whenever the keyboard is operated. C₁ = 0.1-µfd. 600-volt paper. C₂ = 0.025-µfd. 600-volt paper (refer to text). R₁ = 2000 to 5000 ohms, 20 watts (refer to text). R₂ = 10,000 ohms, 10 watts (adjust for 30 ma.). R₃ = 20,000 ohms, 1 watt. NE = 1-watt neon bulb (no series resistor). S₁ = S.p.s.t. toggle switch.

Fig. 4 — Signaling circuit for use with a mark-space type f.s.k. receiving converter. A relay may be substituted for S₂ for remote switching of send-receive functions. C₁ = 0.1-µfd. 600-volt paper. C₂ = 0.025-µfd. 600-volt paper. R₁ = 2000 to 5000 ohms, 20 watts (see text). R₂ = 7000 ohms, 10 watts. R₃ = 20,000 ohms, 1 watt. R₄ = 3000 ohms, 10 watts (adjust for 30 ma.). NE = 1-watt neon bulb (no series resistor). S₁ = S.p.s.t. toggle switch. S₂ = D.p.d.t. send-receive switch, 250-volt insulation, toggle or wafer type.

edures for telegraph identification. The writer favors keying the transmitter carrier since this allows maximum readability at the receiving point. This is especially true where QRM or weak-signal conditions have rendered the f.s. signal unreadable and c.w. remarks are necessary for conclusion of a QSO.

August, 1928

... An editorial forewarns amateurs that next year's tightened regulations will call for universal improvement in technical and operational performance.

... Associate Technical Editor Ross Hull goes to high-C circuits, more rigid construction and looser coupling in "Overhauling the Transmitter for 1929."

... R. B. Bourne, IANA, writes on "Acoustic Wave Filters and Audio Frequency Selectivity," providing data necessary for the construction of practical units.

... In "28,000 Kilocycles — And How!" the ten-meter layout of 1SZ, 2GP, 2JN, 5AUZ, 5HE, 6UP, 8ALY and 8BX are briefly described.

... In "Concerning Lunar Effects on Electromagnetic Waves," Greenleaf W. Pickard doubts that the moon has tangible influence on short-wave communication.

"Following the 'Southern Cross' to Brisbane," by J. Walter Frades, 6CZR, extols the work of amateurs who kept watch on KHAB along the route of this great flight.

... "Army-Amateur Activity in the Philippines" tells the story of op1 HR and the functioning of affiliation between ham radio and the Army Signal Corps.

... American 1ASF and Canadian 1AR are the two top scorers listed in results of the 1928 International Relay Party held last February.
A Four-Band Miniature 'Phone-C.W. Rig

13 Watts for a Variety of Uses

BY W. W. DEANE,* WS6ET

During the past few years, many articles have been written describing small transmitters for mobile or portable work. However, practically all have been confined to one- or two-band operation, 'phone or c.w. operation (but seldom both), plug-in coils for band-changing, or other such restrictions. To overcome these shortcomings, the transmitter described in this article was designed and constructed. This unit is adaptable to mobile, fixed-station, portable or emergency use. The principal considerations in the design were maximum band coverage, both 'phone and c.w. operation, simplicity in adjustment, compactness and, of course, minimum cost.

Circuit

To achieve these features, the circuit illustrated in Fig. 1 was utilized. A 6AQ5 operates as a grid-plate crystal oscillator and another 6AQ5 is used as the final amplifier with a pi-network output circuit. Both the oscillator and final-plate coils are bandswitched by a ceramic wafer switch, St. Several audio circuits were considered, but all were discarded in favor of the one presented by W1JEQ in the September, 1952, issue of QST.1

Construction

The transmitter is constructed within a 6 × 6 × 6-inch miniature cabinet. The general construction, layout and wiring details are adequately indicated by the accompanying photographs except, perhaps, for the mounting of L3 and L4. Fig. 2 shows the method of mounting these two coils. L3 is soldered across the extreme contact ends of S1B. Taps are made at the 30th and 44th turns, and soldered to the 40- and 29-meter positions, respectively, of S1B. L4 is mounted vertically and is soldered directly to J5 and the 10-meter contact point on S1B. Note that on 10 meters L3 is completely shorted out. Leads for the oscillator plate coils are brought to S1A through half-inch holes fitted with grommets directly under S1.

The audio section is located across the rear of the chassis, with T2 in the rear right-hand corner as viewed from the panel. The 6AQ5 oscillator is located forward of T1 and the 6AQ5 final-amplifier tube is in front of T2.

All power wiring should be done with shielded wire and the by-passes applied as recommended.

---

* 550 South "G" St., Oxnard, Calif.

1 Chambers, "A Two-Band Miniature Mobile Transmitter," Sept., 1952, QST.

Plan view of the miniature-tube 'phone-c.w. rig. The modulator is at the rear of the chassis, with the output coils and tuning condensers mounted on the panel.
Fig. 1 — Circuit diagram of the miniature phone-c.w. transmitter.

C₁ — 20-µfd. ceramic.
C₂, C₅ — 100-µfd. mica.
C₆, C₈, C₉, C₁₀, C₁₁, C₁₂ — 0.001-µfd. disk ceramic.
C₇, C₁₇ — 30-µfd. mica trimmer.
C₁₅, C₁₆ — 140-µfd. variable (Hammarlund HIF-140).
C₁₄ — 100-µfd. mica.
C₁₃ — Fixed mica output padfer (see text).
C₁₇ — 0.01-µfd. disk ceramic.
C₁₈ — 10-µfd. 25-volt electrolytic.
R₁, R₂ — 47,000 ohms, 1/2 watt.
R₂ — 56,000 ohms, 2 watts.
R₃ — 22,000 ohms, 1/2 watt.
R₄ — 10,000 ohms, 1 watt.
R₅ — 100 ohms, 1/2 watt.
R₇ — 0.47 megohm, 1/2 watt.
R₈ — 470 ohms, 1/2 watt.
L₁ — 42 µh. — 95 turns No. 30 enam., 1/2-inch diam., close-wound, tapped at 3rd turn from ground.
L₂ — 2.2 µh. — 16 turns No. 30 enam., 1/2-inch diam.
L₃ — 32 µh. — 54 turns No. 20, 1-inch diam., 15½ inches long, tapped at 30th and 41th turns (B & W 3016 Miniductor).
L₄ — 0.6 µh. — 5 turns No. 18, 1-inch diam., 1/2 inch long (B & W 3014 Miniductor).
J₁ — Closed-circuit key jack.
J₆ — Male power connector (Jones P-301-AR).
RFC₁, RFC₂ — 1-mln. r.f. choke.
S₁ — Double-pole, 4- or 5-position wafer (see Fig. 2).
T₁ — Driver transformer: single plate to p.p. grids, ratio 2.66 to 1 (Triad A81-X).
T₂ — 5-watt modulation transformer, 50-ma. secondary, tapped (Triad M-IX).

Bottom view of the miniature-tube rig, showing the placement of the oscillator coils and trimmers. Condensers are near the center. The power connector is at the rear.

To connect 12AU7 and 12AX7 heaters for 6-volt operation, connect Pins 3 and 4 together as one terminal. Other heater terminal is Pin 9. 6AQ5 heater terminals are Pins 3 and 4.

August 1953
in the TVI chapter of *The Radio Amateur's Handbook*.

**Adjustment**

Standard tuning procedure applies. With an appropriate crystal inserted (3.5-Mc. crystals for the 80-meter or 40-meter bands and 40-meter crystals for the 40-, 20- and 10-meter bands), adjust the oscillator plate circuit for maximum drive to the final. This can be determined either by removing the ground from $R_3$ and measuring the current flow, or by measuring the voltage drop across $R_5$. In either case, a 2.5-mH r.f. choke should be connected in series with the negative prod of the high-resistance voltmeter. For 3 to 4 ma. of grid current the biasing voltage should be between 65 and 90 volts. When the trimmer $C_5$ is adjusted for 3.9 Mc., with the switch in the 80-meter position, the circuit should resonate in the vicinity of 7250 kc. when the bandswitch is turned to the 40-meter position. Then, when $S_1$ is turned to the 20- and 10-meter positions, it should be possible to resonate the oscillator output circuit in the 14-Mc. band by means of $C_7$. Only approximate resonance is necessary for any of the bands, since the circuit is reasonably broadband.

The final amplifier is brought into resonance by $C_{13}$ and the antenna loaded with $C_{16}$. A 15-watt lamp makes a suitable dummy load for initial tune-up.) The minimum plate current with no load will be approximately 20 ma. When loaded into an antenna or dummy load, the plate current should be about 45 ma. The plate current is measured by connecting a 100-ma. meter at pin jacks $J_2$ and $J_3$. When operating on 80 meters, an added capacitor, $C_{15}$, may be required across $C_{16}$ to obtain sufficient loading. The capacitance value will have to be determined by experiment and may vary from 100 to 1000 $\mu$fd. This condenser is plugged into 'phone-tip' jacks $J_4$ and $J_5$ located on the front panel directly below $C_{16}$. Table I at left indicates transmitter voltages and currents to be expected.

### Table I

<table>
<thead>
<tr>
<th>Tube</th>
<th>$E_p$</th>
<th>$E_{sg}$</th>
<th>$E_a$</th>
<th>$E_k$</th>
<th>$I_p$</th>
<th>$I_k$</th>
</tr>
</thead>
<tbody>
<tr>
<td>6A05 oc.</td>
<td>300 v</td>
<td>225 v</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>35 ma.</td>
</tr>
<tr>
<td>6A05 final</td>
<td>250 v</td>
<td>225 v</td>
<td>---</td>
<td>---</td>
<td>45 ma.</td>
<td>---</td>
</tr>
<tr>
<td>12A17 input</td>
<td>120 v</td>
<td>---</td>
<td>---</td>
<td>4 v</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>12A07 amp.</td>
<td>250 v</td>
<td>---</td>
<td>---</td>
<td>8 v</td>
<td>---</td>
<td>---</td>
</tr>
</tbody>
</table>

A miniature 4-band 'phone-c.w. rig for portable or mobile use. The two output tuning condensers and the coax output connector are at the top. At the center are pin jacks $J_4$ and $J_5$ for the 80-meter output padder, and the bandswitch. Crystal socket, microphone jack, key jack and plate-currents jacks are across the bottom.
Is Your Rig R.F.-Tight?

Electronic Weatherstripping as an Aid to Shielding

BY OTMAR P. SCHREIBER,* W2UHH

- Do you have your rig shielded and filtered and still have trouble with TVI? Perhaps your shielding is not as complete as you think it is. In this article, W2UHH tells how you may quite easily make sure that your enclosure is leak-proof, yet “openable.”

Undoubtedly, there is many a ham who feels that the job of suppressing TVI from his rig is an insurmountable task. Yet the requirements to be met in his case are much less stringent than those imposed upon most military installations. There is probably no place where it is more essential to reduce r.f. leakage to the very minimum than in a modern combat plane. A night fighter would not be very effective if its radar, v.h.f. communications equipment, and motor-ignition system could not be used simultaneously. In spite of the fact that space limitations dictate that these units must be placed in close proximity, effective isolation is achieved. The leakage from megawatt-peak radar transmitters can be reduced to less than 5 microvolts per meter! In accomplishing this, electronic weatherstripping has played no small part.

The Problem

The importance of shielding is continually stressed in QST and the Handbook, not only to prevent direct radiation of harmonics, but also as a means of keeping harmonic currents from flowing around power-supply and antenna filters, largely nullifying their intended function. However, the point that many hams do not appreciate is that the shielding must be tight.

In this instance, the word “tight” has a meaning that is not too well understood. Everyone is familiar with the fact that wave-length decreases with increasing frequency. This is highly important when considering the leakage from a rig at TV frequencies, especially as stations start using the new u.h.f. channels. Leakage is directly related to the longest dimension of an opening—not the area, as is often supposed. For example, an opening between a lid and a chassis 8 inches long, but only 0.006 inch wide may leak far more than a 1/4-inch diameter hole, yet each opening has the same area. While the leakage from either opening will be greater at 50 Mc. than at 5 Mc., the leakage from the crack increases at a greater rate than that from a round hole of equal area, as the frequency is made higher. At 500 Mc. (Channel 19 in the new u.h.f. band), where 8 inches is more than a quarter wavelength, the 0.006 X 8-inch slit acts like an efficient antenna!

Now, it’s practically impossible to see an opening 0.006 inch wide, and cracks like this are common to the majority of shielding enclosures usually considered as tight. It is for this reason that the importance of using closely-spaced tight-drawing fasteners has been stressed in the past. Equipment can be designed so that it can be operated without the necessity for ready access to the interior. However, most hams would still prefer the convenience of a hinged cover for inspection and minor adjustments, were it not for the problem of leakage. Needless to say, a lid that requires the removal of a multitude of fasteners is of little practical purpose.

Electronic Weatherstripping

Electronic weatherstripping, as it is popularly called, is not a new development, having been in use for various applications for a number of years. As the term implies, it is parallel in purpose to household weatherstripping—to seal off unavoidable leaks. Metex* stripping is composed of monel wire which is knitted, not woven or braided. It is the interlocking loop structure which results from knitting that gives the required resiliency, or spring, to the finished product. Compressing the knitted mesh gives it the desired cross-sectional shape and stability without sacrificing its elastic properties. The

Using electronic weatherstripping to de-TVI a Harvey-Wells transmitter. This photo shows the stripping around the panel and the shielding of the louvers. Not shown is the stripping around the rear opening.

August 1953
result is a resilient, conductive metal-to-metal filler between mating surfaces — one that readily conforms to the often unsuspected minor irregularities in these surfaces — and continues to do so no matter how often the doors or panels are opened and closed. Only a few screws or fasteners are needed to exert sufficient compressive force on the weatherstripping to obtain a leakproof seal. The number of fastenings will, of course, depend on the size of the enclosure, but in all cases will be considerably less than when using the "brute-force" method — many screws, closely spaced.

Experience has definitely shown that the corrosion resistance of monel makes it preferable to other metals, even though they may have higher initial electrical conductivity.

**Installation**

As a result of discussions with many hams, individually and at group meetings, a new type of weatherstripping (identified as Metex TVI-20-S) has been designed especially for universal application to ham problems. It is furnished in a continuous strip compressed to a \( \frac{1}{4} \times \frac{1}{16} \) inch cross-section (see Fig. 1A). This strip is so constructed that the cross-section can easily be changed to \( \frac{1}{4} \times \frac{1}{4} \) inch, or to form a channel (see Fig. 1B) to fit spaces, such as the hinge side of a lid, where the space will not accommodate a thickness of \( \frac{1}{4} \) inch. Pulling one end of the strip apart will expose the longitudinal split in one side, and the remainder of the strip will easily open for the required length.

The sketches of Fig. 1A and B show one satisfactory method of applying the TVI-20-S. In each case, small holes are drilled at intervals of an inch or two and the stripping is "sewed" on around the edges of the opening with copper wire. The metal surfaces with which the stripping makes contact naturally must be thoroughly cleaned down to the bare metal. This can be done by scraping with a knife and then brightening up the surface with sandpaper or steel wool. Paint remover will make the job easier, but it must be applied very carefully to avoid damage to the finish adjacent to the desired surface to be bared. Apply the remover sparingly with a small brush and immediately wipe off any of the remover that strays away from the desired area. Within a quarter or half hour, the finish should become soft and wrinkle up. It can then be removed quite easily with a putty knife. Wipe off the surface with turpentine and finish up with sandpaper or steel wool.

While other methods may be devised to attach the weatherstripping to the enclosure, there are certain precautions that must be observed. Solder will soak into the material like water into a sponge. On hardening, it will destroy the resiliency of the mesh and may cause leakage for several inches on either side of the soldered spot. Similarly, adhesives that set hard will have the same effect, and even those that do not set hard should be applied sparingly in spots an inch or more apart, since most adhesives are dielectric.

**An Actual Application**

The photo shows how the author used the electronic weatherstripping on a Harvey-Wells TBD-50. This rig belongs to W2IMM who formerly had to operate mobile from the curb in front of his home to be TVI-free and then only when the trunk was closed, in spite of the low-pass filter in the antenna. He lives in a heavily-populated but good TV-signal area and likes to live at peace with his neighbors.

TVI-20-S was sewn around the front and the smaller rear openings of the cabinet, as shown in Fig. 1A. Note that all paint was first cleaned off and that the screws and nuts supplied with the rig are still used.

The photo also illustrates an interesting method of shielding louvers first used by W2TII. Electronic weatherstripping was used to make good metal-to-metal contact between the cabinet and the screen. The screen and stripping were held in place by passing self-tapping screws through a clearance hole in the cabinet and screwing them through the stripping and screen, and into a sheet-metal backing strip with tapping holes. The only evidences of any alterations on the exterior of the cabinet are eight screwheads per louver — no blistered paint from soldering. Actually, the backing strip need not be metal so long as it is stiff enough to compress all the stripping between screws. Wood strip, or other similar material, might be used,

(Continued on page 108)
A Seafaring Kilowatt

The "New Look" of W2ZX/M

W e li k e to keep a roving eye on one of America's favorite roving amateurs—Captain Henrik Kurt Carlsen, W2ZXM of Flying Enterprise fame. We thought you'd be interested in the new kilowatt rig "Captain Stay-Put" whipped together in spare time aboard his new command, Flying Enterprise II.

Kurt not only enjoys keeping a solid signal consistently on the air but he likes to "roll his own." And when he builds he does a seaworthy and airworthy job of it.

The transmitter, shown at upper right, is capable of putting out well over a kilowatt but is kept coating along at legal maximum input. Its r.f.-section tube line-up: VFO or crystal input to four 6AQ5 buffers/multipliers, 807 driver and push-pull 4-250As. The modulator section: a 6SJ7 preamp, 6S7J speech and a 6S7J driving a pair of 4-250As in class AB1. Except for the final tank coil, the outfit bears switches from 80 through 10 meters with choice of VFO or five crystal frequencies. Despite the fact that much operation is done outside the three-mile limit, Captain Carlsen's gear is constructed with TVI and BCI possibilities in mind.

There are six separate power supplies in Kurt's cool kilowatt. A special 5-kw. d.c. motor-generator is available for powering W2ZX/MM although the set-up is operable at reduced power directly off the Enterprise II main generator.

through a 2-kw. step-down transformer. Most relays are actuated by selenium-rectifier power units to avoid hum complications.

Strict maritime regulations must be observed when installing such a seagoing ham shack as W2ZX/MM. No part of the ship's commercial gear can be used for ham purposes nor can interference by the amateur layout be tolerated. There are other gimmicks to watch out for, too. For instance, you cannot employ plug-in power cords of lengths exceeding 1½ feet. (Did you ever see a landlubber station that could comply with that specification?)

The Captain also keeps a private 5-watt commercially-licensed station ready for action and tries his hand at radio-controlled model aircraft experimentation now and then. When 28-Mc. conditions permit, you'll have good opportunity to work W2ZX/MM, whether he's on the road to Mandalay or off the shores of Tripoli.

The entire r.f. section of Captain Carlsen's kilowatt is accounted for by the unit shown in two views below. Thorough coating with pressure-sprayed aluminum paint is one of the precautions necessary against sea corrosion. Compact construction is possible through use of forced-air cooling, yet all circuits are easily and quickly accessible for maintenance. Subchassis are of aluminum; the final, however, is mounted on steel. To ensure compliance with amateur power regulations, an overload relay kicks off the rig when the final input exceeds 990 watts. All construction was done in the W2ZX/MM shack, the Master's private cabin aboard Flying Enterprise II. "Captain Stay-Put" is installing a rotary beam so that he will no longer be tempted to spin the ship to vary fixed-antenna directivity!
In designing a mechanical filter that is not merely a slight variation of an old design, the following questions must be answered:
1) What materials will be used for resonators?
2) What mode of vibration will be used in each resonator?
3) What resonator dimension will be chosen when any dimension is arbitrary?
4) What coupling means, including material and method of operation, will be used between resonators?
5) How shall the different elements of the filter be joined together—by welding, soldering, one-piece construction, press fitting, or what?
6) Shall electrical circuits and ferrite resonators form part of the filter?
7) If metal resonators are used at the ends of the filter how shall they be damped?
8) Shall the filter be symmetrical or single-ended?
9) How shall drive and take-off be accomplished if the end resonators are metal?
10) How shall the filter be mounted so as not to cause detuning or unintentional damping?

Several of the above questions call for extensive research before they can be answered most fittingly for any given filter requirements, but in any case it is evident that a mechanical filter can take on an almost infinite number of physical forms. For example, if there were only ten possible resonator modes a six-circuit filter could be made up in a million different ways, according to the answer to Question 2 only. In a relatively brief introductory article such as this it would probably be confusing to try to discuss more than a very few of the possible filter forms, and it seems best to decide arbitrarily on a couple of simple forms for the purpose of illustration. The details of the calculations entering into the design will likewise, for simplicity, be omitted.

An I.F. Filter for 'Phone Signals

As a first example, then, let us choose a torsion filter with electrical end circuits coupled with ferrite resonators, and aluminum resonators

* 155 Hodge Road, Princeton, N. J.
† Part II of this article appeared in July, 1953, QST.

In this third and concluding installment two practical designs for mechanical filters are given, along with adjustment procedures. Their construction is admittedly beyond the ability and facilities of most amateurs, since accurate machine work and good test equipment are required. Nevertheless, even if you aren't in a position to experiment in this field you will find the article informative—and will appreciate why commercially available filters, using materials worth intrinsically only a few cents, cost as much as they do.

between the ferrites, as shown in Fig. 20. It is to be very selective so as to be useful for singlesideband reception or generation so it should have quite a number of circuits. Seven should be enough. It will be centered on 100 kc so that the resonators will be of convenient size. This frequency is useful as the second i.f. in double conversion receivers. A band of 3000 cycles/second will be sufficient for a single sideband so \( B \) will be taken as 0.03. Its output should be reasonably flat in the transmission band so the peak-to-valley voltage ratio will be taken as 1.05, which corresponds to a ripple of only about 0.4 db. As there are electrical circuits at both ends it will be of the symmetrical type. Let us further assume that the ferrites will be one-quarter inch in diameter and that the aluminum portion of the filter will be turned out of quarter-inch dural rod, all resonators being a half wave long. (Note that the physical length of a halfwave resonator is obtained by dividing the torsion-wave velocity of the material by twice the operating frequency so that the ferrite resonators will not be exactly the same length as the aluminum ones.) This completes the arbitrary specifications of the filter.

Calculation shows that the required coefficients of coupling between the end circuits and the ferrites are only a little over 2 per cent and that the \( Qs \) of the end circuits must each be 55. These values are readily obtainable.

Fig. 20 — Mechanical filter analogous to the electrical circuit of Fig. 19. High-Q mechanical resonators replace the three center circuits of that figure, while the end sections are magnetostriactively coupled to the electrical circuits.
The calculations of the various resonator and neck dimensions required to meet the specifications involve the densities and torsion wave velocities of aluminum and ferrite. If the densities are taken as 2.8 and 4.8, respectively, and the velocities as 3.1 and 3.3 kilometers per second, the result of the calculations is a drawing to be given to a machinist for the aluminum part of the filter as shown in Fig. 21. Note that the diameter (.0108 inch) of the necks joining the aluminum and ferrite resonators (at the ends) to give 1.66 percent coupling differs very little from the diameter (.0098 inch) of the necks joining the aluminum resonators, where the required coefficient of coupling is 1.6 per cent. However, as described in Part II, the coupling varies as the fourth power of the neck diameter so that a small change in diameter makes a relatively large change in coupling.

In Fig. 21 it was assumed that the hole in the ferrites is 0.04 inch in diameter. It makes little difference what the exact hole size is so long as it is small enough so that it makes little difference to the resonator energy. On the other hand, if it is too small, it is difficult to turn the tips down small enough to fit in the holes. It will also be noted that the tips have been made the same length as the ferrite resonators so that the ferrites can be cemented to the tips throughout the full length of the hole. This joint must be good and solid, especially at the ends of the ferrite, and the tips should be a fairly close fit in the holes. Armstrong’s A-2 cement is good for the purpose. It can be obtained from Armstrong Products Co., Argonne Road, Warsaw, Ind. It might be better to make the tips a little too long and file the excess off after cementing, as the exact length of the ferrite may not be known until it has been ground off to the right frequency.

**An I.F. Filter for C.W. Signals**

As a second example of filter design let us suppose we want a band of 300 cycles/sec at 100 kc. For c.w. use not many circuits are needed — four should be more than enough. But perhaps we would like very high frequency stability over a considerable range of temperatures. In this case the resonators should be made of NiSpan-C, which is a nickel alloy obtainable from the H. A. Wilson Co. of Newark, N. J. This material is sufficiently magnetostrictive to permit drive and take-off (although with considerable transmission loss even for narrow-band filters) so that ferrite transducers are not needed. It is hard to machine, however, and the filter is best made by grinding. The material can be obtained in quarter-inch rods and so the resonator diameter will be assumed to be one-quarter inch.

The c.w. filter is too narrow to allow the use of electrical end circuits, so the resonators will all be made of the metal and hence the required terminating damping must be supplied mechanically. To simplify construction, a single-ended filter will be chosen as it requires damping at one end only.

This time we must provide enough mechanical damping to reduce the apparent Q of the first resonator to 328. The most stable way to do this is to attach a mechanical transmission line to the free end of the first resonator. This is simply a long wire of diameter chosen to take away vibration energy at the rate necessary to bring the Q down to the desired value. An infinitely long wire would be ideal but a moderate length such as a foot or two can be used if the wire is wrapped with electrical Scotch tape to cause enough attenuation so that reflections from its far end are not noticeable. For compactness, the wire can be coiled up, provided the total circumference is large compared to the wavelength of the torsion waves traveling along the wire. The wire size required depends on the density and velocity of propagation of torsion waves. Since copper wire is available in closely graded sizes, copper is a logical choice for the line. For copper, calculation shows that the diameter required in this case is 0.009 inch, which is between 13 and 14 gauge. Probably either No. 13 or No. 14 would do well enough.

Since the Q of the first resonator is still pretty high even with the line connected to it, the line can probably be attached first and the resonator tuned afterwards. It can be soldered or pressed into a hole drilled into the end of the resonator just far enough to grip the wire solidly.

So much for the mechanical design of the filter. Drive and take-off coils are to be placed over the first and last resonators (respectively or vice versa). The coils are preferably tuned so as to

---

Fig. 22 — Mechanical filter for c.w. reception. Its bandwidth is 300 cycles centered on 100 kc. The material is NiSpan-C. The complete filter arrangement is shown in Fig. 23. Except as indicated, dimensions are in inches. Cross-section is circular, with arrows indicating diameters and upper numbers indicating length.
to obtain maximum transmission, but due to eddy currents in the metal the Q of the circuits will be so low that they will not affect the transmission characteristics appreciably except that they will help reject frequencies well outside the passband. The resonators must be permanently biased by briefly shorting a battery through the length of the structure, the time of contact being very short so that no heat will be developed. The pattern which changes shape at resonance. If the figure is not a good ellipse it means that there are harmonics somewhere, but this does not prevent observing resonance although harmonics in the generator output will prevent obtaining a perfect bridge balance. The detector or output arm of the bridge does not have either end grounded, so a small transformer is used to obtain single-ended output. This may be a ferrite torus with ten or

![Diagram of circuit](image)

**Fig. 23** — Circuit using the filter of Fig. 22. Constants associated with tubes are conventional. Inductances of the drive and take-off coils, although not critical except that they determine the impedance level so a large L/C ratio is preferable, must be such as to be resonated to the operating frequency by the variable condensers. Coil Qs are not important in this filter. The coil forms should fit fairly closely over the resonators but the filter should be supported so as not to touch them. Shunt feed is indicated for the drive coil so there will be no d.c. in the coil to magnetize the resonator; however, this precaution may not be necessary.

working drawing for the filter will be as shown in Fig. 22, if the velocity of NiSpan is $3 \times 10^3$. The circuit is given in Fig. 23.

**Tuning**

The most difficult part of the work is the final tune-up. For this, some sort of bridge scheme is very helpful — and, in fact, a necessity when resonance is to be detected in ferrite magnetostrictive resonators. To supply the bridge a good stable signal generator is needed, with a dial or other means capable of measuring frequency differences as little as one part in ten thousand. The output of the bridge is fed through a reasonably flat video amplifier to an oscilloscope. A suitable layout is shown in Fig. 25.

In the bridge shown, resistors $R_1$ and $R_2$ may be more or less equal to the output impedance of the signal generator; the coils, with the sample and dummy in place, should be of the same order of impedance at the frequency of operation. Coarse balance of the bridge is most conveniently obtained by adjusting a dummy in one of the coils which is generally similar to the resonator or sample to be observed, and a finer balance by adjusting a smooth-running potentiometer, $R_3$, whose resistance is small compared to $R_1$. The dummy must not be biased or it will produce responses itself, which may confuse matters.

The idea is to balance the bridge to a very small output at frequencies off resonance of the sample so that when the generator frequency passes through the resonance frequency of the sample a twitch in the scope pattern will be seen. Sometimes it is helpful to supply the scope with horizontal deflection voltage direct from the generator, so as to produce an elliptical pat-

so turns concentrated at one side of the torus and several times as many output turns concentrated on the other side, if the video amplifier has high input impedance — otherwise, the output turns are adjusted to suit the amplifier input impedance. The whole set-up is less sensitive to body capacity and stray pick-up if it is built to be shielded as much as possible and connections are made by concentric cables with the outer conductors grounded.

Assuming such a set-up and some experience in balancing it and observing the responses of single resonators, there are several ways to attack the problem of tuning the elements of a complete filter. None of them is easy and entirely satisfactory. If it were possible to clamp perfectly all the resonators except the one being tuned, that one could be tuned like a single resonator. When quarter-wave necks are used the resonator

![Diagram of clamp](image)

**Fig. 24** — Suggested clamp for metal resonators. If the axial length is small, one such clamp may be put on each end of a resonator. The clamps may be of brass. The dimensions should be unimportant unless by bad luck the clamp itself happens to exhibit resonance at the operating frequency.

should be tuned to the middle of the desired band, since quarter-wave necks clamped at their far ends should not affect the frequency. If the observed frequency is too low, file a little off the resonator ends. It is not necessary to file the entire end face — just take a little off the
cording. If the frequency is too high, file a slight groove around the middle of the resonator. The resonators should be close enough to the right frequency to begin with so that the amount of filing will be quite small. The clamps should grip the resonators very firmly at several points around each end, as indicated in Fig. 24. If the clamps are really effective only a single response should be observed even when clamps are put only on the resonators adjacent to the one being tuned. By this process a narrow-band filter can usually be tuned quite well, but of course the process can be used only if all the resonators are magnetostriuctive or are made so by plating them with about 0.001 inch of hard nickel.

Another method, which can be used on the phone filter first described with the ferrites cemented on, is to put one of the ferrites in the sample coil of the bridge, clamp the aluminum resonator next to it, and tune the ferrite by grinding the ends or the middle. Then move the clamp along to the next aluminum resonator but keep the ferrite in the test coil. Now two resonances will be observed. If the two do not fall at equal distances on each side of the ferrite frequency it must be the fault of the resonator next to the ferrite, so it is tuned until they do. Then the clamp is moved one step further along whereupon the ferrite will show three responses. If the middle one of these does not fall on the ferrite frequency the third resonator should be tuned to make it do so. This process can be continued indefinitely in theory, always tuning the most recently unclamped resonator to make the spectrum of responses shown by the ferrite symmetrical about its own frequency, but as cumulative errors arise in practice it is better to turn the filter around after reaching the middle and repeat the process from the other end.

Even if by the above methods or otherwise, the mechanical part of the filter has been perfectly tuned, the battle is not yet won, for it remains to tune and couple the end circuits correctly and to adjust their Qs to the required value. This process is complicated by the fact that any change in coupling, by moving the coil more or less over the ferrite, changes the tuning considerably, and even to some extent the Q of the coil. The systematic procedure is to connect the coil to a Q-meter and adjust its coupling to the ferrite so that with the resonator adjacent to the ferrite clamped, and the circuit properly tuned, two responses are observed on the Q-meter, separated by the fraction $k_p$. To get these responses the coil Q must be fairly high. Then, however, human nature being what it is, the systematic procedure will probably not be followed. Instead, a more or less successful adjustment of the coil coupling, tunings, and Qs will be made by cut-and-try with the filter connected up for transmission. This method will probably give satisfactory performance if the theoretical curve is not really needed, and in fact might well be the best method if a sweeping generator were used and the output curve displayed on a scope so that the effects of the various adjustments on the performance curve would show up at once.

Some Miscellaneous Remarks

The filter may well be built in a chassis containing an input tube and an output tube and the tuning condensers. Good shielding must be provided between input and output circuits in order to reduce the full attenuation of the filter at frequencies well outside the band. The mechanical part should be so mounted that the points of large motion do not touch anything. The resonators can be supported at their centers, or in the case of torsion elements, needle-point supports can be inserted into tiny cone-shaped holes at each end of the structure. The c.w. filter that has been described is small enough so that it could be supported entirely from the wire line which in turn can be clamped between pieces of soft rubber or felt. The complete filter unit can be tested by supplying voltage to the grid of the input tube from the signal generator and measuring the output voltage across a resistor in the plate circuit of the output tube. The performance curve can be made by holding the signal generator voltage constant and plotting output voltage against frequency, or by plotting the generator voltage required to keep the output constant.

Ferrites are too hard to be tuned with a file. A grindstone will cut them but is likely to crack them. An iron grinding turntable with Carborundum powder in water is fine but not usually available. Fine emery or garnet paper and patience is a practical answer.

Theoretically all the dimensions can be scaled down by a given factor to give an operating frequency scaled up by the same factor. (The fractional bandwidth is not changed but the bandwidth in cycles goes up in proportion to the operating frequency.) It is recommended, however, that any initial experimenting be done at a frequency such as 100 kc, where the dimensions of the parts are not too small. For 455 kc, for example, the

(Continued on page 110)

![Fig. 25 — Test set-up for adjustment of frequency of magnetostriective resonators. $R_1$ and $R_3$ are approximately equal to the output impedance of the signal generator, while $R_2$ is a potentiometer having low resistance compared with $R_1-R_3$.](image)
The "Plain Ground-Plane" Antenna
Solid and Simple Construction for 10 Meters

BY S. E. MCCALLUM,* W2ZBY

LADS with machine shops or unlimited funds can turn the page. For this "plain groundplane" is for plain folks who have a rough time getting machined fittings made. We are talking about a 10-meter ground-plane antenna that's inexpensive, light, sturdy, efficient — and b-step-e.

Back in 1959, the boys in Bergen County, New Jersey, were going mobile like crazy in response to the call of civil defense. We asked Antennexpert Bob DeCamp, W2AFC, how to put up a simple little vertical, the better to work all the mobiles from home.

"Put up a ground-plane," he said.

The thought made us shudder — what with not having access to a machine shop to make fittings and not being too sharp at figuring out how to match a line to such a radiator. A few weeks later we tried him again — explaining that all we wanted, really, was just vertical polarization that would do the trick without too much time or cost.

"Put up a ground-plane," said Bob.

So we strung up a folded dipole vertically in a tree — a trick Ralph Hasslinger, W2CVF, used — and to our knowledge still uses — to blast the county c.d. channels quite successfully with 75 watts. But our 110 watts on the same lash-up didn't even blast the flies off the insulators.

Ralph wouldn't divulge the secret of the magic powder he sprinkles over all his gear, so we approached DeCamp again — this time talking vaguely about various types of verticals, hoping to trick him into a general discussion wherefrom we could extract some ideas on a nice simple affair. He gave us a cold eye and said:

"Put up a ground-plane."

Instead, we made a coaxial vertical antenna à la ARRL Antenna Handbook. We used TV masting for the skirt, running the coax up the middle with the braid attached to the top of the skirt and the center conductor to the base of an 8-foot whip mounted above. The boys politely reported 9-plus and changed the subject. The signal seemed to hop around quite a bit: A half mile in one direction, Don, W2LST, would barely hear it; on the other hand, Doc, K2BY, 10 miles the other way, said it was "way over 9." The more we used the coaxial vertical antenna, the more fellows gave these reports — and the less we liked it for omnidirectional work with mobiles.

We picked up the 'phone to call DeCamp again — and then put it down without making the call. No use, we thought. He'll just tell us to put up a ground-plane.

And Ground-Plane It Is

To get our mind off the subject we opened the September, 1952, issue of QST that had just arrived. But there is no rest for the wicked. For on page 18 we found "Matching Coax Line to the Ground-Plane Antenna," by Robert T. DeCamp, W2AFC — an article complete with cut-and-dried (not cut-and-try!) formulas for making a ground-plane for any frequency out of whatever material you happen to have on hand for radiator, radials and feeder. Well, we had radials (sections of TV masting) and we had feed line (70-ohm coax). The only thing lacking

---

* 1 Swaggertown Road, Scotia, N. Y.
was a really suitable radiator. DeCamp already had told us to stay away from seamed TV mast-ing as a radiator, and we wanted something with bigger diameter — thus broader — than wire or whip.

Lo and behold, we looked out the window and saw our good friend Sal, W2HGT, plodding up the driveway with a beautiful 9-foot length of 1½-inch-diameter aluminum tubing over his shoulder.

“What’ll I do with it?” he asked. “I’ve two more pieces like this at home.”

“Give me two of them and I’ll make us each a ground-plane that’ll knock the boys into the back seats of their cars,” we replied.

“Good deal,” said Sal.

When he left, we sobered a bit at the thought of constructional problems ahead. But, fired with imagination from DeCamp’s article — and with a background of practical know-how on how not to get vertically polarized! — we boldly put through the landline call to DeCamp after all and announced that we were going to put up a ground-plane. We held the ‘phone away from our ear expecting blasts of: “I told you so,” and “It’s about time.” But he fooled us; he quietly said:

“Let me know when you’re ready and I’ll come out and help.”

Pencils and scratch pads melted away for about a week while we tried to figure out an easy and inexpensive way to mount all the components. We wanted no machined fittings — yet something light, and strong enough to laugh at an 80-mile-an-hour gale. The first finished design looked like a telephone pole complete with cross-arms and would have weighed, conservatively, about three tons. More pads, pencils and head-scratching until finally we arrived at the design shown in Fig. 1.

The finished product doesn’t look like it was made in a factory. It wasn’t — it was hammered out, literally, in the back yard with hammer, pliers, file, saw, screwdriver and brace and bit. But —

It’s easy to make.
It’s strong.
It’s light.
It’s cheap.

And best of all, it lays down a signal evenly for miles around — with a standing-wave ratio of 1.5 to 1 at the edges of the 10-meter phone band!

What do the locals tell us now? “Best signal we’ve ever heard from W2ZBY, OM.” And one time we hooked on a little 6A8G rig, and were tickled pink to be called a liar when we announced we were running 9 watts — especially inasmuch as the antenna was down among some trees only 9 feet above ground! Sal tells us (yes, we really did make a second ground-plane for him) that, confidentially, the boys report his 45 watts now knock out old master filter-builder Ralph, W2CVF, with the magic folded dipole hung up in a tree.

**Construction**

The drawings show the construction, but we’ll run through the procedure with a few hints learned the hard way. Start with the polystyrene and wood blocks that hold the radiator to the 2 × 4 upright. We used this clamp-type construction because we had the material and because it is strong. We defy any 100-mile-gale in the world to rip the radiator off the upright! In fact, our ground plane already has remained solid in a gale that preteezed W2ALZ’s triangular aluminum tower. In making these clamp-insulators, each set of blocks should be clamped in position on the 2 × 4 and drilled all at once. This saves a lot of fussing when the long 1½-inch bolts are slipped in place. The drawings show the poly blocks have round slots to provide a good grip on the radiator. A half-round file does the job — and we found that a can of beer applied internally during this tedious process helps considerably.

The next job is to drill the 1½-inch hole in the 2 × 4 upright. Two important points here: The hole must be precisely perpendicular to the 2 × 4, because a fraction of an inch off at the center means 6 inches or more upward and downward tilt at the ends 8 feet away. Second, the radial should fit snugly to prevent horizontal play that would put strain on this weakened point in the 2 × 4. We used an expansion wood bit which was set a trifle too conservatively and so we had to file out the hole to pass the radial.

Be sure to measure the radial itself before setting the bit. The second time we did the job (building the one for W2HGT) we set the cutter on the expansive bit out a trifle farther, planning to shim the radial up snug. However, fortune smiled and neither file nor shims were necessary.

(Continued on page 110)

August 1953 37
Adding a Bandspread Range to the BC-221 Frequency Meter

Greater Accuracy in the Ham Bands

BY BEVERLY DUDLEY

For the measurement of amateur frequencies, the dial-reading accuracy of the popular BC-221 heterodyne frequency meters can be quadrupled by adding a simple bandspread arrangement. This provides a third frequency range whose fundamental frequency is continuously variable from 3500 to 4000 kc. One switch and two adjustable capacitors are the only components needed to add the bandspread range, and the two general-coverage ranges of the instrument are available at any time they may be required. By bandspreading the BC-221 frequency meter so that it covers only the higher-frequency quarter of the high-frequency range, it is possible to read frequencies to about ±10 cycles in the 50-meter band, and to about ±80 cycles in the 10-meter band, provided the instrument is carefully used and is correctly operated and checked against a properly-adjusted 1-Me. crystal oscillator which forms part of the instrument.

The circuit of Fig. 1 is a typical schematic wiring diagram for the variable-frequency-oscillator section for BC-221 units. The circuit constants given include the range of values which are likely to be encountered in different models. It seems likely that the same diagram would also apply to the LM equivalents of the BC-221 meters, although no information is at hand by which this statement can be checked.

Modifications

The diagram of Fig. 2 shows the circuit of the instrument after modification to provide bandspread operation. The necessary changes are indicated by means of heavy lines. A 3-position 4-pole switch is required. In addition, an adjustable capacitor, C10, in series with the main tuning condenser, is needed to restrict the frequency range for bandspread operation. In order that the calibration for bandspread operation may be made independent of that of the general-coverage high-frequency range, a separate padding capacitor, C11, is also required.

The 3-pole 2-position range switch (S1, Fig. 1) normally supplied with the frequency meter is replaced by S2 (Fig. 2), a 4-pole 3-position wafer switch of small size. The Mallory 3143J (shorting) or 3243J (non-shorting) switches, which are but 1 1/4 inches in diameter, or miniature Centrallab wafer switches, should do nicely for this purpose. In substituting the band-changing switch, it is recommended that as much wiring as possible be done on the switch before it is mounted on the coil sub-assembly, since space in the BC-221 is at a premium. In replacing the range switch, be careful not to disturb the circuit elements, or their adjustments, any more than is absolutely necessary to make the substitution, for the instrument can be

---

*22 Temple St., Belmont 78, Mass.

---

Fig. 1 — Typical circuit of the oscillator section of BC-221 frequency meters. Values given below include upper and lower limits for components found in different models.

C1 — Trimmer — 1 to 2 μfd.
C2 — Tuning condenser — 150 to 235 μfd., max.
C3, C4 — Low-frequency adjustment — total about 25 μfd.
C5, C6 — High-frequency adjustment — total about 25 μfd.
C7 — Grid condenser — about 250 μfd.
C8 — By-pass condenser — 0.002 to 0.1 μfd.
C9 — Coupling condenser — 10 to 50 μfd.
R1 — 1500 to 4500 ohms.
R2 — 30 to 400 ohms.
R3 — 0.15 to 0.33 megohm.
R4 — 7500 to 20,000 ohms.
R5 — 50,000 ohms.
L1 — Tuning coil — 6.5 to 10 mh.
L2 — Tuning coil, 24 to 39 ohm.
S1 — 2-position range switch.
easily thrown off calibration.

Not all models of the BC-221 frequency meter are alike in construction or circuit design, so no specific directions can be given for the placement of the bandspread capacitor, $C_{10}$, or the bandspread paddle, $C_{11}$. The capacitance of these two condensers depends upon the circuit constants for the particular model BC-221 meter being modified, and only approximate values can be indicated. Most models of BC-221 frequency meters use a tuning capacitor having maximum capacitance of 200 $\mu$fd, but values as low as 150 $\mu$fd, and as high as 225 $\mu$fd, are encountered in some models. A bandspread tuning capacitor, $C_{10}$, adjustable over the range of from 60 to 120 $\mu$fd, should be adequate in any case. The bandspread capacitor can be made by wiring a fixed capacitor of 50 $\mu$fd, in parallel with a small adjustable capacitor of 75 $\mu$fd. Maximum capacitance. The paddle for the bandspread range, $C_{11}$, should probably have a maximum capacitance of somewhere between 5 and 20 $\mu$fd. A certain amount of experimentation may be required to select the proper values in any given case. Once the proper capacitance values are determined, they need not be changed.

The changes required for adding the bandspread range will upset the calibration of the BC-221 frequency meter. Consequently, the calibration on both general-coverage bands should be checked when the necessary wiring modifications have been completed. If the changes have been carefully made and the added parts have not been mounted too close to the coils, it will probably be found that the instrument can be brought back to its original calibration merely by properly setting the trimmers, $C_3$ and $C_4$, for the low range, and $C_5$ and $C_6$ for the high-frequency band. If adjustment of these trimmers does not bring the unit back to its original calibration, the meter requires recalibration. Calibration is a straightforward, if tedious, process but can be accomplished without any auxiliary laboratory equipment by the procedure described previously by the author. When the instrument has been calibrated for both general-coverage ranges, the bandspread range should be calibrated.

**Bandspread Calibration**

Probably the best method of calibrating the bandspread range is to begin by locating the 3500- and 4000-ke crystal check points near the ends of the dial scale. With a receiver tuned to 3500 ke, and $C_{11}$ set to its midposition, adjust $C_{10}$ so that zero beat is obtained when the BC-221 dial reads about 200 divisions. Then set the receiver to 4000 ke, and, while leaving $C_{10}$ untouched, vary $C_{11}$ until a zero beat is obtained when the BC-221 dial reads about 4800 divisions. This procedure leaves 200 scale division unused at each end of the dial. Several successive trial adjustments may be necessary before these two conditions can be fulfilled simultaneously.

With the frequency limits for bandspread operation thus delineated, an approximate calibration curve for the meter can be made by means of a communications receiver covering the 80-meter band, and plotting frequency versus dial setting on graph paper. After such an approximate graphical calibration is at hand, a number of calibration check points can be more precisely determined by the procedure outlined below (also in reference¹). Finally, a calibration book for the bandspread range should be prepared.

With the BC-221 meter set for "crystal check," exact dial readings for the major crystal check frequencies in the range between 3500 and 4000 ke should be determined. In this frequency range, the major crystal check points (together with their approximate dial readings), when using the 1000-ke crystal normally supplied, 

(Continued on page 114)


*In an earlier issue of QST, the author discussed the calibration of the BC-221 frequency meter for the benefit of numerous hams who had picked up these instruments minus the calibration charts. In this article, he describes a simple method of adding a bandspread range that quadruples the dial-reading accuracy for amateur bands.*
The Multiband Antenna Coupler

Six Bands Without Coil Changing

BY GEORGE L. THOMPSON * W2JII

The antenna coupler described in this article was designed chiefly to simplify band-changing when using a bandswitching transmitter. No plug-in or switched coils are used, and only a single split-stator tuning condenser is required to cover all bands from 3.5 to 28 Mc. Moreover, this design features simple construction with relatively few parts which are to be found in most junk boxes.

The Circuit

The circuit of the coupler as used at W2JII, and the method of connecting it to the transmitter and receiver are shown in Fig. 1. When 3.5- or 7-Mc. energy is fed from the transmitter to link \( L_3 \), the circuit will act as if it were connected as in Fig. 2A because the two halves of the small coil \( L_2 \) will have little reactance at these low frequencies, and may therefore be thought of as long connecting leads between the grounded end of the large coil, \( L_1 \), and the condenser stators. Fig. 2A shows that we have a simple parallel-tuned circuit under these conditions, with the two sections of the condenser in parallel across coil \( L_1 \). This circuit may be resonated at either 3.5 or 7 Mc. if the total maximum-to-minimum capacitance ratio of the condenser is at least 4 to 1, and if the inductance of the coil \( L_1 \) is such as to resonate at 7 Mc. with the total minimum capacitance.

When 14-, 21-, 27-, or 28-Mc. energy is fed from the transmitter to link \( L_4 \), the circuit will act as if it were connected as in Fig. 2B, because both the center of coil \( L_2 \) and the rotor of the condenser are at ground r.f. potential, and may therefore be connected together by coil \( L_1 \) with no change in the electrical properties of the circuit. Fig. 2B shows that we also have a simple parallel-tuned circuit under these conditions, but with the two sections of the condenser in series across coil \( L_2 \). This circuit may be resonated at any frequency between 14 and 28 Mc. if the inductance of coil \( L_2 \) is such as to resonate at 28 Mc. with the minimum capacitance which, in this circuit, is half the capacitance of one section of the condenser. The maximum-to-minimum capacitance ratio in this circuit will still be the same as when the two sections of the condenser were in parallel, which again permits a 2-to-1 frequency coverage.

With the condenser nearly open, the coupler will tune to either 7 or 28 Mc. With the condenser nearly closed, it will tune to either 3.5 or 14 Mc.

Because of the arrangement of the coils \( L_2 \) and \( L_4 \) in this circuit, only one of them at a time can be hot. This enables us to connect two antennas at the same time to the coupler, one on each coil. The one on the coil that happens to be cold will not affect the circuit while the one on the hot coil is taking power from the transmitter. If the antennas are designed so that one may be used on both 3.5 and 7 Mc., and the other on all the higher-frequency bands, no switching of antennas will ever be required. If you use more than one low-frequency or more than one high-frequency antenna, provision must be made for changing their connections to the coupler when changing bands. But one high-frequency and one low-frequency antenna may be left connected to the

---

*1911 Woodlock Ave., Asbury Park, N. J.

**Fig. 1** — The multiband antenna-coupler circuit and method of connecting to transmitter and receiver. Components and values are discussed in the text.

---

*In this article, W2JII neatly solves the problem of the bulky inconvenience of the usual antenna tuner. Working on the principle of the multiband tuner, all bands from 80 to 10 can be covered with two coils and no switching. The simplicity and compactness should appeal to the low-power and high-power man alike.*
center-fed multiband antenna designed for 14, 21 and 28 Mc. However, as Fig. 2A indicates, the circuit is unbalanced for the two lower-frequency bands. Individual dipoles for 3.5 and 7 Mc. with matched low-impedance lines can be coupled inductively, as shown. A single antenna consisting of a half wavelength of wire for 3.5 Mc. (or multiples of a half wavelength for 3.5 Mc.) can be used for both 3.5- and 7-Mc. operation by connecting it to the rotor of the tuning condenser. In this case it is a simple voltage-fed wire.

By removing the ground connection at the junction of L1 and L2, and moving the L3 link coil to the center of L1, the circuit will be balanced for both high and low frequencies. However, the center of L2 will then be hot at low frequencies and it will be necessary to provide good insulation between L2 and L4. Also, it will probably be inadvisable to leave feeders connected to L3 while operating at 3.5 Mc. or 7 Mc. from the consideration of simultaneous radiation from both antennas, possibly with an increase in harmonic output.

The photograph shows a 300-ohm flat line from a 20-meter folded dipole clipped across a turn at the center of the high-frequency coil, L3, and the end of a half-wave dipole for 3.9 Mc. clipped to the frame of the tuning condenser which is hot at this frequency.

The location of the coax antenna relay between the coupler and the receiver, when in the receive position, puts the coupler between the antenna and the receiver. The received signal is built up by the resonant circuit of the coupler, so the greatest response to incoming signals is automatically secured at and near the frequency to which the transmitter is tuned. Practically no signal will be received, however, when the receiver is tuned to some other band than that to which the coupler is tuned. This is in some respects an advantage, and in others a disadvantage. One advantage is the reduction in the amount of noise that reaches the first stage of the receiver.

coupler at the same time. If several antennas are to be used, the various feed lines should be equipped with links or clips to make it possible to change antennas quickly.

Tests have shown that the simultaneous connection of the two antennas does not result in any noticeable increase in harmonic output. The coils in the tuner have been so proportioned that when operating on the lower-frequency bands, the circuit is detuned considerably from resonance with harmonics falling in the higher-frequency bands.

Fig. 2B shows that the circuit is a balanced arrangement for the higher frequencies. Therefore, it is suitable for use with almost any type of feed system, and is conveniently adaptable to use with a multiband antenna tuner, showing the method of mounting the coils and link switch.

August 1953
The Condenser

Since it is believed that most hams prefer to use materials on hand, or easily obtainable, in constructing a device of this type, only a general description of the construction and critical values will be given. The model shown in the photograph was made entirely from parts obtained from the junk box.

The condenser should be selected first. It must be a dual-section job, and must have a maximum-to-minimum capacitance ratio, somewhat greater than 4-to-1. A 5-to-1, or greater, ratio is desirable. A condenser having a maximum capacitance of 140 or 150 µfd. per section will be suitable if its minimum capacitance is not over 30 µfd. The one shown is a Cardwell with a maximum capacitance of about 240 µfd. and a minimum capacitance of about 30 µfd. per section. It is larger than necessary, but happened to be available.

The original insulators, having been broken, were replaced with lucite strips and stellite bushings. The bushings were found necessary when the lucite bubbled up internally at critical points under the influence of the r.f. The voltage rating of the condenser depends upon the power output of the transmitter. A plate spacing of 0.047 inch will stand about 1500 volts and is sufficient for an r.f. power of 500 watts. For greater power, wider plate spacing should be used. The coupler shown is used on a 400-watt plate-modulated transmitter.

The mechanical construction of the condenser selected will determine how the coils and s.p.d.t. switch are to be mounted. The coils, L1 and L2, are permanently soldered to the condenser terminals since they are never changed. In the model shown, a soldering lug is bolted to the center of each lucite strip to act as a tie point for the center tap of L3 on one side, and a tie point for the grounded end of L1 on the other side. These two points are then joined with a heavy wire running across the top of the condenser. The outer braid of the RG-8/U from the coax relay is soldered to the center of this heavy wire. One end of each of the link coils, L3 and L4, is also soldered to this same point. The other ends of the link coils are soldered to the switch contacts. The center conductor of the coax is soldered to the movable arm of the switch. The switch is mounted on stand-off insulators and homemade metal brackets supported by the condenser frame itself.

Since the frame of the condenser in Fig. 1 is hot when on 3.5 or 7 Mc., the condenser must be insulated from the chassis. Any suitable stand-off insulators may be used for this purpose. In the model shown, stellite bushings were used to insulate metal stand offs. In any case, be sure to provide sufficient spacing to prevent flashes to the chassis. The tuning dial must also be insulated from the condenser drive shaft. A ceramic coupler or section of insulated shaft may be used for this purpose.

Coils

The sizes of the coils are fairly critical. As pointed out before, the inductances of L1 and L2 will depend upon the minimum capacitance of the condenser used. L4 is made of 1/2-inch copper tubing (No. 10 wire would do). This coil is 2 inches in diameter and about 1 1/2 inches long. If the minimum capacitance of the condenser is about 30 µfd. per section, 6 turns will be required for L2. If less than 30 µfd., 7 or 8 turns may be needed to enable the circuit to tune from the high end of the 28-Mc. band to the low end of the 14-Mc. band. The low-frequency limit will depend upon the maximum capacitance of the condenser. If this is somewhat more than four times the minimum capacitance, no trouble should be encountered with a 6-turn coil for L2. A grid-dip oscillator will quickly show if L2 has the proper inductance. This coil should be adjusted before L1 is attached.

Coil L1 should be made of No. 12 wire or heavier, 2 inches in diameter and about 2 1/2 inches long. This coil will require 12 to 14 turns. The grid-dip oscillator again may be used to check the frequency range by coupling it to coil L1. coil L2 being left in the circuit. It should be possible to tune from the high end of the 7-Mc. band to the low end of the 3.5-Mc. band if L1 has the proper inductance.

If 50-ohm coax is used to connect the transmitter to the coupler, the link coils, L3 and L4, should have a reactance close to this same value. Five turns will therefore be required for L3, and 1 turn for L4. These coils are coupled as shown in the photograph. All coils are air-wound and supported only by their leads. The 1-turn link is made of No. 12 well-insulated wire, as it is held in place by friction between the center turns of L3. The 5-turn link is made of No. 12 enamel-covered wire. Both link coils are 2 inches in diameter.

Adjustment

The adjustment of this coupler is fundamentally the same as for any of the more conventional types. The general idea is to get maximum transfer of power from the transmitter to the antenna. To do this requires a low standing-wave ratio on the line between the transmitter and the antenna coupler. This is accomplished by making one of the various antenna feed lines that are to be connected to the coupler all look like 50 ohms to the transmitter. Detailed data on one procedure for matching to flat lines may be found in February, 1950, QST. This method requires the use of an r.w.r. bridge in the line line. With the model described in this article, an antennscope was used to make the necessary adjustments. To use this instrument, disconnect the link line from the coax relay, or from the receiver, whichever is more convenient, and connect this end of the line.

*(Continued on page 116)*
BY ELEANOR WILSON, W1QON

Last month the YLRL election results arrived so late that there was only time to list the new officers. Further information about them is provided in this issue. Look for information and photographs of the various YLRL District Chairmen in YL columns to come.

The new President, Margaret Wells, W1BCU, has capably served YLRL for the past two years as Secretary-Treasurer and is well prepared for her new duties.

* Ruth Siegelman, W2OWL, the new Vice-President, has had four terms of office in the N.Y.C. YLRL. Ruth, whose OM is not licensed, operates ten 'phone.

Barbara Houston, W3QOF, is the new Publicity Chairman. The XYL of W3MAX, Barbie is a former YLRL Harmonies editor (1949).

Readers should already be familiar with the new Secretary-Treasurer, Miriam Blackburn, W3UIUG. Miriam has merited much praise for her outstanding work as editor of Harmonies during the past term. The Ladies’ Amateur Radio Klub of Chicago and vicinity (LARK) has agreed to assume editorship of Harmonies for the current term.

As of June, 1953, there were over four hundred YLRL members, with the membership growing weekly. The club was organized in 1939 by Ethel Smith, W3MSU (then W7FWB). A letter from her, published in QST, expressed curiosity as to the actual number of women amateurs. Ethel requested all YLs to make themselves known to her, with the idea of banding together. Ten girls answered, a constitution was drawn up, and the YLRL emerged.

Any licensed woman amateur radio operator may join. Novices, too, are invited to join; however, their membership is limited to the duration of validity of their licenses. All licensed YLs, regardless of age, are eligible, and YLs of all countries and continents are warmly welcome.

Write President W1BCU at Woodland Road, Foxboro, Mass., or any of the other officers and they'll be pleased to answer questions you may have concerning the YLRL organization and its activities.

YLs Active in Emergencies

Boquets to the many YLs who have so capably handled reams of traffic during and following the country's recent storm disasters. It would be impossible to list all of the girls, but we're proud of their splendid example of unselfish service to community and country!

Keeping Up With the Girls

Newly-licensed DL6OSM, Margret, of Lubeck, Germany, is the daughter of DJ1AD, Hilde. At present KL7ANG is the only active YL in Anchorage, although there are several others in town. Nancy, who is Sogy-Texas, of the Anchorage Amateur Radio Club, operates 75 and 80. Unfortunately, both W7NJS, Beth, and W7OVO, Irma, lost their husbands (W7HJ and W7BMM respectively) by death within two days of each other. W5RZJ, Louise, was pleased to meet thirteen YLs at the New Mexico State Picnic at Roswell... KH6A00/2, Lee, is now residing in Bethpage, Long Island... YLs who attended the annual Oregon Amateur Radio Association Convention at Salem were W7s ECC FKS FWR GLK HHI ITZ JNS NTT ONM QWX QXH RAX RIC SBR SJW SPC, W7s RVM RZD and SYF... W6NXN, Janie, is a nine-year-old YL from St. Louis, Mo... W4UDQ, D.B. and OM, W4HDK, are happy about the new arrival at their house—a son on May 12th... W4YCB, Evelyn, will be in Florida for the next two years... OM W1BFT, who received YLCQ No. 1, estimates that he has worked some 150 YLs. W1Q0Y.

(Continued on page 180)
A few minutes with diagonal cutters and a soldering iron produced this base and meter support.

Quick-and-Easy Chassis

Simple Construction for Experimenters' Gear

BY S. MILTON THOMSEN,* W2CGN

Today's small and lightweight radio components do not require the ponderous, hard-to-work chassis to which we have become accustomed. Hardware stores sell a material almost ideal for making small chassis and subchassis. This material is called "hardware cloth." It is a heavy wire screen of quarter-inch mesh, costing about ten cents per square foot. With a square yard or two on hand, you can have a chassis of the size and shape you want, just a few minutes after you decide you want it.

Cutting requires only tin shears or a diagonal cutter; bending is easily and neatly done along the edge of a board or in a small vise. Spot-soldering holds the bent-down edges in place. No small holes need be drilled; wires can be brought through anywhere. Larger holes, any size or shape, are cut with a diagonal cutter.

Soldering directly to the chassis is easy even with small pencil-type irons, because the screen is well tinned, and there is not much material in it to conduct heat away. No grounding lugs are needed and items like tie points and sockets (with metal shells) mount more quickly with solder than with bolts.

Rigidity of the finished chassis is surprisingly good. Even small filament or power transformers are well supported when mounted at a corner. If necessary, bracing cross members of hardware cloth can be soldered in place. Larger chassis can be assembled from several "strip" chassis soldered in place side by side. I have a receiver made up of four such strips; front end, i.f., audio output, and power (including a filament transformer and a selenium rectifier).

Unsuited for this construction are items with heavy components, or precision r.f. items. Particularly suited are all those small gadgets for which suitable chassis are hard to find, gadgets such as multirange meters, audio amplifiers, power supplies, test oscillators, and various test circuits. Several examples are shown in the photographs.

Because this material is so easy to work, new techniques are possible. For example, instead of planning in detail before beginning to assemble, you can plan as you go along. Parts can be mounted on a flat sheet before the sheet is cut to size, and the wiring can be done before the sides are bent down.

There are two things to watch when you buy hardware cloth for this purpose: (1) It should be bright and shiny; too long a stay in the dealer's back yard makes it dull and hard to solder. (2) The cross wires should be reasonably straight and perpendicular, so the resulting chassis will be rectangular.

A few more examples of experimental lash-ups using hardware-cloth chassis and brackets.
Results—Armed Forces Day Activities

Receiving Competition

One hundred and thirty-seven operators have received certificates of merit signed by the Honorable Charles E. Wilson, Secretary of Defense, in recognition of making perfect copy of his Armed Forces Day message to radio amateurs. This represents 46 percent of the total participants (295). The message was transmitted at 25 W.P.M. by military stations AIR, NSS and WAR at 2000 EST on May 16, 1953. A paraphrase of this message was transmitted by AIR, NPG and WAR at 2100 EST on the same day. Very poor conditions made reception difficult. Certificate winners follow:

WAR BO CWY OMK IWS JB LSJ PFL RUZ SBE TUK IAP VMX VNJ WBT WC WVE ZMK. W3s BHK CA FGN GJY CMG ORX PDJ PTZ QCB QQS. W4s AGR CH KE KJ KLY LNY NJO OXX SDR SR URG. W7s BI EGX PFL BOXW SEC TBK K9B SEC SPH TOU YMT. W8s AVV BVY/4 CAY CBX CJ CRT DCH DDT DTY FFW GGX NAY OWF PUL WLI YB YHM KXK. K9E EA. W7s BJY BVZ KYV. W5s FFK FHL HRL KNX SQK WO WILN. W5s AKP AND BAX DEE HML M0T NTV UBW UC. W4s EXL MOR NIZ SPR WML K9G AO. K9G5 ACH ADG/5. K9H5S ABR ARB FX. K7P4 EM RD PM.


Military-to-Amateur Test

Operating on preannounced military frequencies, AIR, NSS and WAR worked amateurs in the 3.5-, 7- and 14-Mc. bands. The three military stations made a total of 242 QSOs with amateur stations. Special Armed Forces Day QSL cards have been sent to all stations worked by AIR, NSS and WAR. Contacts of all stations were limited because of the very poor conditions present during the test. Operators making contact are to be commended for their perseverance.

AIR operated simultaneously on 3467.5 (A1), 7835 (A3) and 14,065 (A3) kc., working amateurs in the 3.5- and 14-Mc. bands. Operators were: W1QIY, Thomas B. Greenligh, A/1e, USAF; W3JDK, Howard Riddell, T/Sgt, USAF; W6TOQ, Wayne E. North, S/Sgt, USAF; W9CSK, Norman K. Hester, A/1e, USAF; W9QTH, Lawrence Rudolph, A/1e, USAF; Robert J. Callahan, A/1e, USAF; Francis X. Guiterrez, S/Sgt, USAF; Clarence S. Lewis, A/2e, USAF; Jane Nolan, A/2e, USAF; Denis H. Ranier, S/Sgt, USAF; Mary G. Shives, S/Sgt, USAF; and Hugo Williams, S/Sgt, USAF. AIR made 125 contacts.


WAR operated simultaneously on 2220 (A3), 4085 (A3) and 6997.5 (A1) kc., working amateurs in the 3.5- and 7-Mc. bands. Operators on 6997.5 kc. were K7A0X, Frank Stoll, SFC, USA, and W4DEP, Paul Allyn, M/Sgt, USA: on 4085 kc. W3UWJ, James A. Lord, Major, USA, and W9MOS, Paul Weaver, PFC, USA, operated from MARS mobile unit No. 1 at Bolling Air Force Base. WAR made 73 contacts on two bands. (No calls were heard on 1.8-2.0 Mc.)

W5NWT and W6SPD were the only Novice stations contacted. The following amateurs worked each of the three military stations on one or more frequencies:

W8 LY, W6 FNO HC. W7s ANK PYN SR. W6s HNW JPC. W7s CJ PHW. K7 FAO. W7S SRP and K7P4 PM.

 Armed Forces Day Radioteletype Broadcast

Armed Forces Day found WWV announcing W-2 conditions (very poor). In spite of this, a very creditable showing was made by amateurs who copied the radioteletype broadcasts.

The broadcast from NDC, Norfolk, Va., was copied by K1NAI, W1UDX, W2s KLD SRK.

(Continued on page 160)
One of the newest DX stations to appear on s.s.b. is Capt. Anthony Borgia, DL4IE, ex-W6E0U, ex-W4POL. Operating on 14,302 with a Multiphase Exciter driving an Hk-257 to 250 watts peak output, a good signal is laid down in this country via a 5-wavelength sweep beam. . . .

OZT reports that s.s.b. is still coming along fine in Denmark, although most of the activity is confined to 3.7 Mc. Active stations include OZs 3EA, 5AL, 5BS, 7NU and 1WV, and 3EA is also on 14 Mc. 7T suggests that a standardized calling frequency (say, 14,330) would help DX and Ws to get together on s.s.b. a little easier. If, for example, Ws listened on 14,330 after their CQs, they could establish contact with the DX and then the DX could move off to an agreed-upon frequency. Another version of this would, of course, be for the W operator to indicate during the CQ where he is going to listen first, but it wouldn’t help a rock-bound DX station who didn’t have a crystal for the frequency. . . .

W9KNP passes along the word that the Starved Rock (Ill.) Hamfest saw a big turnout of s.s.b. men, including W8JBG, W9DOD, W9DOG, W9UNS, W9TFU, W9CTT, W9LBH, W9DKA, W9NOK, WORPG, W9MO, W9CAJ, W9SZH, W9DRV and W9KAA. W9DYV was on hand to demonstrate s.s.b. to the 1300 in attendance.

A Carrier Null Indicator

The usual method for balancing out the carrier of a s.s.b. exciter is to tune it in on the receiver, turn down the transmitter audio gain and then adjust the transmitter carrier control for minimum on the 8-meter. This can be very bothersome when one is often reinserting and removing carrier for demonstration or educational purposes. Mark Moynahan, W2ALJ, uses along a simple gadget that he uses with his Central Electronics 10-A exciter, and it has the advantage that it can be left in the circuit at all times, without plugging the needle when the operator starts talking. It shows excellent sensitivity in the middle range and yet it is not overloaded by the 10-watt peak output of a 6A07.

As can be seen in Fig. 1, it uses a 1N34 r.f. voltmeter, with a selenium rectifier across the indicator. At low voltages the selenium rectifier has little or no effect, and the residual carrier will indicate in a normal manner. At higher voltages the selenium conducts and prevents "pinning" of the meter. At W2ALJ’s, full-amplifier outputs of 3 and 225 volts (across a 52-ohm line) give voltmeter readings of 0.2 and 2.5 volts. The basic idea is a useful one that should find other applications around the ham shack.

A Receiver for 20-Meter Mobile S.S.B.

Knowing the trouble some ops have in tuning in s.s.b. on any ham band with a home station receiver, the usual reaction upon hearing about W2EVL’s mobile 20-meter s.s.b. station is “Nigosh! How does he tune the stuff in?” The secret is that he doesn’t do the tuning at 20 meters — he tunes the i.f., a la the Collins 75A receiver. Tony’s mobile receiver consists of a crystal-controlled converter working into a BC-453, and the 453 is used as the tunable i.f. In the converter (Fig. 2) the plug-tuned signal circuits are stagger-tuned to cover 14.0 to 14.35 Mc., and the two r.f. stages plus the triode mixer give a receiving set-up with excellent sensitivity. The slow tuning rate of the BC-453 simplifies the actual tuning-in problem, of course, and the stability of the converter-plus-453 combination holds the signals from then on. W2EVL’s mobile s.s.b. station is quite effective, as anyone who has heard or worked him can testify. But no s.s.b. op is ever satisfied, and Tony is planning to QRO shortly to 500 watts peak on 20 mobile.

Fig. 1 — W2ALJ uses the above circuit for the continuous monitoring of carrier suppression. A selenium rectifier, CR1, “shorts” the meter at high values.

C1 — 0.005 μfd.
R1 — 2000 ohms.
CR1 — 120-volt 40-ma. selenium rectifier.
V — 0-3 1000-ohm-per-volt voltmeter.

Fig. 2 — W2EVL uses this crystal-controlled converter ahead of a BC-453 for the receiving end of his 20-meter s.s.b. station. Only the 453 is tuned during operation.

L1 — 26 turns No. 28 enam., 3/8-inch diam.
A Cascade Driver Stage

For a number of years the “cascade” circuit has been the exclusive property of the v.h.f. men and the TV set manufacturers, but no more. Art Hale, W4AWS, of Orlando, Fla., finds that it makes an excellent replacement for a 6AQ7 amplifier, if you have had trouble taming one of those fiery triodes. As used at W4AWS (see Fig. 3), the 6SN7 cascade follows a 6B7A converter that gets its signal from a modified SSB Jr. exciter and a 9-Mc. VFO. The output from the cascade is linked-coupled to an 807 amplifier that is a little unusual in that it uses an extra 567 for neutralizing and balance. With 6000 ohms swinging in the 807 grid circuit, a peak grid current of about 2 ma. shows plate-meter peaks of about 115 ma. Battery control-grid bias is used, and the screen is stabilized at 315 volts by three VR-105s in series.

Zero-Bias Tubes for Linear Amplifiers

W3USX uses a pair of 6E5G in his final amplifier, with the grids tied together to give zero-bias operation with 2400 volts on the plate. They drive to 400 ma. plate current with only about 15 volts at the grids, and this is obtained from a Class A 4E27. The zero-bias operation is apparently quite effective, and only a small amount (about 5 watts) of grid-circuit swinging is required.

W7CJB ties the screen and control grids of an 829B together for zero-bias operation at 400 volts on the plate. The 80-ma. built-in screen condenser adds to the input capacity, of course, but this is no hardship, and a 6A8G drives the 829B to 150 ma. on peaks. Rooting plate current runs around 15 ma.

An Oscillator for the Edmunds Exciter

Two of the problems of construction of an Edmunds crystal-filter exciter are finding a suitable test oscillator and accurately setting the oscillating frequency in the filter note. Woody Davey, W7CJB, of Mission, Mont., solves the problems in a hurry by using the oscillator circuit shown in Fig. 4A. When the 470-ma. grid condenser is plugged in (it’s mounted in a crystal holder), a VFO is available for aligning the filter. Replacing the condenser with the proper crystal gives a crystal oscillator that can be pulled about 400 cycles by tuning the 140-ma. variable.

Woody uses the simple absorption wavemeter of Fig. 4B to indicate output at the 6A8G plate circuit — he likes it a lot better than a v.t.v.m. for the job. When used in conjunction with the VFO, he can align the crystal filter in about 90 seconds.

Low-Frequency Oscillators

Braldo Dueno, KPAHF, uses a commercial filter at around 30 kc. in his r.f. generator, and for a stable low-frequency signal to be modulated, he uses the beat between two surplus crystals (Channels 390 and 383 - 390, 55 and 500 kc). Each crystal works in a half-6SL7 oscillator with a 2.5-mh. r.f. choke for the plate load — the output from one oscillator is fed to the control grid of a 6SK7 and the other oscillator drives the 6SK7 suppressor grid. A 30-ke. tuned circuit in the plate circuit of the 6SK7 picks out the difference frequency and furnishes crystal-controlled 30-ke. energy for a 1N211 balanced modulator. KPAHF suggests that the principle can be used for obtaining various other crystal-controlled frequencies throughout the low-frequency range.

Feeding R.F. to the Monitoring 'Scope

W6TBR passes along a little hint he picked up from W6QBG. He takes a wire to his antenna lead for a distance of about one foot and ties the other end of this wire directly to one of the vertical plates of the 'scope. The capacity between the wires is enough to give about 1/4 inch deflection on the 'scope, but this will vary with transmitter power, frequency, and impedances at the take-off point. The dode is used in place of the coupling condenser, C1, Fig. 3, page 118, February, 1953, QST.

Fig. 3 — The cascade circuit is used as a driver by W4AWS for his neutralized 807 output stage. A “cold” 807 is used for neutralizing and for circuit balance.

Fig. 4 — W7CJB uses the circuit at A for the oscillator in his Edmunds exciter. Plugging in the 470-ma. condenser in the grid circuit gives a VFO for aligning the crystal filter, and plugging in the crystal gives a crystal oscillator that can be “pulled” about 400 cycles for accurately dropping the frequency into the filter note.

The absorption wavemeter at B is used to indicate output from the 6AQ7 stage of the exciter, by placing it near the 6AQ7 tank coil and tuning the wavemeter to resonance.

L4C1 — Tunable to 75-meter band. L4 is tapped about 1/4 total turns. MA — 0-150 microamperes.

August 1953
Happenings of the Month

ELECTION NOTICE

To All Full Members of the American Radio Relay League Residing in the Atlantic, Canadian, Dakota, Delta, Great Lakes, Midwest, Pacific and Southeastern Divisions.

An election is about to be held in each of the above-mentioned divisions to choose both a director and a vice-director for the 1954-1955 term. These elections constitute an important part of the machinery of self-government of ARRL. They provide the constitutional opportunity for members to put the direction of their association in the hands of representatives of their own choosing. The election procedures are specified in the By-Laws. A copy of the Charter and By-Laws will be mailed to any member upon request.

Nomination is by petition, which must reach the Headquarters by noon of September 20th. Nominating petitions are hereby solicited. Ten or more Full Members of the League residing in any one of the above-named divisions may join in nominating any eligible Full Member residing in that division as a candidate for director therefrom, or as a candidate for vice-director therefrom. No person may simultaneously be a candidate for both offices; if petitions are received naming the same candidate for both offices, his nomination will be deemed for director only and his nomination for vice-director will be void. Inasmuch as all the powers of the director are transferred to the vice-director in the event of the director's resignation or death or inability to perform his duties, it is of great importance to name a candidate for vice-director as it is for director. The following form for nomination is suggested:

Executive Committee
The American Radio Relay League
West Hartford 7, Conn.

We, the undersigned Full Members of the ARRL residing in the Division, hereby nominate as a candidate for director, and we also nominate as a candidate for vice-director, from this division for the 1954-1955 term.

(Signatures and addresses)

The signers must be Full Members in good standing. The nominee must be a Full Member and the holder of an amateur license, and must have been a member of the League for a continuous term of at least four years immediately preceding receipt by the Secretary of his petition of nomination. No person is eligible who is commercially engaged in the manufacture, sale or rental of radio apparatus capable of being used in radio communications, or is commercially engaged in the publication of radio literature intended in whole or in part for consumption by radio amateurs.

All such petitions must be filed at the headquarters office of the League in West Hartford, Conn., by noon EDT of the 20th day of September, 1953. There is no limit to the number of petitions that may be filed on behalf of a given candidate but no member shall append his signature to more than one petition for the office of director and one petition for the office of vice-director. To be valid, a petition must have the signature of at least ten Full Members in good standing; that is to say, ten or more Full Members must join in executing a single document; a candidate is not nominated by one petition bearing six valid signatures and another bearing four. Petitioners are urged to have an ample number of signatures, since nominees are occasionally found not to be Full Members in good standing. It is not necessary that a petition name candidates both for director and for vice-director but members are urged to interest themselves equally in the two offices.

League members are classified as Full Members and Associate Members. Only those possessing Full Membership may nominate candidates or stand as candidates; members holding Associate Membership are not eligible to either function.

Voting by ballots mailed to each Full Member will take place between October 1st and November 20th, except that if on September 20th only one eligible candidate has been nominated, he will be declared elected.


Full Members are urged to take the initiative and to file nomination petitions immediately.

For the Board of Directors:

A. L. BUDLONG
Secretary

July 1, 1953

LICENSE PLATES

Texas, Oklahoma and Michigan may now be counted among the states granting call letter license plate privileges.

Governor Shivers of Texas signed a bill on May 27th granting call letter plates to all amateurs maintaining mobile installations. Two filibusters in the legislative houses almost neutralized many months of planning and work by Texas amateurs but concurrence was finally obtained through the concerted efforts of W5FXN, W5QDX, W5NFC and W5SYPG. Several of the Texas clubs and W5s NZE and CQ are listed as being particularly active in this drive.

Oklahoma is to receive call letter plates and special state-issued personal identification cards. House Bill 744, recently signed by the Governor, provides that in the interest of public peace, health and safety the Act shall take effect immediately.

Cosmo Calkins, W8HSG, was largely responsible for Michigan Governor Williams' signing the call letter license plate bill. As Legislative Technician for the Michigan Senate, W8HSG expended such effort in behalf of the bill that the Michigan Senate unanimously adopted a resolution naming House Bill 101 "The Cosmo Bill."
COMING A.R.R.L. CONVENTIONS

Sept. 5th-6th — Delta Division, New Orleans, La.
Sept. 13th — New Hampshire State, Concord, N. H.
Sept. 19th-20th — New York State, Buffalo, N. Y.
Sept. 19th — Eastern Canada, Montreal, Que.
Oct. 9th-11th — Southwestern Division, Los Angeles, Calif.
Oct. 10th-11th — Midwest Division, Lincoln, Nebraska

HAMFEST CALENDAR

CALIFORNIA — Saturday, August 8th, at Cedarbrook Park in San Jose — the SCCARA will hold its Annual Bar-B-Q. A really good time is guaranteed. Send your pre-registration now to P.O. Box 6, San Jose. Tickets $3.50 per person.

GEORGIA — Sunday, August 30th, at Robinson's Tropical Gardens near Atlanta — the Annual Hamfest of the Atlanta Radio Club. The menu will feature fried chicken and free drinks. Fun for all with transmitter hunts, contests and games for the XVLS and YLs. Tickets are $3.00 for adults, $1.75 for children. Reservations should be obtained from Reagan Warren, W4RVH, 490 Angier Ave., N.E., Apt. No. 3, Atlanta.

INDIANA — Sunday, August 16th, in Highland Park in Kokomo — The Kokomo Amateur Radio Club will hold a hamfest, with registration starting at 10:30 A.M. Lunch will be potluck, so all are requested to bring something. There will be a transmitter hunt and entertainment has been arranged for the XVLS and kids. Registration fee is $1.00. Advance registration not necessary, but may be obtained through W9DKR on 75 phone.

NEBRASKA — Sunday, August 16th, in Lincoln Park, Superior — the Annual Hamfest-Picnic of the Kansas-Nebraska Radio Club. Information is available from C. L. Garman, W9PYX, Courland, Kansas.

OHIO — Sunday, August 30th, at Happy Days Camp, Virginia Kendall Park, just north of Akron on Route 303 — the Buckeye Shortwave Radio Association will conduct its 7th Annual Ham Outing. The registration time is 2:00 p.m. and the fee is $2.00 per family. For further details contact R. J. Nune, W9EDW, R.D. 1, Box 128, Doylestown.

QUEBEC — Saturday and Sunday, August 8th and 9th, at the Chambord Restaurant on Provinicial Highway No. 2 Cap Saint — the Radio Amateur of Quebec, Inc., will hold its Annual Hamfest. The hamfest site is 35 miles south of Quebec on the north shore of the St. Lawrence. The main events will be held on August 9th. All W and VE amateurs are welcome to attend. For further information, write to Gaston Choquette, VE2KB, 6534 Bordeaux, Montreal.

Governor Allan Shivers of Texas signs the bill authorizing call letter license plates for amateurs with mobile units while W5NFC, W5QDX and Rep. Thomas R. Joseph, jr., sponsor of the bill, smile their approval.

At last word, a California license plate bill was awaiting only the Governor's signature.

One-half the 48 states now grant call letter plates. They are: Alabama, Arkansas, Delaware, Florida, Georgia, Indiana, Kansas, Louisiana, Michigan, Minnesota, Mississippi, Missouri, Nebraska, Nevada, New Mexico, North Dakota, Ohio, Oklahoma, Oregon, South Dakota, Tennessee, Texas (mobile only), Virginia (mobile only) and Wisconsin. In addition, the Canal Zone and Alaska grant the privilege.

KOREA RESTRICTION

A number of countries have filed formal objection with the International Telecommunications Union to amateur communications, and FCC has no alternative but to impose a prohibition against U.S. amateurs working such countries. Korea was added to the list in early June, it now reading: Austria, Cambodia, Indonesia, Iran, Korea, Laos, Thailand, and Viet-Nam.

DELTA DIVISION CONVENTION

New Orleans, Louisiana, Sept. 5th-6th

A Delta Division ARRL Convention, sponsored by the Greater New Orleans Amateur Radio Club and the Westside Amateur Radio Club, will be held September 5th-6th at the Jung Hotel in New Orleans. The program will include talks on TVI and u.h.f., films to interest those in many phases of ham radio, and varied activities for the ladies. President Desland will attend and will address the Convention. Amateur license examinations will be conducted by the FCC.

Registration fees are $8.00 for licensed amateurs, $5.00 for YLs and XYLs. Further information may be obtained from Henry Heymann, W5PDP, Chairman, 3215 Octavia Street, New Orleans 15, La.

QUIZ QUIZ

For many years A has refused to use any antenna system that can't be coupled to his transmitter by just connecting it to the swinging-link terminals. He claims that all antenna couplers are "lossy" and he doesn't want to suffer the loss in output power. His friend B argues that antenna couplers aren't lossy at all, and that more power is delivered to the antenna when a coupler is used. Who is correct?

(please turn to page 105 for the answer)
EMERGENCY CONTINUITY TESTER

A simple continuity tester can be constructed with a receiver and two test leads. One test lead is connected to the receiver antenna terminal and the other is connected to the antenna. With such connections, continuity can be easily detected by the increase in gain in the receiver.

—Ronald J. Finger, WN9VCH

MODIFICATION OF W5LVD'S BREAK-IN SYSTEM

The electronic break-in system recently described in QST has been installed here at W5VRP. Because the VRP transmitter line-up is somewhat different than the one for which the system was designed, and because of a desire to avoid the use of a battery in the control circuit, it was necessary to modify the original circuit.

![Circuit Diagram](image)

Fig. 1 — Circuit diagram of the break-in system at W5VRP.

C₁ — 1.0-μfd. 200-volt paper.
R₁ — 0.27 megohm, ½ watt.
R₂ — 0.1 megohm, ½ watt.
R₃ — 0.2 megohm, ½ watt.
R₄ — 1.0-megohm linear-taper potentiometer.
R₅ — 20,000-ohm potentiometer.
K₁ — S.p.a.t. 6-volt relay.

The revamped circuit does eliminate the battery and also makes the action of the first diode control tube independent of the number of stages or the type of tubes that are keyed.

Fig. 1 shows that a keying relay, K₁, has been introduced to the circuit and that the plate potential for the first diode of the control section is now obtained from a voltage divider, R₁/R₂, that is connected back to the screen supply through the relay. Thus, the diode voltage is determined entirely by the values of the divider components and the supply voltage, rather than by a battery and the key-up cathode potential of a single r.f. stage as is the case with the previous arrangement. The balance of the circuit, except for minor changes to allow for the use of available components, is similar to that described by W5LVD.

—John Althouse, W5VRP

NEON-SIGN TRANSFORMER USED AS MOUNT FOR VERTICAL ANTENNA

Burned-out gas tube (neon sign) transformers can be purchased from some electrical contractors for around one dollar each. These transformers are housed in a sturdy steel box that is fitted at each end with a large high-voltage porcelain insulator. The mounting of one of the boxes on a mast provides an ideal base for a vertical whip or ground-plane antenna. The units are now known to be sturdy enough to support 14-Mc. verticals (quarter-wave) and there is every reason to believe that they will stand up when used with a 7-Mc. quarter-wave job.

The transformer I adapted is a 350-v.a. unit manufactured by Dongan, but Acme makes one of slightly different design that would serve just as well. Either of the types is large enough to permit internal mounting of a tuning or a matching unit. Since there is a feed-through at either end of the case, it would also be possible to use the assembly as the center mount for a dipole.

—Christopher Noble, W5PFG

RAINPROOF SHIELD FOR TRANSMISSION LINE CONNECTORS

An excellent weather shield for exposed transmission line couplings can be made from flexible molded-rubber tube pullers (G.E. type). These tube pullers are available free of charge at many electronics stores, for advertising purposes.

The coax or Twin-Lead is merely fed through the puller and the small end is taped securely to the transmission line just above the coupling.

To change transmission lines or check the coupling, just fold back the larger end for easy access.

If a permanent weatherproof connection is desired, the tube puller may be inverted and the large end completely filled with melted wax. When the wax hardens, the coupling may even be used under water with no ill effects.

—M. A. Ellis, W4LTV
Who:

Shortly after news of the Mt. Everest denouement reached an expectant outside world, sadder news forthcame from those lands of the Himalayas to the world of amateur radio. With heavy heart we must record here the passing of Reg N. Fox — "Mr. Rare DX" for over a decade — whose call AC4YN now stands symbolic of all that is bizarre and elusory in the realm of long-distance amateur radio communications.

Reg was afflicted with an arthritic condition, a siege of illness over the years that left him partially paralyzed and in intermittent severe pain. This ailment ultimately cost him his life.

The late Reg N. Fox, AC4YN, from a photograph in Out of This World (Greystone Press, New York) in which author Lowell Thomas, Jr., includes highlights of the AC4YN story.

Below, through courtesy of WHILF, the QSL that confirmed the first U. S. A.-Tibet QSO ever logged.

QSOs with AC4YN were never plentiful. It was a game of Fox and hounds, with Bf'er Fox always tough to catch. And how he enjoyed the chase! F. Claude Moore, WHILF, was the first American amateur to succeed in catching up with the phantom 14-Mc. signal from Lhasa at the Top of the World. This first AC4-W QSO took place in early 1939 after years of effort by hundreds of other keen-eyed U. S. amateurs. D. B. "Mitch" Mitchell, W9KOK, was the last North American ham to contact Reg before AC4YN shut down and fled Tibet to escape occupying Chinese Communist forces in 1951. Fox's plans therefor to become an active AC5 never quite materialized. To W9KOK, who handled nearly all Reg Fox's communications with the United States these past few years, we are indebted for first word of AC4YN's passing. Among favors of friendship Mitch gladly granted Reg was the procurement and shipment of a supply of the drug cortisone for the relieving of arthritic pain.

Prior to the Red occupation, AC4YN was the personal radio operator for that mystical holy figure and ruler of Tibet, the Dalai Lama, and was in charge of the country's communications. He spent his last months residing with his Tibetan wife and four children near the village of Kalimpong, India. There he organized a radio school with the assistance of literature furnished by ARRL through W9KOK.

From his cottage above the town Reg could survey the mountainous horizons he loved. He wrote friend Mitchell: "[From my windows] I can't quite see Everest, but the majestic Kangchenjunga is there in all its splendor. . . . I think that I shall always be in the vicinity of these grand Himalayas."

And so he shall. Final was written to a romantic chapter in DX annals when Tibet-adopted Englishman Reg N. Fox, AC4YN, died June 4, 1953.

What:

Twenty c.w. fell prey to fast-rising W8JGU for CE4AD, CP1BX (14,010), G'D3EQ (041), HBIC (075), I5AEPH (015), K2AKS (068), M22AG (080), OE1IUSA (050), OQ5GU (040), OQ5XX (070), 4X1s BN (020-035), FQ (065) and 954BS (053). Bill's new 3-element spinner broke the ice for his first Asians . . . . CR9AH (064), D7TSV (080), HlJ's 2FL (014), 3DM (042), K6AFQ (040), K555A (028), K6QG (060), KT1UX (020), K5U5U (048), ST2AR (005), VQ4YME (072), V8s 6GG (038), 6CI (080), 9AP (090), ZCSYS (050), ZD2S (070), Z6s 1BG (014), 2AA (052) and ZPSAY (050) answered W8IUL. Van finds that 732AA leaves for a visit to England in October. . . . VESRBXY had a chance to work CN8EG (090), CT3AA (090), FP8s AI (100), AJ (100), OA4ED (045), OB13HP (085) and 954AX (040) . . . . WI8OD got a pipeline going in Japan and worked these nations within three weeks: JA1 1AQ 1AR 1BC 1CB 1AX 5AB 5AF 6AO and 8AB. All were in the vicinity of 14,075 kc. Frank also nabbed DU1FC (100), FO8AI (100) and an ODS. . . . Catches reported either and you follow. W7EPB: M1B, VP2GCH and a 955, 654A X: FG8AP, K8HAA, P88E, TA3AA and VT2GJ. II8TQG: HCL1W, W4TVQY: L100A4W, II8BAY: FG8s AB AD, JA1 1CR 2BJ 6AA 7AB and PJ2AD. W5TVF: EAs 5AF 5BC and an 18l . . . . In addition to 3AZXO (068), W70EB/7 patched onto EAs 7, P2F, 7LJ 3AB 9WE, OX3G1 and many Oceanians. Ev still stalks HPI2L, KG6AY, KB6s LL LP, TFSAB and VR-2GC. He reports W7s RME RVD and S8M bagging their shares of the stuff, too. W7SMS poke out fine with 25 watts and a 550-foot-piece of copper . . . . "CR" at WIAW encountered these specimens on 20: EAAAF (067), EL2P (033), L21XAB (020), OY3PF (003) and V59AR (088). . . .

The Asiatic 14-Mc. viewpoint is furnished by KG6LL in this collection: CPSEK (060), CR9AF (065), EAY5 (060), FASH (050), FASII (060), ITYCD/Trieste (065), JA4BB (060), KWSBB (065), M5BBS (065), MP4KAC (100), SP3AK (000), T2TS (050), W8ZAB (000), GWZ2 (000), VSDIF (000), ZJ1BB (000), ZJ2AW (065), SA1IHT (060) and 9S4AL (060). All but MP4KAC were raised . . . . West Gulf DX Club's DX Bulletin and So. Calif. DX Club's Bulletin advise to be on the watch for AC5A in Bhutan, CA4W (070-000), F8SAB (029), G5DUB (015),

August 1953 51
One of the few Portuguese Guinea stations active, Anibal Vicente's Bissau installation, CR5AC, is always the object of much attention whenever the bands are open to Africa. (Photo via W2TXB)

FOSAD (99) each morning; W8SUJ finds most of his 40-meter stuff between 1830 and 2200 EST... ... U8RRK rattled the 'phones of W4ZA/E. Mick heard the Russian (if legit) say that their W ban is officially off now. LUSZ0 and WSTUX/K6 (22) bring W4AE up to 50 worked contacts. In W4AT C, the Transcontinental DX Club reports FM7WD (05), P12IC/G3, PV8AJ (08), YU1DF (10), ZD4AF (04) and sundry Europeans...... K16FPM writes, "Our local radio club had a DX contest on 40 meters a couple of weeks ago and we were all quite surprised at the DX available......" Among the trophies snagged were C3BF, CX1FB, CR7LIU, FOSAI, JA1 AC 3AA 7AC, K6JAX, P1Z1WZ, W2AOS/KG6, QV2GQ, numerous 2Zs and ZK1AB. An interesting development was the working of ZK1AB (40) by K6D0 ER MG and PM. Lovely if legit...... W2TKG napped No. 61 in ZK1AB (18), and ZC5VS (80) has been giving the gang British North Borneo on occasion.

Fifteen 'phone is duck soup at W5ViR, Tex salted away CP5AB, CX1GQ, FOSAI, HCF5I, H1P7P, H1R0K, K16EA, KZ5F, OAC4L, PY381, VK4TN, XE2OM 3BR, YV1BC, ZA1 BY1B 1CD 1G9 1RF 2AF 2ALZ 2L, V4DC 41U and ZP06C. TZ4BQ (26) got away...... Last but not least, W6ZN rattled off K6C4AU, K16NQ, KZ5F CP WA WZI, WZI, WP6B. T18EP was operating aboard a fishing boat off Panama.

Fifteen c.w. was used by W3AYS to catch KH6AR, T62GJ and 984AX. No W5ViR employed the same medium to raise C5D8G, C5T7T, E47CP, E1T, E9FSAI, F88AG, KZ5FL, LUs 4DAY 6AX 8DNN, OAs C DT, P12JAI, ZA1AIX 2AFA 2GS 2LF and VK3XG. That makes 47 15-meter contacts for Texas...... DL1JN collected V59AP (21,030), ZD10X (225) and ZP06J (404). But still chases LU3DD (045) and TA3AA (060).

Eleven and ten meters have been scoring bottom these humid days but W9H1UZ corned CT2B0 (3058), V44EFP (3515), V77ONS (3509) and YV65DR (3507) despite the state...... KPI4KD found 3.5-Me, inhabitante PY5 6F1 and 7ACQ workable, a new country to Ev on 80...... Ex-DL1JQ hears that 5X4AX has a 28,400-ke, "phone set-up cooking which nabbed 3A0AQ, KE6DH, N4OL, OB06L and ZD2DCP, so there's still DX on 101...... W4AE2 and the TDDXC gang verify that last report by Reporting As QSOs with F88A AQ (28,254), AW (28,357) and CR7LU (28,303). Mick's gang also heard K7AEF (28,302), ZL8 2SB (28,372) and 4WB (28,300) but no wows.

We thought one-sixed would be a dead subject but now here's a startling report from Low Band connoisseur W1BB:...... On May 3rd at 1030 GCT, W2WMT QSOd ZL1WW on 100 meters." W2WMT and ZL1WW were 5Z1AS 349 and 230 on 1890 and 1904 ke, respectively. This was on
schedule made at ZL1WW’s request through ZL2ACV. Since May 3rd two more W2WPW/ZL2WW 1.9-Me contacts have been made. These QSOs should certainly establish W2WPW as North America’s Static-Eater of the Year!

Where:
In some cases Eritrean stations have adopted ET2 prefixes while retaining the last two letters of their call signs. This rule isn’t hard and fast, though, judging from the ET2WW entry to follow — — — — VU2JP, QSL manager for ARCI (India), says cards can still go via ARCI’s Box 6966, Bombay, address but they’ll be QSP’d faster if sent to VU2JP’s home QTH. J. S. Nicholson, Munmar P. O., Travancore, South India. — — AP2F, as in the roster that follows, volunteers to continue as Pakistan’s manager.

AP2R, Cpl. B. Handleby, 583728, RAF Soda, RPAP, Drigh Rd., Karachi 8, India.
C3BAA, (QSL to CE3A9G).
CN2AE, 3C2AB Suv, APO 30, 2 Postmaster, New York.
D6AV, QSL % Mra. Dave Hykes, 43 High St., Greenfield, Mass.
ex-DJA/LQ, Alfred Stael, 394 No. Park Blvd., Independence, Kansas.
E72WW, (Previously M3US) Box 374, Arama, Eritrea.
F6BH, P. O. Box 587, Namasivai, Madagascar.
ex-F6BD/Z, Josef Klein, Rue de Gouvenst, & Kayserberg (Haut-Rhin), France.
ex-F6BAP, (QSL to F8HIZ).
FRAOA, (ex-FQ8AR) Georges Birepinte, Box 22, Noumea, New Caledonia.
FQ8AV, Louis LeCoq, Box 69, Fort Lamy, Chad, F. E. A.
FQ8AW, Point-Noire, Moyen Congo, F. E. A.
F8YSE, Mario de Lepine, B. P. 60, Cayenne, French Guiana.
H6ICQ, (QSL via USAKFA).
H8IDM, Box 943, Fort-sao-Prince, Haiti.
H1K6Q, Equina Tallar, Deraulio Soledad, Barranquilla, Colombia.
J2AS1, Kiyosato Tango, 2 Waranaka, Kasagi Aichi, Japan.
J3ALQ, QSL via JARG.
K17AWB, Box 210, Anchorage, Alaska.
M4ABAB, (QSL via K6DID).
O2AS, Box 235, Tripoli, Lebanon.
O8GCU, Paul Hermaux, Post Box 673, Leopoldville, Belgian Congo.
S1UMB, P. O. Box 572, Cairo, Egypt.
V81BA, (QSL via WA3).
ex-W6ING/KM6, (QSL to KM6BO).
Y81AH, Box 35, Damascus, Syria.
Y82F, Box Post Box 95, Pala, Egypt.
ZB1DF, (QSL via RSBG).
Z2OS8, (QSL via ZC4JB).
Z44V, (QSL via ZC4JB).
Z6AB, (QSL via ZK1AB or NZAB).
Z82SU, (Z82SU) (Marion Island; QSL to Z82SU).
S1A1L, Box 372, Tripoli, Libya.
S1A1M, Box 373, Tripoli, Libya.
S1A3P, (QSL via RSBG).
S1A7Q, (QSL via RSBG).

Much QTH assistance this month from W1s BOD MX RH WPO WQC, W2VNX, W3s AXT AYS EII, W4s YHD ZAE, W5UUX, W6s PY YY, WS4GJ, W6s HUZ KA, F7A, K6RLL, L. M. Michel and the WGDXC gang.

Tidbits:
Asia — AP2R presents his operating schedule for the benefit of those still needing Pakistan (times GCT): 06:00-08:00, 14,070-14,090 kc. c.w.; 1030-1330, 14,220-14,240 kc. phone; and 1400-2000, 14,200-14,220 kc. phone. Other Karachi activies are AP2Q, L. N. A’s 2K and 5A are located in Quetta and Lahore, respectively. — Reports that V89AS permanently took over V89AW’s station in Oman are incorrect. V89AS

We paid a photographic visit to top DXCC ‘Phone Honor Rollee PY2CK’s shack last month. Here’s a shot of the fellow’s mammoth 14- and 28-Mc. rotary, the take-off point for a big rig regularly heard around the world. That’s Jayme halfway up the mast.

August 1953
CR6AI gave many W/VEs their first Angola contacts shortly after World War II. CR6 signals are more plentiful these days but Joao is still one of the most consistently heard and worked.

Audible — Both sides of a W6YY—VK4NC 14-Mc. QSO were recorded and retransmitted by the Australian Broadcasting Commission as a feature of the popular "Australia at Home" program Down Under. That's probably the biggest W ham signal ever heard in VK-land. — Bill Storer, ex-VK1BS—VE2EG, hopes to land the call VK4EG when he ships with the Australian Antarctic expedition scheduled to take off this December. Exploration headquarters will be located on the White Continent itself, approximately due south of Heard Island. The way things look right now, only twenty or thirty watts will be available for ham work. That should be entirely adequate to stir up lots of business on any DX band!

Europe — Here's another award you sheepskin hounds can try for: the Turin Certificate, or Diploma Torino. Basically, W/VE stations may obtain the paper by submitting proof of contact with five Turin 11s. Italian and European amateurs must triple and double that figure respectively. Endorsements will be available for additional QSLs and all contacts must have been made after January 1, 1952. For more complete details write the sponsoring society: Associazione Radioamatori Italiani, Sezione di Torino, Caucelli Postale 250, Turin, Italy. — Eighteen-year-old OH2TV wonders if he is the youngest QSL manager kicking around. Any disputants? — Ex-DL4QHI is now K2AXC after stacking up QSLs from 130 countries during his Bavarian idyl. — Ex-DLALQ notes that DJ1BZ rolled up close to 100 c.w. countries during his first six months on the air. — F7AW (ex-RA5AG—DL4AND) has this to say: Station F7AW, located in the Supreme Headquarters Allied Powers Europe, has been established as the only international amateur radio station in the world. Any operator assigned to any of the NATO nations holding a valid amateur license is permitted to operate the station under the above call. The French government has granted our power input at 350 watts. This is 300 watts more than any other ham station in France is authorized to use. We have the only three-letter call in France except that of the RP." Ford adds that F7SHP works a .w. "phone and CQ'ing" and has a 32V-2 driving the final of a BC-610. Receivers available at present are two 5J-1s and a 75A-2. No third-party traffic is permitted at F7SHP. A distinctive QSL will confirm QSO with this station. Its 3-element 14-Mc. beam atop a 100-foot tower should put quite a signal into the U.S.A. Yama — Would-be amateur Jose Martinez Moreno, de Calle de Balmes 182, Barcelona, Spain, desires correspondence with American amateurs. — Lines of interest from SV9WFP (W2DZAL—W5NRD): "On the nights of the 18th and 19th of May, I was able to be on the 20-meter band with a phone transmitter at Xania, Crete, under the call SV9WFP/5Y9. Unfortunately, my operating time was limited but some 130 stations in 20-odd countries were worked. No Ws were heard or worked." Ray points out that all non-Greek personnel operating anywhere in SV, SV5 and SV9 must sign the SV8 prefix. Morais don't pass up any SV/SA SV8WP treks Slateaward in Caribbean dutch. — According to W5RRN, PA1PYW looks for some of the tougher WAS states around 14,100 kc. between the hours of 2200 and 0200 CDT.

South America — Still no sign of CE6AA as we assemble these extracts. The way the gang have been tuning 14 Mc. with bated breaths the sudden appearance of CE6AA should result in the great-grandfather of all pile-ups. Thanks to W5CQD, W1 ontvangst, K5WZ, CE6AG and W9YY for extra effort to keep us posted on the Eastern Island DXpedition.

K4HUB amassed over 2000 QSOs in his first eight months on the air to become one of the most familiar Puerto Rican stations now active on DX bands.

Status — — — Enoswhile "Bow's" contributor W5LAK now hunts oil with radio in Venezuela. John hasn't been able to land a YV call but keeps an ear out for ham-band buddies with an NC-183. Friends of W5LAK may drop him a line via Roger Exploration, S. A., Apartado 465, Caracas. — — — Ll's LDDV and SAD who both widely worked, are owned and operated by the same gentleman.

Hereabouts — DXCC Honor Rollee W5XO went and got himself married not long ago and was last heard from while honeymooning in the Bahamas. [Congrats to him, Ross, but he could at least have made it T9.] — Jerry — — — W4YE recently ran across a stack of DX QSLs made out by him as WA4AG in 1932 but never mailed for lack of postage. Depressed days pass, you know. Now he's busy tracing QCXs and getting them off the hook. Better 21 years late than never! — From 108 countries confirmed, W9KXE has managed 833TA, WPR and WAA. Paul reports a happy influx of VE9AD QSLs. Bill from W1PM got a great band getting back on the air again with his 1930 907 rig after a 12-year layoff. "To me, the most striking changes since before the war are the increased use of VFOs and a far greater number of DX lines on the air." — That W7CJW finds that W7AVE is pretty fancy Novice DX. Doc Saxon's shack is out at St. George Island in the Pribilof, a Bering Sea outpost of about 200 souls and seals. — W7TVJ bumped into CM7BS while both attended Wexford Academy in Massachusetts. — FP6A AA and AK (W3BKE and W2BBK, respectively) scheduled a mid-July sojourn on St. Pierre.

VE3BBV is WAS on 28-Mc. 'phone and has worked over 6000 different stations from his Yukon layout on 80 through 10 meters. Formerly VE5AGF, Gordon has kept Whitehorse on the ham map for many years,
In last month's lead paragraphs we pointed out that the frequencies above our 2-meter band are growing up rapidly, and that new two-way records for 220 and 420 Mc. could be expected any day. Now we're glad to report that part of this prophecy has already come about; we have a new 420-Mc. record for this country, if not for the world.

Early in June, W2QED, Seabrook, N. J., and W8BFQ, Everett, Ohio, started a daily schedule on 144 Mc. at 0700 EST. Object: to try 420 whenever 2-meter conditions looked good. This 360-mile path is not open too often, even on 144 Mc., but signals do come through well enough on occasion to indicate that work on three times the frequency should be possible also. And, of course, last September, W8BFQ had heard W2QED on 435 Mc. when the 144-Mc. band was riding a peak.

They made a few scratch contacts on 144 during the first three weeks of the tests, but the signal was never good enough to maintain the communication necessary to arrange a check on the higher frequency. Margaret's near-kilowatt on 144 Mc. got through a few times when Ken's 120 watts could not get back. Then on the morning of June 21st, though signals in other directions were no better than normal, there was enough of an opening for two-way communication on 144 Mc., if c.w. were used. Tests were arranged for the higher band, 432 Mc., for W8BFQ, 435.6 Mc. for W2QED.

As has happened before on shorter paths, the signals on 420 were as good or better than on 144, and the first two-way over-the-mountains DX to be worked on 420 Mc. was under way. Signal levels were so poor on 144 Mc. that nearly two hours of trying were consumed in the process of establishing two-way contact on 420. Had the schedule been kept the other way around, high frequency first, the new record might well have been set more readily.

The same condition prevailed again on the morning of the 27th. Following the initial contact on 144, the change to 420 netted solid voice communication with W8BFQ-WJC for more than an hour. Working cross-band duplex, W2QED on 435 and W8WJC on 144, there were times when the 2-meter signal was nearly inaudible, yet there was a good signal on the higher frequency. Fading on the two bands showed no correlation whatsoever.

The long-standing previous record of 262 miles was surpassed again on June 25th, when W1RFU, Wilbraham, Mass., worked W3BSV.

Salisbury, Md., a distance of about 310 miles. And on the night of June 19th, W8BFQ was getting an S4 signal from W3RE, near Washington, D. C., a rough-terrain haul of some 300 miles.

It is being demonstrated almost daily that when sufficiently-good equipment is used the 420-Mc. band is capable of providing excellent coverage. Experience on the W2QED-W1HDQ morning schedule has shown that the 435-Mc. signal can be heard just about any time that the 144-Mc. one is 3 dB. or more above the noise.

---

*W1HDQ

---

August 1953 55

---
level. As this is written we've tried both bands on 20 different mornings in June, with only two failures on 20 435 Mc. On this morning, W2QED's 144-Mc. c.w. was peaking only 3 db. above the noise, and fading out completely. On 4 out of the 20 mornings, the 435-Mc. signal was stronger than the best that 144 Mc. could do. When we consider that this was done with 30 watts output on 435 Mc. at W2QED, compared to better than 60 watts of carrier on 144, it becomes obvious that we should not rely too heavily on lower frequencies in estimating our chances of breaking down a path on 220 or 400 Mc. Let's have more two-way communication on these higher bands, on schedule or otherwise, regardless of the indications prevailing on 50 or 144 Mc. There's real business waiting to be done above 148 Mc. Let's get about it!

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

By the end of June, 6-meter men over the country were thinking that the man in charge of 2-layer ionization had grown off on an extended vacation. We've had a pretty stormy midsummer, with the past how much effect solar activity had on the incidence of sporadic E. The last sunspot cycle minimum fell during the war years, so we've had no opportunity to check before, but this season's dearth of DX has been no mystery. Only a few openings, most of them short and widely scattered, came along in May, and June, peak month of the year, was shaping up as the poorest on record.

There was some DX, to be sure, but nothing like the round-the-clock, across-the-map stuff of 1946 through '51. Particularly was double-hop, normally the prime thrill for the 50-Mc. gang, missing in the 1953 ledger. W8FKY, Grand Junction, Colorado, and W7QAP, Douglas, Arizona, made things lively for the Field Day crew by crossing the eastern half of the country on the 7th, and a burst of Cuban activity had the boys on their toes a few other times, but mostly the openings were of the 600- to 1200-mile variety, and there were not too many of them. Now and then we worked 1000 miles, if it's any comfort, but didn't keep a lot of the faithful from trying, and there was hope that the season might still redeem itself, with some of the best days still ahead at copy time. On the bright side, W9OKR, Pittsburgh, heard WJSBX on the 24th.

But if a dip was the order of the day on 6, a spiker was being sung on 2. Tropospheric DX was bursting out all over, aided and abetted by increased activity in many quarters, and by the installation of larger beams and higher-powered rigs. Use of c.w. was growing, and the sharper DX hounds sticking almost exclusively to this highly effective method of dealing with weak signals.

The last week or so of May saw things getting under way across the Middle West and South, and a tale of DX reports and states-worked claims cascaded onto your conductor's desk a just day or two after copy for the July issue had been sent to the printer, a distressing state of affairs all too well known to those of us who must close copy sometimes.

On May 26th, W9EMS, Adair, Iowa, worked W8BVJ, Watertown, S. Dak., for what is probably the first 2-meter contact between these two states. It was State No. 22 for Fred, and he picked up another in the same state a week later, working W4OZK, Lookout Mountain, Ala. This haul of more than 600 miles was accomplished through the help of W9GUD, who can probably take credit for the first Alabama-Iowa 2-meter contact. W9RCI, W4HIX and others were also on the sidewalks on this one.

On the 27th, the whole Middle West was after W4OZK, as well as W4HIX and W9WCB in Tennessee, and W9RCI in Mississippi, and it was the same again on the 28th. Complete details of the Alabama stations' work have not been received from them, but W4OZK appears as the "first Alabama station" in many logs from W8, 9 and 9, while W8HBD lists W4FIC, Birmingham, as his "first, also probable first contact between Alabama and Mississippi."

During the evening of the 28th, W9GUD heard a station believed to be in Colorado. The fellow was signing "W9 Ocean Eddy" and talking to someone named Fred, discussing going to Estes. Any fill on this.

W9HBD gives us the weather dole for this period: Beginning late on the 25th, a long cold front extended from Wyoming down through Nebraska, southwestern Iowa, cutting across Missouri just north of the St. Louis area, and eastward across Indiana and Ohio. By the morning of the 26th, it was below St. Louis, and on Wednesday the 27th, it was across southern Tennessee, with its western end south of Kansas. Later the same day, the western end looped up to Wyoming, the eastern portion sloping off through western Kansas, Missouri, and northern Mississippi and Alabama. The northern side of this front was continental polar cold air, the barometer reaching 30.28. Skies were generally clear, with thin high cirrus most of the period. W9KLR mentions that the barometer was 30.4 at the peak in Rensselaer, Ind., the highest of the spring season.
Coaxial Grid Circuit for 4X-150A Amplifier

In this section in April QST, we mentioned that W1QVF, West Hartford, was running a 4X-150A amplifier straight-through on 432 Mc. This resulted in a batch of letters asking, "What does he use for a grid circuit?" We asked Tom for the details, and the accompanying drawing tells the story.

The famous "gold-plated special" test oscillator tank circuit is put to work again, though anyone wishing to use a similar approach could make his own coaxial assembly without too much trouble, as all principal dimensions are given. Tom's amplifier construction follows the design shown by W1PRZ in May, 1951, QST, except for the use of the coaxial grid circuit described herewith.

Modification of the tank to adapt it for this grid circuit application is done as follows: (1) Cut it down to 5¾ inches. (2) Turn down the disk on the inner conductor to 1¼ inches diameter. (3) Drill ventilation holes, as indicated on the drawing, in the end plate and at intervals around the outer conductor near the grid end. (4) Mount the output coupling loop and coaxial connector. (5) Mount the inner conductor on stand-off insulators (see Detail A). The inner conductor must be filed flat, or hammered slightly out of shape, to make room for the ¾-inch cone stand-offs. (6) Mount the grid resistor and its feed-through by-pass. The inner end of the resistor is soldered to a 4-40 screw, and the inner conductor is tapped so that this can be screwed into it (see Detail B).

Where the amplifier is to be grid-modulated with a TV signal, the grid resistor is replaced with an r.f. choke consisting of about 12 turns of No. 22 wire on a 1-watt resistor. The output coupling loop is made of copper or brass strip, ¼ inch wide and 4 inches over-all length. This is soldered to the connector and adjusted to suitable shape before mounting the connector in place.
Thanks, Gang!

An unusually large volume of v.h.f. correspondence was received by your conductor this month, and consequently, we are not able to make detailed acknowledgment of all of it either by personal mail, or through the medium of this department. We want all of you to know that your letters and cards are invaluable in the preparation of this section of QST each month, so we acknowledge, with our heartfelt thanks, the help of the following amateurs, in addition to those specifically mentioned in the text: W1A MAIN MEP UXI HDA PYM; W2s VMX ORI GULU UK YDK AOD UTH NGA; W3s QYE RUE SSJ QKI YHI UKI UQF NNV RXT; W4a AO TMO VGY VEL FLW; W6s NED FOG SCK; W6s PIV BWG VMM MVK DLZ; W7s QAP JRG; W8s BAX WXY WRN NOH UZ; W9s ZIL ZAB ALU PVY IFA LEE GFL; W9s WKB INI YIK III; VE5ABT, X61GE, and JA1AN.

And thanks also to the hundreds of you who sent in V.H.F. Party logs. You'll find the official results beginning on page 60 of this QST.
Correspondence
From Members-

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

FIELD DAY

Editor, QST:

At a recent meeting of the West Seattle Amateur Radio Club a motion was passed to request the League to alter the rules of future Field Day contests as follows: Field Day shall start simultaneously in all time zones, say 4:00 p.m. Central Standard Time, and continue for twenty-four hours. This would conform to the rules of other contests and it is believed would allow a fairer advantage for West Coast stations to obtain more station contacts.

--- Mrs. Todd Yng, W7LGS, Secy. W, Seattle Amateur Radio Club

SWITCH TO SAFETY

1938 Howard Court
Falls Church, Va.

Editor, QST:

I think that your article in the June QST entitled "How to Live Longer" by Don Mix is so very appropriate. As a ham who has seen equipment range from open chemical rectifiers and all-exposed wiring to modern self-enclosed "switch to safety" construction and one whose own young son (W4YZC) is just beginning in the game, I found Don Mix's article of tremendous interest. With so many youngsters entering the hobby of ham radio through the Novice licensing system, it seems all the more important that we do everything possible to minimize the possibility of accident and even death by electrocution which has needlessly befallen so many hams in the past.

Please continue the campaign and periodically remind all of us by timely articles such as this of the importance of employing safety techniques in our amateur construction.

--- Leland W. Smith, W4YE

LEAGUE SERVICE

5405 Georgia Avenue
West Palm Beach, Fla.

Editor, QST:

This is to advise that the check from ______ was received okay the same day on which I received your letter inquiring about same. So the matter is closed at last.

Thanks a million for all of your help. I've been a member of ARRL for many years — and this is the second time that you have helped me out of a "scrape." It is mighty heartening to belong to an organization with such a strong sense of service, and which insists on integrity by its adherents second only to its own. The warm appreciation that I feel makes petty arguments of small cliques or pressure groups seem insignificant, indeed!

--- Hurshall D. Turner, W4M VJ

QRP OR QRO?

29 Mount View St.
Newton, New Jersey

Editor, QST:

The following is proposed by the Sussex County Amateur Radio Association:

1. That the power input limit be lowered in the bands from 3.5 to 30 megacycles to approximately 300 watts in order to relieve QRN, etc. The largest percentage of present day amateur stations are running less than this figure, as witnessed the increasing popularity of the commercial transmitters in the 150-watt class. Such a limit would encourage development of antenna technique and operating practices.

2. Due to the influx of foreign broadcast stations into the forty-meter band, and the inevitable fact that they are moving down the band more and more, thereby raising the e.w. portion, we suggest that the entire band be exclusively for "phone" operation, and the 3.5- to 4-megacycle band be exclusively for e.w. operation.


1000 Overlook Avenue
Chattanooga, Tennessee

Editor, QST:

Occasionally some frustrated individual suggests that our power limit be reduced. Mr. Wellman (June QST) says his 175 watts "will do as well as a kw." So why does he complain? And, if his claim is true, his 175 watts will also cause as much QRN as a kw.

... Under an extension of his philosophy, we would have a restriction limiting the horse-power of automobiles to that of the car he happens to think is adequate. ... I hope he doesn't fancy a motorbike as ideal for the average man.

As for the gentlemen from Bermuda, since we do not propose restrictions for VHF's, they should not propose any for us.

... I don't think anything is accomplished by publishing such suggestions. FCC is pretty good at dreaming up their own screwy proposals and we don't need to give them any ideas.

--- Ward Buhrman, W4QT

ANY IDEAS?

Univ. of New Hampshire
Durham, New Hampshire

Editor, QST:

I have an electronic problem that might interest hams reading your journal QST.

For recording animal calls in the tropical jungles, a walkabout preamplifier is needed to accompany the microphone at the end of half a mile to a mile of cable. I have one design but it is heavy, and proved too susceptible to 100 per cent relative humidity and temperatures between 80° and 90°F. It uses three 6AKS tubes, and permits the man with the microphone to monitor what is going over the wire to the recording unit, as well as converse with the sound man at the recorder.

I would like a lighter unit, possibly using miniature or subminiature tubes and hence demanding less battery current. Scaled moisture-proof transformers are a must and in future I would plan to use ceramic tube sockets. The frequency response needs to be from 15 to 16,000 cycles.

Lighter earphones, such as hearing-aid type or the lightest used in acoustical voice recorders would be an improvement. Within these specifications, I'd like to see the cost cut away down — to fit a very limited research budget.

Someone on a hobby basis might like to help get this recording research project back in the field, in return for credit in publications.

--- Lorus J. Milne
Professor of Zoology

CARDS, PSE

P. O. Box 374
New Port Richey, Fla.

Editor, QST:

Many contacts I have had have promised faithfully to QSL. My lifelong ambition is to work WAS and WAC mobile but it seems as though without the cooperation of all concerned this task is impossible. With the passing of time it seems as though the request for a card is getting to be an embarrassment to many a ham. Why? After all, it is not asking a guy for his right arm although many have displayed such emotions. I QSL 100 per cent and consider it a privilege and a pleasure. Can anyone give me a good excuse for a two-penny stamp? Pretty cheap excuse.

--- VV. Lighthill, W6RIG/4

August 1953
June V.H.F. Party Results

Contest Activity Sets Spring-Fall Record

With close to 300 logs submitted, and scores running well ahead of previous contests, the June V.H.F. Party of 1953 stands as the top v.h.f. contest of the spring-fall series since this type of activity was begun seven years ago. The added incentive for Novice and Technician operators, written into the rules for the first time with this party, was a factor but it doesn’t tell the whole story. The boom in 2-meter operation generally shows plainly, and the growing appreciation of the fun that can be had in one of these week-ends of concentrated v.h.f. operation is bringing more of the gang into the picture every time.

Conditions? Well, from all we can tell, Fate was rather kind to us this time. The 50-Mc. band was open a couple of times; not enough to make it a walkaway for the 6-meter gang, but the threat kept them on their toes throughout the party. On 144 Mc., there was a good inversion across the Middle West that drifted eastward just in time to make a few contacts possible over the Alleghenies in the closing hours of the party. In California there was some work over distances up to 400 miles or so, a distinct rarity in that mountainous terrain.

One of the outstanding v.h.f. contest scores of all time was amassed by a group of hams who, because they operate together, are ineligible for a section award. The v.h.f. section of the Waltham Amateur Radio Association, W1MHI/1, deserves some kind of special solid-gold hand-fabricated award, we think, in view of their continued outstanding contributions to the success of our spring and fall v.h.f. contests. Operating from Pack Monadnock Mountain in Peterboro, N. H., W1s PYM, QMN, and RUD rolled up 259 contacts on 50, 144 and 220 Mc., for a total of 7317 points, with their section multiplier of 27.

The country’s highest competitive score was posted by W1RFU, Wilbraham, Mass., who worked 50, 144, 220 and 420 Mc., from one of New England’s finest v.h.f. locations (he lives there!) to roll up 150 contacts. His multiplier of 29 pushed the total score to 4750 points. He has the distinction of working the best 420-Mc. DX of the contest, too, with W3XX/3 near Tannersville, Pa., about 200 miles.

The Electric City Radio Club gang of Scranton, Pa., deserve a big hand for their work in setting up W3XX/3 in Pennsylvania’s Poconos, and keeping it set up in the midst of a violent storm Saturday night. Another iron-man act was turned in by WNIWTD/1 and his crew, who hopped gear for 144 and 220 up the rocky slopes of Mt. Monadnock, Jaffrey, N. H. WIFMU/1, a semimobile set-up on West Peak, Meriden, Conn., W6CGG/6 on Mt. Loma Prieta, W2UPT/2 on a 3265-foot elevation near Stamford, N. Y., and W3PZK/3 in West Virginia also did fine jobs.

The YL department was doing right well again in this one. W5BFQ, Everett, Ohio, racked up the country’s second highest score, and W2FBZ, new to v.h.f. competition, was not far behind, with the fourth-place score nationally.

In the pre-contest publicity we promised listings of the outstanding single-band scores. Actually, in looking over the results, the advantage of working more than one band becomes pretty obvious; nobody anywhere near the top on a national basis got there by only one band, but some very good work was done, particularly on 144 Mc. Apparently, the best man in this department was W3IBH, Philadelphia, who worked 160 different stations in 8 sections for 1280 points. W3UKI, of the same city, did just about as well on 144 Mc., and he also piled up a good total on 50 Mc. Gerry’s 122 contacts in 10 sections was one of the best 2-meter scores, even so. We used to think that midwestern stations did well to make 40 or 50 contacts on 144 Mc., but look at W9KLR, Rensselaer, Indiana, with 113 in 9, for 1017 points. W3QKI, Erie, Pa. (out of reach of most of the Atlantic Seaboard activity) had 81 in 8, for 752. W6ZYY, with WN6SCZ helping, worked 110 2-meter stations, and W6IVW caught up with 97. W2UK, New Brunswick, N. J., made no effort to run up a big score. Tommy was after sections, and he set an all-time v.h.f. contest section total, with 16 worked. The one-handers had better watch out if W2UK decides to bear down next September!

Nobody made an outstanding 50-Mc.-only score, but use of the band was a big help to the fellows who were set up to do the job right. Participation on 220 and 420 was up over previous contests, despite the new lower credit for these bands. Several users of the higher bands found it possible to make contest hay there without arranging the contacts previously on 6 or 2. Work on 220 was reported by 19 contestants and 26 used 420 Mc.

One of the better W6 scores was turned in by W6TMB. Don will be remembered by Middle West 6- and 2-meter operators, particularly, as ex-W9USVY. Perhaps not too many of them knew, however, that he is blind!

Looking through the high scores, you miss one of the most significant: W7LEE, Parker, Ariz., worked 9 stations in 4 sections (Ariz., San Diego, Los Angeles, and Nevada) from his “impossible” 2-meter location in the Colorado Valley.

In the following tabulation, scores are listed by ARRL divisions and sections. Unless otherwise noted, the top scorer in each section receives a certificate award. The highest Novice and Technician in each section also receive certificate awards. Asterisks denote Technician winners. Columns indicate the total score, the number of

60 QST for
contacts made, the section multiplier, and the bands used. A represents 50 Mc., B 144 Mc., C 220 Mc., and D 420 Mc. No contacts were reported for any higher band. Multiple-operator stations are shown at the end of each section with the calls of all operators participating.

**ATLANTIC DIVISION**

E. Pennsylvania

W4UTL...2100-147-17-AB
W3NH...1290-160-8-B
W3SAO...603-86-7-B
W3OQK...570-72-8-B
W5TDF...581-34-8-B
W2QMM...218-34-8-B
W5SON...216-54-4-B
W8NOK...92-23-4-B
W8SLL...92-23-4-B
W8MUF...61-32-2-B
W8RSC...50-25-2-B
W8SSE...39-13-3-B
W8FNL...10-10-1-B
W8KRA (W3), LDK...10-10-1-B
LQM L2D MRQ NNH (GAT PMG QRE RDC) 3575-94-25-89-ABCD

Mid.-Del.-D.C.

W3FYW...600-68-10-B
W3TOM/3...418-42-7-B
W3HYH...324-34-4-B
W3LMC...312-82-5-B
W3JXK...228-56-7-B
W3JW...900-50-4-B
W3MEO...148-37-4-B
W3TPA...112-24-9-BC
W3WSL...904-51-1-BC
V3HOU/W3...45-16-3-B
W3NII...31-11-3-B

S. New Jersey

W2BUL...1545-105-15-AB
W2QEQ...1650-144-15-AB
W2KUK...1200-75-10-AB
W2BIL...297-34-7-BD
W2AF/2...250-37-10-A
W2AFA...236-76-9-B
W2QQ...96-24-4-B
W2RRA...52-13-4-AB
W2DMD...16-0-2-B

W. New York

W2RUI...1901-98-19-ABCD
W2UTH...720-80-9-AB
W2FOQ...700-69-12-AB
W2ONI...700-69-10-BD
W2FCG/2...550-88-10-BC
W2ARL...384-61-5-RDC
W3CR...270-50-4-B
W3HUK...215-44-5-BD
W2QOP...250-34-6-B
KN5CCH...105-33-3-B
W2CVI...58-29-3-B
W3QY...42-22-B
W2BII...257-9-8-B
W3CTA...15-15-1-B
K3ALZ*...12-2-2-CID
W2UPT/2 (K2A AST CVX, W2s) J3C MBH 756-54-24-ABCD

W. Penn. Pennsylv

WAQKI...753-94-8-B
W3FPH...612-51-12-AB
W3FYK...186-28-5-AB
W3KMN...250-8-8-B
W3KWH (W3s NBQ SDV UEM) 272-34-8-AB
W3ONP/3 (W3LIV) 120-22-5-B

**CENTRAL DIVISION**

Illinois

W9WOK...1650-86-7-AB
W9PK...497-71-7-AB
W9DRN...240-60-4-B
W9NVO...240-60-4-B
W9QPP...171-57-9-B
W9UWI...144-85-3-B
W9CRN...102-34-3-B
W9KGC...40-29-2-B
W9NYG...12-11-1-B

Indiana

W9KLJ...1017-113-9-B
W9KRU...322-56-9-B
W9DUM...136-34-4-B

Wisconsin

W9RTI...128-38-6-AB
W9YEW...204-51-4-B
W9NVK...159-34-8-AB
W9RKS...144-85-3-B
W9GFL...98-19-5-B
W9IJM...92-23-4-B
W9LRE...24-12-3-B

**DELTA DIVISION**

Tennessee

W4VYQ...57-19-3-B
W4HJC...30-12-9-B
W4TV...120-16-3-ABCD
W4TIE...7-12-4-B
W4NYE...7-7-1-B

**GREAT LAKES DIVISION**

Kentucky

W4PCY...650-60-10-AB

Michigan

W8RMH...720-77-9-BC
W8UNN...511-73-7-AB
W8TER...376-52-9-B
W8SRW...310-55-6-B
W8SNN...270-47-5-B
W8UMI...190-30-8-B
W8BIV...124-31-4-B
W8UDD...102-28-4-ABCD
W8JL...96-24-4-B

Ohio

W8BQB...8559-150-22-ABCD
W8WXY...1070-107-10-AB
W8LPD...756-84-9-AB
W8SGO...504-60-9-B
W8RQK...306-56-9-AB
W8OCH...229-155-5-AB
W8SVI...247-50-3-AB
W8SDN...248-31-8-AB
W8SDO...200-50-3-AB
W8LWO...150-30-5-B
W8SNME...165-35-5-B
W8SLZ...135-45-3-B
W8SNQ...121-31-5-B
W8SDC...120-60-3-B
W8HSY...114-23-2-B
W8SNV...48-23-2-B
W8MRO...44-22-2-B
W8SCT...43-14-9-A
W8WLR...40-20-3-B
W8LGI*...30-9-2-CD
W8NNXR...24-17-2-B
W8FOS...12-19-3-B
W8HUA...12-19-2-B
W8TOO...12-5-2-A

**HUDSON DIVISION**

New York

W2BVD...976-61-16-AB
W2YXE...360-65-9-AB
W2UXM...129-22-9-B
W2ACY...85-17-5-B
W2OPW...30-20-4-B
W2FKY...80-20-4-B
W2CMX...10-6-4-BC

**NEW ENGLAND DIVISION**

Connecticut

W1HDIQ...4920-150-30-ABCD
W1KIH...1330-95-14-AB
W1PHR...340-70-12-AB
W1KWX...510-90-9-B
W1QNH...725-87-12-AB
W1VLD...720-88-11-AB
W1HDF...730-49-12-B

Massachusetts

W1WLE...660-64-10-BD
W1SPX...603-61-9-ABCD
W1VLL...408-58-7-B
W1WRW...300-56-8-B
W1YHM...245-49-5-B
W1WY...180-36-5-B
W1TXZ...168-34-4-B
W1XLM...168-36-6-B
W1UEC...180-26-6-B
W1VLA...125-43-3-B
W1NYD...126-42-3-B
W1OLG...60-29-3-B
W1HTF...45-15-2-B
W1WY...18-2-2-B
W1MPU/1 (W1A RIA RMZ) 1177-107-11-B

Maine

W1DS/M...80-30-4-B

E. Massachusetts

W1CTW...2200-146-15-ABC
W1BNJ...1175-98-12-ABC
W1AGE...873-97-9-AB
W1UHY...693-86-11-AB
W1TPZ...474-79-6-B
W1NYF...390-78-5-B
W1PXL...300-60-9-B
W1LMU...342-57-6-AB
W1UDD...328-45-7-A
W1HS...159-37-9-A
W1CPB...124-31-4-B
W1TQO...108-27-9-B
W1OED...100-25-4-B
W1WZ...57-21-3-B
W1OED...57-19-3-B

W1QMB sets up the gas-engine generator for WIMHL/L, atop Pack Monadnock, Peterboro, N. H. In the rear are the 4-cylinder 50-Mc. array and a 16-cylinder fopower beam for 220 Mc. A separate 144-Mc. station was operated from the ranger’s cabin nearby. This group ran up nearly twice the score of the next in line in the June V.I.F. Party.

On page 182
Summer Schedules. Net attendance and traffic have held up well. Some nets have adjusted operation to three times per week and a later or earlier period to suit the convenience of netters. A few nets are discontinuing, to resume in the fall; others continue with operation streamlined and in reduced volume because of vacation absences. Some operating mobile are making it a point when away on vacations to report into their home net to clear traffic on the progress of the vacation. Visiting ham stations in “vacation land,” and radio reporting-in as a visitor on the local section net is also proving popular.

The AREC and RACES Program. Data reported in EC annual reports (’52) in almost all cases showed an increase in the size of EC-AREC groups. There is a higher percentage of full (active rather than supporting) members than last year. Forty-three percent of all AREC members have mobile units. There was a big increase in ’52 over ’51 “10, 75, and 2” continue the popular bands for mobile. Half of all our AREC groups reported that planning toward participation in RACES had been instituted. About 12 percent indicated that there were neither civil defense nor RACES plans that they knew of. There was an estimated increase (9.4 per cent) in the number of amateurs registered in the Amateur Radio Emergency Corps, bringing the estimated total to 32,761 members. It appears that several thousand home stations now have emergency power, over 60 per cent battery power and 40 per cent gas generator power. More RACES plans have been approved by FCDA and FCC in the last 30 days. It appears that about 60 individual amateur stations with RACES authorizations would be covered under these plans. Adding to the nine-state coverage (under plans) New York City, Nassau, Schenectady and West Chester counties plans now have official approval.

Tornado Work Has a C.D. Parallel. Industrial disasters, wartime attack, hurricanes and floods often catch the nation by surprise. The Flint, Michigan and Worcester, Massachusetts, tornadoes were no exception (story coming up). The complete destruction wrought resembled Hiroshima and Nagasaki indeed and taxed the relief provisions of these communities to the full. An atomic attack would result in such devastation a thousandfold. One of the most conservative papers referred to the relief work as “a test in civil defense.”

There was not so much an inadequacy of numbers as of training in the matter of C.D. workers. Among the many lessons learned, it was empha-

sized again and again that trained workers, instead of casual people who wanted to help by getting in at the last minute, could have accomplished more. One report stated that “communications were never adequate to quickly reinforce areas where the crisis was greatest... there was never adequate reconnaissance to aid the heads in making assignments or exchange of worker personnel.” Now so far as our own communications contribution of amateur radio is concerned we always want to be proud of the performance of our amateur group. ECs and SECs therefore strive to recruit and lay local plans and drill or test at intervals as well as in the annual fall S.T.E.T. to the end that our AREC constitute “one strong and single amateur facility” to be deployed and used as the job may require! Training is indeed necessary, for the Radio Amateur Civil Emergency Service requires disciplined and planned communications. RACES is a joint undertaking of civil defense and amateur radio and you and I have to get signed up in it (a) to make use of our privilege in the amateur regulations under RACES (b) that our work reflect creditably on us personally and (c) to uphold the tradition and stature of the amateur service.

TVI Committee Note. ARRL is pleased to announce an addition to the long list of interference aids available for committee use (page 60, June QST). The article by W5IT entitled “Handling TVI Complaints due to Poor TV Sets” appeared in June QST, and is available upon request from the Communications Department.

RTTY Progress. Results in Armed Forces Day exercises are given on page 45 of this issue. Of 235 submissions on the 35 w.p.m. official message by the Defense Secretary 137 rated certificates for perfect copy! NDC, NDS, NDW2 and NDW sent a special transmission for those equipped to take it by radioteletype. Radio conditions were not good; nevertheless there were some 62 submissions. For a first-year showing, this radioteleype participation is especially gratifying.

Directional CQs Appropriate in Summer. We’re reminded, by receipt of a bulletin stating that a Regional Net is dropping to one session during summer, to pass along this idea. With no late session, the netters have been called upon by the NCS to be on the lookout in their general operation for any stations calling “CQ Ohio” or for any of the particular points in their area.

W8DAE in closing his bulletin quotes W4PL.

"The steady day-in and day-out handling of traffic, free, gratis, for nothing, and on the house, with the compliments of amateur radio, is our
most pleasant contact with John Q. Public. When you mail messages be sure to indicate "through courtesy of amateur radio." Concerning summer nets, wherever the regulars are around and no NCS on the job during streamlined summer operations, it is customary for some one of the group present to take charge and see that any traffic is cleared, then QNF the net as early as possible.

**Emergency Lessons.** "We learned, among other things, that one station at the point of a disaster is not enough to prevent a serious bottleneck. We learned that we should do something about stability and limiting the bandwidth of our carriers. We learned that both phone and c.w. are equally effective in moving traffic. We learned that 99 per cent of our out-of-state hams are gentlemen and will QSY when asked. We learned we can’t please everyone with one plan. We learned the Michigan gang is patient, understanding, loyal, and faithful." — QMN (DARA)

**Preparedness for Emergency Communications.** Amateurs, true to tradition, once again met the need for providing emergency radio facilities during the critical first days after Flint and Worcester were devastated by surprise tornado visitations. The story is being reserved for our next issue when all reports (still coming in) can be correlated. There are lessons for all to note. Enough has been disclosed to indicate general thanks due and that amateurs generally can take pride in the performance under stress of all amateurs who helped.

All ECs, Radio Officers and civil defense organizations should note the close similarity between these disasters and potential military incidents. Where planning and recruiting and some radio tests had been held this paid off.

There was not, so far as is now known, any difficulty in pushing out the more important messages of community interest, ahead, of the personal (agonizing) traffic: the degree of public interest and necessity is spelled out in the texts themselves. See "With the AREC" this month to better appreciate (a) that those stations in the emergency area should be served by others outside by keeping their radio-silent until called upon, and (b) that useful amateur channels outside the congested "phone hands should be planned and utilized to the outside for each emergency contingency if the best and fullest use of all our assets is to be had in future emergencies.

**About organizing:** Don’t miss that item elsewhere in these pages announcing our new AREC Slide Collection. It can be booked (in turn) with the lecture notes that come with it, by affiliated club groups or ECs addressing such amateur groups. Every community should have both Amateur Radio Emergency Corps and Radio Amateur Civil Emergency Service plans, and recruitment-registration of every active amateur license, to be really ready to do the best job, and not be caught unprepared on that day when our community runs into the unexpected!

— P. E. H.
With the AREC

It is easy to criticize, but not so easy to criticize constructively, and even harder to do so without offending someone. It is a fact that most criticisms of our emergency nets in operation during an actual emergency are made by persons who themselves would not have done nearly so good a job in the same circumstances — this mainly because the critic fails to take into consideration factors of which he is not aware and which are not apparent, such as fatigue, emotion, nervous tension and various kinds of pressure to do this or that or the other thing on behalf of selfish interests or people. The recommendations we are about to make for emergency net operation (see also recommendations for handling emergency traffic under "Traffic Topics") are made in full cognizance of the above factors; and while they result principally from listening during the recent Worcester tornado emergency (and we did a lot of listening), they are not intended to reflect unfavorably on the activities of any individual or group. There is no job done that could not have been done better. If we accept that as axiomatic, let us examine how the job can best be done without trying to imitate that we could have done it better than it was done.

One of the biggest headaches in any emergency net is the great number of hecklers from out of the area who want to help. Good intentions are commendable, but they often backfire. A good NCS should make occasional indications that stations are asked not to QNT unless he calls for them.

Even worse are the stations who barge into the nets with urgent "traffic" messages and who, when asked to QRT, frequently break in to remind the NCS that they are waiting — or call the destination station without regard to the NCS.

In any emergency net, the emergency stations in the disaster area are the ones to be served. If they are weak (and quite often they are) a clear channel is required; this is easy on a.m., and usually on 10 meters and below, but pretty difficult on 75-meter 'phone. Yet invariably it is on 75-meter 'phone where most medium-distance emergency work is done. A great to-do results about clearing a channel, usually causing more QRM as a result. One of the biggest neaties at a disaster-area emergency station which wants to work other than locally would be a good a.w. operator so that the medium-distance work could be taken out of the crowded 75-meter band. Closer collaboration between section 'phone and a.w. nets could work wonders in this regard.

The net control station of any emergency net should be that station with the best combination of strong signal and operator ability (i.e., NCS experience), and a station not in the disaster area, since such a station will have traffic-handling and other emergency station responsibilities. Experience has shown that stations in the disaster area, when they get on the air, will be on the frequency of local emergency and/or traffic nets if possible. By that time the net is usually in operation, awaiting the appearance of a disaster-area station. When that station does get on the air, the first order of business should be to clear his official traffic, if any. After that, give him any official traffic. Thirdly, clear his personal and press traffic. And last, only when no other precedent traffic is on the air, send him "worry" messages, to be interrupted at any time by traffic of a higher precedence (see "Traffic Topics").

If there are two or several stations available in the emergency area, it is often beneficial to set up two channels, one for "in" traffic and one for "out" traffic. Casual stations who break the net asking if they can help should be told they can help — either by standing by without transmitting unless called upon, or by moving away about ten kilocycles and helping "police" the frequency by calling casual interfering stations and asking their cooperation. It should not be the NCS’s responsibility to do this. He has enough to do.

These are just some passing thoughts. No doubt many more will suggest themselves or be suggested in information on amateur operations in Worcester and Flint. The most crying need of all is for advance preparedness for operation

NATIONAL CALLING AND EMERGENCY FREQUENCIES

C. W. "PHONE"

3550 kc. 14,050 kc. 3875 kc. 14,225 kc.
7100 kc. 21,050 kc. 7250 kc. 21,100 kc.
28,100 kc. 29,540 kc.

During periods of communications emergency these channels will be monitored for emergency traffic. At other times, these frequencies can be used as general calling frequencies to expedite general traffic movement between amateur stations. Emergency traffic has precedence. After contact has been made the frequency should be vacated immediately to accommodate other callers.

The following are the National Calling and Emergency Frequencies for Canada: a.w. — 3555, 7000, 14,060; 'phone — 3815, 14,100 kc.

NATIONAL RTTY CALLING AND WORKING FREQUENCY

3620 kc.

This frequency is generally used by amateurs using radioteletype throughout the United States. Other frequencies are under discussion and will appear under the heading in future issues of QST.

under emergency conditions — something most of us admit is needed but few of us do anything about. If we would only realize it, the things we usually wind up doing in an emergency, after a lot of false starts, we would do immediately if we were prepared for that type of operation in advance. And the only way to prepare for it is to practice it.

On May 22nd an explosion and fire occurred at the Mount Vernon, Ohio, Central Telephone Exchange. The city was without intra- and inter-city communications. Sensing the situation, WSPJN, Knox County EC, got on the air and called for assistance. At 1825 the Ohio Emergency Net

In San Angelo, one of the Texas cities hard hit by the May tornadoes, Maurice (Tony) Nixon, WSJTG, was on the air handling emergency traffic within two hours, and remained active for almost 48 hours. Here he is at his rig during the emergency. (San Angelo Standard Times photo)
TEXAS TORNADOES

This will supplement the preliminary report on the Texas tornado emergency of May 11, 1953, which appeared in July QST, under “With the AERG.” We now have additional information collected by SCM W5OQP.

In Waco, the principal relief was provided by the Central Texas Amateur Radio Club. Within 45 minutes after the tornado struck Waco, they had two mobiles at the rear of the City Hall, providing temporary emergency communications. Before two hours had elapsed, the 75 kw. power plant was in service supplying power to the City Hall, and this was their only source of power until 24 hours later when the power company put a 25-kw. unit into action. W5ZDN, the club station, was active at the clubhouse. W5RDL was set up at the City Hall. Others who supplied equipment and the services and facilities of their stations and operating abilities were W5FZB TVA DZ ATW NCD KAU BIN BOB RUM OKM VHF and SGN. Others who assisted were W5A TUB RDQ CQ NIM YPT YVH UNP AME TTT DYD RUT CQG TCH YVM YFP KR and W4PBY. Our reporter (W5YVH) asserts that there were others also active in Waco. The message count of the above group was 4694, most stations being on the air continuously for 65 to 90 hours. QRM was terrific, an usual, but cooperation from outside stations was excellent.

In San Angelo, another Texas city hard hit by a tornado on May 11th, W5JIG was on the air within two hours, receiving traffic coming into the Northwest Tornado Emergency Net and starting a flow of communication which lasted two days. W5CMV assisted W5JIG as second operator. W5ETL, W5SBI and W5PNL were also on the air and assisting. The first few hours of operation were devoted to Red Cross and other emergency matters such as medical supplies, police matters and compilation and transmission of casualty lists. Not until early Tuesday morning were official emergency messages received so that work could begin on welfare messages on behalf of individuals. W5JIG operated eleven hours straight, took a three-hour layoff and came back on again for four more hours. With the help of a relief operator, the station was active until 0255 Wednesday.

In Dallas, W5LEZ got on the air at 1800 May 11th. Contacting a Waco station, he found that the most urgent need was emergency power units. Generators were furnished by the Red Cross and the Naval Air Base and dispatched to Waco from Dallas. Waco traffic was routed over W5TAC and traffic for San Angelo via W5LEZ. The Caravan Club prepared a complete emergency-powered station to go to Waco if needed. Later, because of the very heavy traffic load, another station was sent to Waco and set up at the Red Cross headquarters. This station commenced operation at 0630 the next morning, after which contact was maintained for the next 36 hours, with relief operators taking over as required.

During periods of long skip on 75 meters W5CPI was contacted and handled much Red Cross traffic into St. Louis. Traffic was about 90% Red Cross, the total traffic count about 670. Those taking part were: In Waco, W5A ATM D5K MIM and K5PEP in Dallas, W5 CPW DAS HB JLT MIN LEO QXQ TFJ TKJ TOC VEE WCY WLR. Assisting in relaying and guarding the frequency were W5A I1W TFY VIM and K5FBB.

A.R.R.L. ACTIVITIES CALENDAR

Aug. 1st: CP Qualifying Run — W6OYP
Aug. 12th: CP Qualifying Run — W1AW
Sept. 6th: CP Qualifying Run — W1AW
Sept. 17th: CP Qualifying Run — W1AW
Sept. 18th: Frequency Measuring Test

In W5CPI Qualifying Run — W6OYP
Oct. 3rd: CP Qualifying Run — W6OYP
Oct. 10th-11th: CD QSO Party (e.w)
Oct. 16th: CP Qualifying Run — W1AW
Oct. 17th-18th: CD QSO Party (Phone)
Nov. 7th: CP Qualifying Run — W6OYP
Nov. 11th-15th, 21st-22nd: Sweepstakes
Nov. 16th: CP Qualifying Run — W1AW
Dec. 4th-6th, 11th-13th: 16-Meter WAS Party
Dec. 6th: CP Qualifying Run — W6OYP
Dec. 13th: CP Qualifying Run — W1AW

Eleven SEC reports were received for April activities, representing 1757 AERG members — a new low for the season. This makes 54 SEC reports received so far this year, compared with 65 at this time last year. 20 different sections have reported this year, compared with 28 at this time last year. How some we're falling behind?

August 1953
28-MC. VOLUNTEERS WANTED!

All ten-meter operators will find it of interest to consider devoting some regular time to participation in a program to assist newcomers to our hobby. The ARRL on-the-air code-practice program has met with considerable success on the 28-Mc band, and can be even more successful with your participation. A mimeographed listing of amateurs participating in this program is available to any interested person on request (as well as listings of MARS, Naval Reserve and Press Stations). If you feel that your ten-meter gear affords good local coverage, at times when interested parties can listen, notify ARRL by radiogram, card or letter. Give your call, full name and address, anticipated schedule (days, hours, speed) and request printed instructions if needed. Look ahead to beginning your program at the start of the operating season, but let us know now, so QST listings can be made available about the time you begin. A strong amateur radio constantly needs new amateurs and good operators — do your part!

TRAFFIC TOPICS

The recent series of emergencies (Waco, Flint and Worcester) make the subject of emergency traffic a timely one. Listening on frequencies being used for emergency traffic (75 and 80 meters) coming from and going to the disaster areas brings many thoughts to mind, and makes us examine more closely the practicability and completeness of the recommendations we make in Operating an Amateur Radio in an Emergency Community.

We conclude that in general the recommendations are sound but that a good many traffic men either haven't read them or don't agree with them. The result is the same either way, temporary disruption of traffic nets until a system can be set up. This is to be expected, but in listening we perceive that our traffic nets in an emergency could settle down to business so much more quickly if only more of our operators understood the principles of (1) everyday net operation and (2) net control, and if only those who did understand them would abide by them regardless of personal influences at work.

One of the biggest problems in handling traffic in emergency is designation of traffic. Most of the really important traffic within a comparatively small disaster area such as existed in the recent tornadoes is handled on ten meters and below, and this is as it should be. Most of the personal traffic, both incoming and outgoing, is handled on the 75- and 80-meter traffic and emergency nets. Nevertheless, all nets should be equipped and ready to cope with all kinds of traffic. It seems to us that the time is ripe to make a few suggestions on the handling of traffic during an emergency.

Basically, there are two kinds of emergency traffic — that affecting the welfare of the general population, or a considerable bulk of it, and that concerned with individual welfare only. The former consists of such things as Red Cross traffic, traffic concerning the restoration of utilities, rescue work, need for or dissemination of medical, police or fire assistance, press dispatches, etc. The latter can be neatly divided into three categories: (1) Notification of death or injury; (2) reassurances of well-being; and (3) "worry" messages. Some of these categories can of course be further broken down, making things more complicated. One of our biggest jobs in an emergency, where it is not already done for us, is to sort out the traffic given us for transmission and handle it in a way which will best serve the public welfare and redound to our credit. This, fellows, is no cinch.

Looking at it from a detached viewpoint, it is pretty obvious in which order the above traffic should be handled. Trouble is when something personal is involved or when a tearful plea is received from someone with loved ones in the disaster area a good many of us fail to maintain that detached viewpoint and, subconsciously or not, we allow the importance of the traffic we hold out of all proportion to its actual importance. This usually results in our insisting that our traffic be handled first and the necessity for the NCS (if he is not cowed by our insistence) to explain why other traffic has to come first.

In most cases it is up to us amateurs to decide the comparative importance of different kinds of traffic, and then to send each. We have to use our judgment, divided as far as possible from personal aims. The subject deserves much more extensive treatment than we can give it here, but let's enumerate a few thought-provokers:

(1) In emergencies, traffic might be designated Official, Notification, Press, Assurance and Worry, and handled in that order of precedence. At the same time these designations would indicate precedence, they would also describe message content. This will help the originating station to know how to designate them when filed (and give him less excuse for upgrading) as well as better enable each handling operator to evaluate the contents on the basis of the designation given. Probably there is some justification for putting Press ahead of Notification.

(2) Within their respective designations, traffic coming out of the disaster area should be handled before traffic going into the area.

(3) Traffic not connected with the emergency may be deferred until normal communication is restored into and out of the disaster area, but emergency traffic should all be handled as possible. That is, "worry" traffic deserves handling if there is no more important traffic in the net, and provided of course the station in the disaster area is equipped and willing to handle it.

(4) The originating station puts the precedence designation (if any) on the message (customarily before the number or after the check). By whom and under whose circumstances this designation can be changed, if at all, is a knotty problem which will need more thinking about.

For years we at ARRL have refrained from getting into this subject for reasons too numerous and perhaps too obvious to go into here. We still shy away from "priority" designations ( Urgent, Routine, Priority, Deferred, etc.) as such, but having listened to a lot of confusion in emergency note your NCS is gradually coming around to the belief that some kind of generally-accepted precedence designations are needed in emergency traffic.

In "With the AREC" we are discussing the subject of emergency net formation, organization and operation this month; suggest you traffic men take a look since it also concerns you.

TCNP reports 30 April sessions of 44 stations handling 2750 messages. In May, 37 stations handled 3415 messages in 31 sessions. TCRN conducted 31 sessions in May, five stations handling 3185 messages, an average of about 100 per session.

National Traffic System, W6DQL, manager of the Minnesota Section Net (MSN), wrote to the editors during this month: He noted that we have put too much emphasis on Regional and Area Nets and not enough on Section Nets. The latter, representing as they do the "grass roots" of traffic handling, are scarcely mentioned. This is quite true, a good criticism and one worth discussing.

The Los Angeles Section had a get-together on May 3, 1953, to celebrate the first anniversary of the founding of LSN, and they got together to pose for this photo. A lot of traffic talent is represented here. Left to right, standing: W6s CCO, DPL, DDE, QW, BHG, YGJ; center row: W6s JQF (RM), GYH, FMG (RM), CAK, OFJ, NTV; bottom row: W6s NCA, GJP (RM), FCP, CMN, K6EA and W6GHI.

QST for
The fact is that there just isn't room in these pages for details of section nets because there are too many of them. However, your SCM will invariably be glad to reproduce some section net information in his monthly QST column if you will send it to him. The information we reproduce here will be on NTS Regional and Area Nets is surely much a substitute for the monthly SCM column in which the Section Net can be taken care of. We do solicit reports from section traffic nets (phone or c.w.) and will continue to list the data in the format below as long as room permits — after which we will have to resort to some kind of summarization. But don't you fellows who are doing the delivering and originating at section level get the idea we've forgotten you. We have to admit that Regional and Area nets because this is a responsibility of Headquarters under the new Rules and Regulations of the Communications Department. Your SCM is the man to whom you should turn for publicity on section net activities. Meanwhile, if you want to submit data as below, drop us a line for a few copies of the form used by other NTSs (including section nets). May report:

<table>
<thead>
<tr>
<th>Net</th>
<th>Sessions</th>
<th>Traffic High</th>
<th>Average Consistent</th>
</tr>
</thead>
<tbody>
<tr>
<td>EAN</td>
<td>21</td>
<td>1086 143</td>
<td>51.7</td>
</tr>
<tr>
<td>CAN</td>
<td>20</td>
<td>1032 119</td>
<td>51.6</td>
</tr>
<tr>
<td>PAN</td>
<td>18</td>
<td>763  98</td>
<td>43.3</td>
</tr>
<tr>
<td>IRN</td>
<td>20</td>
<td>336  49</td>
<td>16.8</td>
</tr>
<tr>
<td>2RN</td>
<td>42</td>
<td>450  24</td>
<td>10.7</td>
</tr>
<tr>
<td>4RN</td>
<td>42</td>
<td>259  26</td>
<td>7.0</td>
</tr>
<tr>
<td>8RN</td>
<td>42</td>
<td>427  47</td>
<td>10.0</td>
</tr>
<tr>
<td>I RN</td>
<td>53</td>
<td>854  59</td>
<td>16.0</td>
</tr>
<tr>
<td>RNT</td>
<td>52</td>
<td>452  53</td>
<td>4.9</td>
</tr>
<tr>
<td>RSN</td>
<td>13</td>
<td>82   17</td>
<td>4.8</td>
</tr>
<tr>
<td>RUTL/JTJ</td>
<td>25</td>
<td>2240 224</td>
<td>90.6</td>
</tr>
<tr>
<td>TEN</td>
<td>42</td>
<td>1992 137</td>
<td>47.4</td>
</tr>
<tr>
<td>TRN</td>
<td>37</td>
<td>821  10</td>
<td>2.2</td>
</tr>
<tr>
<td>QFS (Kan.)</td>
<td>18</td>
<td>159  29</td>
<td>8.8</td>
</tr>
<tr>
<td>TLON (la)</td>
<td>21</td>
<td>866  83</td>
<td>41.2</td>
</tr>
<tr>
<td>MIM. C.W.</td>
<td>26</td>
<td>133  14</td>
<td>6.1</td>
</tr>
<tr>
<td>MIM. Phone</td>
<td>24</td>
<td>108</td>
<td></td>
</tr>
</tbody>
</table>

| Total      | 985      | 10275 224   | 20.8               |
| Record     | 506 (52) | 10275 224   | 22.1 (51)          |

Speaking of section nets, we want to offer the suggestion that there is a definite place for the section "phone net in NTS, for quite often it has the coverage that a c.w. net cannot provide. If your section is one of those that does not have a traffic net because there aren't enough c.w. men available, why not try to organize one on "phone, using the c.w. men you do have to effect liaison with the regional net? W6ELQ, in relinquishing the reins of PAN (no successor as yet), wants to acknowledge the invaluable assistance of W7NLH. Nelle is former manager of RN7 and knows her way around in the Pacific Area. The RN7 report listed representation from nine section-level nets, including some from newly-inaugurated sections of Arizona and New Mexico, but none from Colorado or Utah. RN7 certificates have been issued to W7OE and W7TCL. W7CZFX will be asked to assist manager W7PRAX in keeping the net going during the summer. 2RN/TJL boasts the best attendance record as well as the highest traffic total this month. W9TFT wants it known that their one-session high of 221 (on May 4th) included no "book" messages and was cleared in three hours. TEN will reduce schedule to the nights per week (but 100% CAN liaison) if traffic warrants it — but traffic was plenty good in May! Summer NCS needed. TRN summer schedule (starting June 1st) is Monday and Friday on 20 meters, and Wednesday on 750, all at 1945 EST, with a representative to EAN each night if possible. Maritime representation was nil in May.

AROC ORGANIZATION

A newcomer to ARRL Training Aids, the slide collection "Amateur Radio Emergency Corps Organization" will prove valuable to affiliated club groups, as well as AEC groups. The basic structure of the AROC, with emphasis on the EC's job, is presented on 41 slides (total showing time about 25 minutes). The lecture commentary is available in printed form, or pre-recorded for your use on wire or tape. Booking arrangements are available upon request from the Communications Department.

August 1953 67
**ELECTION NOTICE**

(To all ARRL members residing in the Sections listed below.)

Elections are hereby conducted at an election for Sections 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 dates specified. In cases 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 expiring memberships, individual signers 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.)

<table>
<thead>
<tr>
<th>Section</th>
<th>Closing Date</th>
<th>Nominees</th>
<th>Present Term Ends</th>
</tr>
</thead>
<tbody>
<tr>
<td>Western Florida</td>
<td>Aug. 14, 1953</td>
<td>Edward J. Collins</td>
<td>July 28, 1953</td>
</tr>
<tr>
<td>Eastern Florida</td>
<td>Aug. 14, 1953</td>
<td>John W. Hallister</td>
<td>July 23, 1953</td>
</tr>
<tr>
<td>Vermont</td>
<td>Aug. 14, 1953</td>
<td>Raymond N. Floyd</td>
<td>Oct. 15, 1953</td>
</tr>
<tr>
<td>North Dakota</td>
<td>Aug. 14, 1953</td>
<td>Everett E. Hill</td>
<td>Resigned</td>
</tr>
<tr>
<td>Quebec*</td>
<td>Oct. 15, 1953</td>
<td>Gordon A. Lynn</td>
<td>Dec. 15, 1953</td>
</tr>
</tbody>
</table>

* In Canadian Sections nominating petitions for Section Managers must be addressed to Canadian Director Alex Reid, 109 Logan Ave., St. Lambert, Quebec. To be valid such petitions must be filled with him on or before the closing dates named.

**ELECTION RESULTS**

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

<table>
<thead>
<tr>
<th>Section</th>
<th>Nominees</th>
<th>Term Ends</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eastern Pennsylvania</td>
<td>W. H. Wood, W3RBP</td>
<td>June 15, 1953</td>
</tr>
<tr>
<td>South Dakota</td>
<td>J. W. Sikorski, W9RNR</td>
<td>July 2, 1953</td>
</tr>
<tr>
<td>East Bay</td>
<td>Ray H. Cornell, W9JZ</td>
<td>Aug. 10, 1953</td>
</tr>
<tr>
<td>Southern New Jersey</td>
<td>Herbert C. Brooks, K2BG</td>
<td>Aug. 26, 1953</td>
</tr>
</tbody>
</table>

'In the New Mexico Section of the West Gulf Division, Mr. G. Merton Sayre, W3511, and Mr. Thomas F. Marshall, W5RFF, were nominated. Mr. Sayre received 85 votes and Mr. Marshall received 81 votes. Mr. Sayre's term of office began May 4, 1953.

In the Iowa Section of the Midwest Division, Mr. William G. Davis, W5WPP, and Dr. A. J. Ploog, W5SOA, were nominated. Mr. Davis received 151 votes and Dr. Ploog received 130 votes. Mr. Davis's term of office began June 15, 1953.

**MEET THE SCM**

Arthur W. Plummer, SCM Maryland-Delaware-District of Columbia, became interested in ham radio in March, 1954, and within a very short time had acquired his first license with the call W3EQK, which he now holds.

Transmitting equipment in W3EQK's shack consists of a pair of 551A's at 250 watts input, modulated by 551A's in Class B. The station receiver is a Hallicrafters SX-28; antennas are two-element 20-meter and two-element 10-meter beam. SCM Plummer also works mobile with his Elmac A-54 rig and Gonset tri-band converter. Operation from the home rig is on 10- and 20-meter 'phone while mobile operation is conducted on 10-, 11-, 20- and 75-meter 'phone.

In addition to his numerous SCM duties, Art keeps busy as an Official 'Phone Station, Official Bulletin Station, Official Observer (Class I), and Phone Activities Manager, and is a member of the Baltimore Amateur Radio Club. He participates in many contests and was winner of both the 11th and 12th All-Sections Sweepstakes for Maryland-Delaware-District of Columbia.

Art's diversified interests include photography, 8-mm movies, flying (he has been a licensed private pilot for a number of years) and pistol and rifle shooting. His favorite sports are baseball and football. His occupation: Weapons Instructor for the Baltimore Police Department.

**BRIEF**

The 8th V.H.F. Sweepstakes score of W2KU was erroneously credited to W2ICU in April QST.

**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 WI4W will be made on August 12th at 2100 EDT. Identical texts will be sent simultaneously by automatic transmitters on 8825, 3555, 7125, 14,100, 21,020, 52,000 and 146,000 kc. The next qualifying run from W2OWP only will be transmitted on August 1st at 2100 EST on 3580 and 7135 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 six speeds transmitted, 10 through 35 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 WI4W each evening at 2130 EDT. Recorders used on several of the transmissions are given below. These may be purchased at your local dealer.

For practice purposes, the order of words in each line of QST text is reversed during certain of the slow-speed transmissions. To get sending practice, hook up your own key and buzzer and attempt to send in step with WI4W.


QST for
ATLANTIC DIVISION

EASTERN PENNSYLVANIA — SCM, John H. Dubois, K2CFP — SEC: IGW, RM: A.A., BIP, FAS: P.O. Box 3780, 3211 Park Ave., Scranton, Pa. 18506. Officers of the Scranton ARC are NNT, sec.; COT and KMM, vice-pres.; FL, act. mgr. The South Philadelphia ARC meets at the First Unitarian Church, 3rd and Tasker Sts. It seems that the York Club invited the Lancaster gang to participate in a 2-meter tradition at a Fixed, held on May 14th, to their sorrow. Lancaster took first and second places! Lancaster also put 7 mobiles in the Armed Forces Day parade May 15th, and on May 3rd provided continuous coverage of the football game, in Mon. through Fri. on 3990 ke, at 7:45 p.m. and 9:30 p.m. EST. DSG is moving to Narberth, DUG reports good results with off-circuit readings, while EYR says the same for T2FD, BYB reports the Oreland group is all set up for e.d. and is waiting for the final ASL. YGS plott to JLL, YGS are 420 ke on 144.0 MHz, and communicate with chimney, in the recent windstorm. He expects to be on shortly with some new gear and is eager to contact 25-MHz operators, so get out and UFA is all set for low-power phone transmitters as soon as his General Class ticket arrives. Traffic: W3CUI, 6835, BIP 207, BFF 123, PJD 112, NOK 89, AEQ 93, ONA 58, MAC 48, DUG 48, RAG 41, QOL 39, RSG 32, FYF 30, VN 22, FYV 21, SHP 17, AD 10, VDE 8, UFA 2.

MARYLAND-DELAFIELD-DISTRICT OF COLUMBIA — SCM, Arthur W. Plummer, W3EIQ — Lic. CDQ, sailed June 24th for Europe and will return in September. WM7TA was on 3990 ke, at 1200 and 1800 ke, on the air three days with 4AG7-615H. OSF will be heard from soon via twelve-elements on 2 meters. GHQ is active on 10 meters with 4AG7-615H. BLT is active on 2 meters with 1200 ke.. A new farm 20 miles south of B. C. QCS is QRL with MEFP-VPN and TCPN transceiver, ‘phone and e.w. EJQ, your friendly transceiver, is now in operation on 146.5 MHz, and is active on all bands by members of the DARC on a recent visit to Willington Del. Delaware is there for you guys who are trying for a new call and want to get on the air. Bob and going to sign the Delaware License Plate Bill into law recently, Lt. Sam Stant, Delaware State Police, W3STS, is given credit for the majority of work towards its passage. C.d. communications in Delaware will be 100 per cent complete and in operation by the time this is printed. Our last call off to the Chincoteague, Va. Bureau of Animal Health and Other R.F. Amplifiers.” On May 25th a very interesting speaker, Charles Christianson, Field Engineer for Bendix, speaking on “Amateur Electronics” and demonstrated an oscillating-a.f. power amplifier, a multivibrator and other circuits using transistors, KMD, new radios and information on several other c.s. QCS, assistant to 2nd Army MARS director, reports USA will be on soon. ONB reports a visit with JIF and YDA. GSK is running up Baltimore on his homemade tuner, UGF says summer QRN is no good for traffic skeds. Your SCM requests that you not do much QSO work in the next few months as he has deadline to ARRL of the 7th of each month. Late reports make extra work. Thanks, fellow operators. ONB reports perfect conditions on officers and members of the following clubs: Chesapeake at Towson, Md.; Delaware Amateur Radio Club at Wilmington, Del.; and the Radio Club of MD, Del., D.C. Please come to ARRL, the 7th of each month. Complete information on members of the following clubs: Washington, D.C., W3DQ, and all other clubs in the Md.-Del.-D.C. Area please come through so the files can be completed and brought up to date. Complete information on members on page 4.

SOUTHERN NEW JERSEY — SCM, Lloyd L. Gaine, W6JQV — COS has moved to the Southern New Jersey 75-meter emergency ’Phone Net to ZQ. The club station of the DIVA now has quite a responsibility to carry on the call sign tradition in the S.N.J. area. NIS and W6JQV are going for a fixe signal on the 2-meter mobile side. K2AEH ran up 66 contacts during the Sweepstakes and most of them were made on single sideband. ANI is now active in Pt. Way, N.J., and is looking forward to good station on 40-meter ’phone from 1830 to 1930 EDST. Currently acquired a Genet 2-meter communicator and is putting a fine signal on the air. ANI is active on 3990 ke, at 9:30 a.m. and needs the necessary of supplying all the equipment as well as the operators. Traffic: K2BGJ 355, W2RG 163, 2V6 17, ASG 26, 110.

WESTERN NEW YORK — SCM, Edward G. Graf, W3JYV — SEC; UTH. RM: RUF. PAM: GSB. NYS meets on 3815 ke, at 7 p.m.; and on 3990 ke. at 7 p.m., on May 12th, and on 3995 at 8 p.m.; NYS C.D. on 3905.5 and 3993 ke. at 9 a.m. Sun. TIBB is resigned as SEC for Erie County as he has moved to New Jersey. Look for him on 2 meters, NYS is planning a picnic for July 26th at Marcellus County Park on Route 2017, southeast of Syracuse. K2ABZ is looking for a new ARRL call, he has a 2-meter contact with 4AG7-615H. QSF has gone s.a.b. PFY has been appointed SEC for Erie County and Radio Officer for 146.5 MHz. The Buffalo Lumber Co. is planning to operate a QLU, its emergency truck, in a successful c.d. test May 22nd. IFP is a regular on 75 meters. UHA has a rig on 6 meters with an S15 final. W2CBT and AKM are on 2 meters. FE has a new 32V-3. KN2AN is a new call in Hammondport. The Port Shankwin ARA held a family day at Gravel Grove reservation. The Malone Radio Club put an ARSC display in a communications center sponsored by the Rotary Club. CW2, ADI, and W2S CSH and CBS operated the 3-meter rig at the display to relay traffic to CPY for out-of-citv delivery. HXG is the new SEC for Schoharie County. YLM is SEC and Radio Officers in c.d. for Broome County. A good time was had at the Scranton meeting was held in Montrose, Pa., representing the Binghamham, Scranton, Sidney, Elmira, and Cortland Areas. The BHM Amateur Radio Assn. held a meeting at 8 p.m. the 2nd Fri. of each month at the IBM Gun Club, Officers are: PAM, treas.; W. J. Pielowski, sec.; and W. J. Lipowski, treas.; OW, act. mgr. QSL now is K2CXX, BHP and BFL now are mobile. The Greater Buffalo HAM Club is building a new tower in Niagara County. MJF, active on 40-meter c.w., has CL AR2B modular to work the locals on ‘phone. THI, of FCC, spoke on GSA at the 10th meeting. ONG is now on the air with a new arrangement with the electronics renewed; EMW as OSF, NAI as EC. Net certificates were issued to RQF, JRM, AYF, MSE, RVH, BPB, HUP, IPE, BKK, IEP, PBP, reports made of the latest news. OJY, YJE, OYE, OYJ, OVR, PQK, YUP, RCF, RUF, ROL, SHT, SAM, SNC, SSB, TAH, TBR, IJG, UYJ, UNE, VUN, YVR, WGHH, WHF, and complete information on officers and members of the following clubs: Cheesapeake at Towson, Md.; Delaware Amateur Radio Club at Wilmington, Del.; and the Radio Club of MD, Del., D.C. Area please come through so the files can be completed and brought up to date. Complete information on members of other groups also is on hand. I would appreciate it greatly if Net Man

August 1953
ILLINOIS — SCM, H. F. Lund, W9KLQ — Section Net: 215 kHz, 540 kHz, 551 kHz, 271 kHz.

CENTRAL DIVISION

IL — SCM, R. M. Heek, W9CNE — Net: 215 kHz, 540 kHz, 551 kHz.

WISCONSIN — SCM, R. W. Goetsch, W9QRM — Net: 215 kHz, 540 kHz, 551 kHz.

DAKOTA DIVISION

NORTH DAKOTA — SCM, Everett E. Hill, W9VDP — Net: 215 kHz, 540 kHz, 551 kHz.
This page is written this month with a feeling of reluctance and inadequacy of the ability of the writer to express in mere words the feeling that exists in the hearts of all of us here at National. The occasion of saying “au revoir” to our guide and friend for many many years leaves us with an “empty” feeling.

Although we hope to see him occasionally, effective as of June 1, 1953, Mr. William A. Ready has resigned from active participation in the business affairs of the National Company, Inc., and has retired to enjoy a well-earned vacation. This is the sort of thing that most of us dream about, but it must be a drastic step to one who has been so actively interested, not only in a business, but in the well-being and happiness of those working for him.

Mr. Ready was not a licensed ham himself, but he has always been greatly interested in amateur radio and has contributed toward providing increasingly more effective equipment for ham communications, perhaps more than any other person alive today. During the past two decades or so that this page has been written, Mr. Ready has often contributed by personally writing many of its pages. The reprint that appeared last month is a key to the practical, down-to-earth character of the man.

We feel this to be a very appropriate time to pause for a while to think back at what has transpired in the past here at National. We see a picture of steady progress under Mr. Ready’s direction, a progress that has been a happy and inspiring one. For those who can remember, National Co. really got started in the radio business by manufacturing the Browning-Drake broadcast kits and the old Velvet Vernier dials. Then came the shortwave receivers, starting with the TRF regenerative circuits, called the SW-5, SW-45, and SW-3. A shift to super-heterodyne receivers was imminent, and the AGS was designed, followed by the old reliable FB-7. Later came the first HRO, the NC-101X, NC-200, NC-2-40D, NC-173, and NC-183, and many others. The latest models show a constant trend of improvement and the present HRO-60 stands as the top DX getter of them all.

As we try to “look ahead” to the future, it seems to us that the progress that has been made to date is but an example of greater things to come. Carrying on the policy that has been laid down by Mr. Ready, a policy of continued expansion and improvement of our ham equipment while maintaining, as always, the highest standards in the industry, will result in a steady growth for National Company. This growth is limited only by our imagination, and the growth of the amateur fraternity itself.

The 70 radio hams here at National and all the other workers, join me in bidding Mr. Ready a fervent “well done, and God-speed.”

C. C. Hornbostel, President
done so, send in the registration form attached. When I originally took the SCM job, I had more time to devote to attempting to build the section. The situation has been altered since then, and the SCCF and I have to do the best we can on the road. I feel that I am now unable to do full justice to the position. With regrets I find it necessary to resign to make room for someone else to carry on. I want to thank all of you for your kind assistance.

TWILIB 33, USG.

SOUTH DAKOTA — SCM, J. W. Sikorski, WWRBN - Asst. SCMs: Earl Shirley, 9YQR, and Martha, W5LYC; WZ9T, SEC; GCP, PAM, URM, RLJ, OLG. The Prairie Dog At Home - While the call of YZG is the trustee, SMV, Sioux Falls, and LBS, Tulara, are new OSCs appointed. IZA, Vermillion, presented a demonstration of their new model MF transmitter to the South Dakota Broadcast League, 6AJN & 6NK, with Collins 76Q-8. WNBNA has completed 2-meter fixed and mobile rig with 529B final. IZA, Vermillion, has accepted a position at Basin State College, Muncie, Ind. GDE has accepted EC appointment for Clayton County. DTB, Centerville, is control-room operator for WAXA, at Sioux Falls, after the May 30 opening ceremony for year-round operation. They are now fully connected and working: Iowa, Illinois, and Nebraska. Hams at Elsworth AFB, Rapid City, are conducting a campaign to raise money for the memorial and MARS facilities and operations. KVTJ is operating successfully. Director PER attended the Board meeting at WSU. WY4PLO, RNL, H805, R8ASW is new 3D-U. The Minnesota State C.W. Club held a business meeting at the Critterion Cafe in St. Paul. Various net problems were discussed. They elected a new Net Manager was elected. Those attending from the Twin Cities were none, and the Rochester and Twin City stations of the TICN Net from Iowa and RXL from Duluth. We must find a way to thank DOL for the splendid way he handled the MSN during the winter. We must bring it out of a state of a slump. QMC has been elected as Net Manager and we would like to give him the support that he deserves in making it a bigger and better net. We would like to see more stations in Southern Minnesota report into either the MN or 3D-U net. It won't be long now before BGY will be out of the hospital and on the way home. HPN now owns a Viking II DSC, signing DLA4Y located in Grand Forks. David DXC with his 226D and 75A-2, COK changed his final to a pair of 814B. HBE is operating portable from his lake cottage. CIP is making a tremendous effort to get everyone south sides. SWVA, 9UHF, JNC has a new antenna and claims that he can work anything he hears. IKS is located in the high school building. They have 20 Nobix operators operating the station on 5790 kc. St. John's Radio Club at Collegeville is now at 10 meters in a big way for local emergency work. Sam would like to see a Nobix Net for Arkansas. If you have mobile operating, the kids will drop you a card and let me know what you think of DX. I see I can get one started. IUX has a new Gencom Super six converter for mobile. He visited W1IA while on a trip East. A lot of appointments are running out now, so be sure to renew your license.

ARKANSAS — SCM, Fred E. Ward, WS7LX - The members are making sure some of the boys hard to catch and a lot of mobiles are being tuned up for vacation time. YHS sends a nice letter and writes that the Searcy Club is going to 10 meters in a big way for local emergency work. Sam Ward would like to see a Nobix Net for Arkansas. If you have mobile operating, the kids will drop you a card and let me know what you think of DX. I see I can get one started. IUX has a new Gencom Super six converter for mobile. He visited W1IA while on a trip East. A lot of appointments are running out now, so be sure to renew your license.

LOUISIANA — SCM, Robert E. Herr, WS5GHF - Our latest OSC appointees is MNT, in Baton Rouge, who is a member of the Louisiana contingent of the Gulf Coast Hurricane Net on 3933 kc. EB continues with a tremendous volume of overseas traffic via his Guam schedule, on 750 kc. He can get one started. IUX has a new Gencom Super six converter for mobile. He visited W1IA while on a trip East. A lot of appointments are running out now, so be sure to renew your license.

MISSISSIPPI — SCM, Dr. R. C. Cortese, W5OTD — The Mississippi Southern Section is now in the midst of their activities for the last several months. Your SCM wishes the state-wide coverage. NUV is on 6-meter mobile. TIW and TGO are on 75-meter mobile. The SEC of the Mississippi Southern Section is studying the idea of using the SEC's mobile station to hold a seminar on DX operation at the 找不到合适的区域。
Quality screen-grid tubes became popular eight years ago when Eimac introduced the 4-125A radial-beam power tetrode to the electronic industry. Since that time thousands of engineers and amateur radio operators have used the Eimac 4-125A in a wide variety of applications and have consistently received outstanding, dependable performance. This versatile tetrode contains the pyrovac* plate, controlled emission grid wire, low inductance leads, thoriated tungsten filament, and input-output shielding. All of these advanced features are found only in Eimac tubes. Add to this, high power output with low driving requirements, simple circuit design that minimizes TVI, low grid-plate capacitances, and ability to withstand heavy momentary overloads, and you have the Eimac 4-125A — quality tetrode in the 125 watt field.

*An Eimac trade name
amateur is being listed at Flint; the operators are still on duty and we know they can be depended upon to stick it out until the final "all clear" has sounded. Our hats are off to the White River and all our friends handling the thousands of relief and inquiry messages; and I am sure that your splendid work will long be remembered by the grateful people of the affected communities. By the way, are you registered with your local Emergency Coordinator? Application blanks are available upon request from the EC or the SCM. The license-plate bill is due in over the Governor late May and we understand it will be effective with the issue of licenses on June 1. 

[Partial text not visible]

NEW YORK CITY AND LONG ISLAND — SCM, George V. Cooke, Jr., W2ONI. Asst. SCM, Harry Dannreuther, W2KPC, MAR; RY, SEC; ARC, SEC; NBC, SEC; B&N, SEC; QV, SEC; L&G, SEC; GY, SEC; KQX, SEC. Membership in the section AARC is now well over the 700 mark and still growing. All counties and boroughs are really on the ball and activity is at an all-time high. The KGN the new EC there reporting 195 actively engaged in ARC AEC activities. Such activity is further evidence of the growth of ARC in the city. The Brooklyn Radio Club has just reorganized and new officers installed. New members and officers will be announced later. The new EC in Brooklyn are JCI, L.EF, and KN2BOY. OBW-LIVX has returned to the Island after a long stay in Georgia. QO call is located in Centerville. His interest and getting his licensing Degree at the University of Florida. The Brook
town Radio Club now meets the 2nd Fri. of each month. The meeting is held at the Lauter building. The group is made up of amateurs residing in Pennsylvania, New Jersey, New York, and Connecticut. Many of these men have been active in ARC for some time. The new V9R, 10K has purchased a new antenna farm. It is a 40,000 watt vertical (all-band) and the club station, HJQG, is now on the air with a 300-watt transmitter. The group is growing and expects to have an all-band contest which ran from May 15th to June 10th. The group is also interested in getting a new station on the air. The group's plans are to have an all-band station that will be on the air during the day and all night. The group is looking for a location that will allow them to operate on all bands.

[Partial text not visible]
The New HQ-140-X Receiver with Professional Characteristics!

Already enthusiastic response is being received from users of the new Hammarlund "HQ-140-X" receiver. From their brief experience they now know it's the finest "HQ" ever built. It incorporates the carefully engineered features required to obtain full enjoyment from amateur operation.

Behind the professional design of the front panel are new circuits that provide greatly improved receiver performance. Modern miniature tubes are used. There are separate mixer and oscillator stages. Careful component selection and layout assure longer receiver life, and easier maintenance and servicing throughout the years.

Frequency coverage is continuous from 540 Kc to 31 Mc (555 to 9.7 meters) in six bands. Arbitrary band-spread tuning is provided on all the four higher frequency ranges, and station selection in the amateur bands is simple and precise because of direct calibrated band-spread for the 80, 40, 20, 15, and 10 meter bands.

Dealers everywhere are now getting shipments of these receivers. The response already has created waiting lists at some distributors. Net price is $264.50; Speaker, $14.50.

For additional information about the "HQ-140-X," write to The Hammarlund Manufacturing Co., Inc., 460 W. 34th St., New York 1, N. Y. Ask for Bulletin’S2.
keep up the 2-meter activity. AJH is home from college, and expects to spend the summer on 80-meter c.w. to increase his code speed. HJD is active on 2 meters. K2BEV is rounding out the first year of ham activity with plenty of 40-meter IARU and 2-meter c.w. activity on the Middlesex ARC network. WRWH, SYX, PGX, and QCY attended a recent RVRC meeting. The first three are Bloomfield Radio Club members; the last-named is a member of the Morris Hills ARC and is comm. coordinator, Morristown C.D. The Middlesex County C.D. Area 7 drill was a huge success. Amateur radio activity was prailed by the Area Director at the recent directors’ meeting held at the state office of c.d., Trenton. P0Q headed up the amateur activity for this drill in the absence of R.B. Full support was had from the entire VHF gang. EUZ is mobile on 2 meters. HJD is back on 2 meters. The MCBAR gang is promoting a 2-meter portable emergency equipment program. K4CCTL is doing a new 2-meter rig. EOK has a new Bandmaster Senior on 75 meters. QOG operated the amateur station at the Monmouth County Council, Boy Scouts Camporee held recently. More than 500 messages were handled during the three-day encampment. 5UWJ/2 now is on FSK telegraph in the 20-meter band. Traffic: W2CUI 242, EAS 210 N9D 01, CFB 13, ZD8 8, CIX 4, K2BCK 2.

MIDWEST DIVISION

IOWA — SCM: William G. Davis, WB2PP - Asst. SCM; Dr. A. J. Ploog, 7EC, SCA, SEC; VRB: RAI: QV, SCA, YTA, and BDR. TLCN had its 6th annual get-together May 10th and elected a new slate of officers of AUL. New Net Manager is BDR. To increase the outstanding traffic, the outstanding traffic man of the Midwest, AUL was married to Carol Myer May 29th. The knot was tied by EKH, DDW played the organ, and UDR was on hand. UWF is installing radio equipment for the Air Force in Labrador. YBD is an operator at KAYL. YBV now is the owner of KCTA at Charles City. TLCN went on another sked June 1st and meets Mon., Wed., and Fri. at 6:45 p.m. BDR is new RAI. He pulled out all the stops and topped our old traffic maestro, SCA. The Waterloo Chicks and transmitter hunt had an added attraction, the interception of a mobile, BCB, who was passing through town. K8WAD is a newcomer to the BPL radio ranks, BDR, SCA, and QCW attended ORS appointments. BDR’s accomplishments in ham radio are particularly noteworthy because R.B. is blind. He is setting a pace that will make all his fellows dig right in and work. It’s wonderful to see such an example for those in like condition. The Military Amateur Radio Club (Iowa State) also provided a message at Velaske time. K8WAD received messages on 6 meters. B8VX, 3SDW, B0HF, 9LFT, 60VQ, 9SDP, 9DLR, and 9S0A all assisted and handled about 200 messages within 7:45 hours. Traffic: (May) WB0BDR 1345, SCA 1251, K8WAD 729, W6BOZ 391, FZ0 301, BVE 313, QVA 221, G7X 181, Y8TA 191, S8X 195, SBP 110, J8B 88, E6H 62, NYX 23, BLH 15. (Apr.) W8CSA 1670, BVE 167, (Mar.) W6ERP 16.

KANSAS — SCM: Earl N. Johnston, W6ICV — SEC: PAH, PAM: FNS, RM: KXL. Summertime is harvest time. Chung’s Picnic held May 24th was a record-breaker with 294 registered. The mobile bands on 10 and 20 meters was a new feature, with N8S and KOL winning, ZUX reports amateurs from Scott City, Garden City, and Dodge City are working on a hamfest to be held in Dodge City this fall. The date will be announced later. The Johnson County Radio Amateurs Club also participated in the simulated bombing of Kansas City, Mo., on April 29th, providing communications for Red Cross Base station with 12 mobiles. Those participating were H6D, ODU, POC, GLN, WMH, LQV, ZGK, ILU, UQY, Owl, D5X, IPG, DEL, LTY, DS, OMM, EDB, WUT, KGG, NZP, and C8L. WMH is Radio Officer for the Johnson County set-up, with KGG as assistant. The JCARC also is planning to hold its first annual banquet Oct. 9th. E8B has his Extra Class license and his XYL, OCP, now has her General Class ticket. FEO is back in Ft. Scott and is working on his modulator. W9DUE is a new call in Wichita. L8X’s XYL Myra, now has her General Class ticket. We surely will miss Ned Smith, DTV, an ardent 2-meter fan who passed away suddenly May 16th. Traffic: (May) WB6UPU 283, K8F 158, BZ 277, NTY 304, FNS 28S, N8S 75, H8P 42, HFP 15, IFR 15, ICY 12, VBQ 8. (Apr.) WB6UPU 18.

MISSOURI — SCM: Clarence L. Arndale, W6GBJ — SEC: VRB, PAM: AZL, and BVG. The Houston Club has changed its name to Missouri Ozarks Amateur Radio Club with the following officers: JGD, pres.; CTE, vice-pres.; 1C2, secy. The St. Louis University Amateur Radio Club is now affiliated with ARRL. Following the Waro, Tex., disaster RCE, the stl. Louis, EC, contacted CPR to determine if he could establish contact with Waro to handle Red Cross traffic. Contact was made with KW5EJ and W9KLAU with a total of 51 messages being handled during the night. QSO also was handled via a mobile. Waro's messages, ODU is learning to copy traffic on a Braille writer and hopes to improve her speed soon. It is reported that lightning badly damaged the shack and razed AJV. CXX's activities still are limited because of illness. QMF has his new 2-meter beam operating. G8M monitors 7160 kHz daily from 1:30 p.m. to 4:00 p.m. looking for traffic. BTVW

(Continued on page 78)
# Belden Aptitude-Tested Intercommunications Cables

Aptitude-tested Belden Intercommunications Cables are available for every type of installation and for every type of equipment. The permanence and trouble-free performance of Belden Inter-Com Cables assure you constant quality in your work. For more profitable installations, specify Belden Inter-Com Cable.

Belden Manufacturing Company
4621 W. Van Buren St.
Chicago 44, Ill.

<table>
<thead>
<tr>
<th>A.W.G. and No. Condrs.</th>
<th>22-2</th>
<th>22-12</th>
<th>22-12</th>
<th>22-3</th>
<th>22-3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stranding</td>
<td>Solid</td>
<td>Solid</td>
<td>Not Paired</td>
<td>Not Paired</td>
<td>Not Paired</td>
</tr>
<tr>
<td>No. Pairs</td>
<td>1</td>
<td>6</td>
<td>6</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Insulation Thickness (inches)</td>
<td>.010</td>
<td>.010</td>
<td>.010</td>
<td>.010</td>
<td>.010</td>
</tr>
<tr>
<td>Tinned Copper Shielding</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>

For Station-to-station and extension wiring (shielded)

<table>
<thead>
<tr>
<th>A.W.G. and No. Condrs.</th>
<th>22-4</th>
<th>22-5</th>
<th>22-7</th>
<th>10-2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stranding</td>
<td>7x30</td>
<td>7x30</td>
<td>7x30</td>
<td>7x30</td>
</tr>
<tr>
<td>Nom. Diam (inches)</td>
<td>.168x.278</td>
<td>.140</td>
<td>.170</td>
<td>.245</td>
</tr>
<tr>
<td>No. Pairs</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Insulation Thickness (inches)</td>
<td>.015</td>
<td>.010</td>
<td>.010</td>
<td>.010</td>
</tr>
<tr>
<td>Tinned Copper Shielding</td>
<td>Over 1 pair</td>
<td>Over 1 conductor</td>
<td>Over 3 conductors</td>
<td></td>
</tr>
</tbody>
</table>

For Station-to-terminal wiring (unshielded)

**GENERAL PURPOSE PLASTIC INSULATED CABLES.**
Flexible, lightweight, and small diameter. Applications include control, annunciator, and communication circuits.

---

**Belden Radio Wire**

The Aptitude-Tested Line
inside this package on your Jobber's shelf... is the world's toughest transformer

H-TYPE

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

CHICAGO "New Equipment" transformers (available in 3 mountings) feature one-piece drawn-steel-cased—the strongest, toughest, best-looking units you can buy. The one-piece seamless design, enclosing an electronically perfect construction, provides the best possible electrostatic and magnetic shielding, with complete protection against adverse atmospheric conditions. For every application: Power, Blue, Filmament, Filter-Transformer, Audio, MIL-T-27, Stepdown—ask your electronic parts distributor for CHICAGO "Sealed-in-Steel" Transformers—the world's toughest with that extra margin of dependability.

FREE
"New Equipment"
Catalog
Get the full details on CHICAGO'S New Equipment Line—covering "Sealed-in-Steel" transformers for every modern circuit requirement. Write, Audio, Free copy of this valuable catalog today, or get it from your distributor.

CHICAGO TRANSFORMER
DIVISION OF ESSEX ELECTRIC CORPORATION
3301 ADDISON STREET + CHICAGO 18, ILLINOIS
00 WATTS PH. • 120 WATTS CW.
TVI SUPPRESSED XMTR
COMPLETE KIT $198.50

...all tubes and all parts for SRT-120 xmtr & PS-501 power supply. The SRT-120-P includes copper coated, wrinkle-finish cabinet with partially assembled polished chassis, ready for wiring; complete step-by-step, fully illustrated instructions; interconnecting cables, plugs, shield and everything ready for assembly. Save the high cost of labor.

Available—Factory wired/tested $279.50

COMPLETE LITERATURE WITH DETAILS & SPECIFICATIONS FREE

See Them at Your Favorite Dealer Now!

SRT-120-P
MOBILE OR FIXED
Complete less pwr. sup.
Choice of Mobile or Fixed Cabinet (specify)
Complete KIT $159.50
Completely wired/tested $198.50

ACK RADIO
Birmingham, Ala.

ADIRONDACK RADIO SUPPLY CO.
Amsterdam, N. Y.

ALLIED RADIO
Chicago 7, Ill.

ALMO RADIO
Phila., Wilmington, Salisbury, Camden, Atlantic City

ARROW ELECTRONICS
New York City

WALTER ASHE
St. Louis, Mo.

GEORGE D. BARBEY CO., INC.
Reading, Penna.

CONCORD RADIO
New York City

DELAWARE ELECTRONICS SUPPLY Co., INC.
Wilmington, Del.

M. N. DUFFY & Co.
Detroit, Mich.

EVANS RADIO
Concord, N. H.

FT. ORANGE RADIO DIST. CO.
Albany, N. Y.

R. C. & L. F. HALL
Galveston, Beaumont, Houston, Texas City, Texas

HARRISON MARINE SERVICE
New York City

HARRISON RADIO
New York City, Jamaica, N. Y.

HARVEY RADIO
New York City

HENRY RADIO
Butler, Mo., Los Angeles 15, Calif.

HOUGH RADIO SUP. CO.
Cheyenne, Wyoming

HUDSON RADIO
New York 19, N. Y.

JOHANNESON ELECT. CO., INC.
Greensburg, N. C.

KIESELFELDT ELECT. INC.
Los Angeles 15, Calif.

LAFAYETTE RADIO CORP.
Plaatsfield, N. J.

NEWARK ELECTRIC
Chicago, Ill.

OFFENBACH & REIMUS
San Francisco 2, Calif.

OLSON RADIO WAREHOUSE
Cleveland, Akron 8, Ohio

PRESTWOOD ELECTRONICS CO.
Augusta, Ga.

PURCHASE RADIO SUPPLY
Ann Arbor, Mich.

RADCOM ENGINEERING CO.
Newark 3, N. J.

RADIO ELECTRIC SERVICE OF PENNA., INC.
Phila., Easton, Allentown

RADIO EQUIP. CO.
Lexington, Ky.

RADIO SHACK CORP.
Boston 8, Mass.

RADIO WIRE & TELEVISION
Boston, Mass.

REED RADIO & SUPPLY
Springfield, Mo.

E. A. ROSS & Co.
New Bedford, Mass.

SHAW DIST., CO.
Charlotte 2, N. C.

SPECIALTY DIST. CO., INC.
Atlanta, Ga.

SREPGO, INC.
Dayton, Ohio

J. V. STOUT
Baltimore 12, Md.

SUN RADIO
New York City

SUN PARTS DIST.
Wash. 3, D. C.

TERMINAL RADIO CORP.
New York City

TRI-CITY RADIO SUPPLY
Rock Island, Ill.

UNIVERSAL SERVICE
Columbus 13, Ohio

VALLEY ELECTRONICS
Burbank, Calif.

VAN SICKLE RADIO
Pt. Wayne, Ind.

WARREN RADIO CO.
Kalamazoo, Mich.

WESTERN RADIO & ENG. CO.
Phoenix, Arizona

WORLD RADIO LAB.
Council Bluffs, Iowa

SONAR RADIO CORPORATION
3050 W. 21 ST. BROOKLYN 24, N. Y.
Friday and all hams are invited. There are many more mobile rigs than ever before on the roads in Maine this summer. We have seen W1E, DX, WS, and 8H. Fire the rigs up on 3000 ke, boys and give the Maine gang a call. Our SCM would appreciate reports of your activities and traffic-handling on or before the 7th of the month. There’s not much news in the summer, so please give us a call.


MASSACHUSETTS — SCM: Frank L. Baker, Jr., WH2D — New applicant, NJS as RC for Region 6 of this State’s c.d. setup, MKW as RC for Dorchester. WAG as ORS, MON as RC for Stoughton. Appointment endorsed. As RCs—JCR for Eastern Massachusetts traffic nets, JXJ Amron, QZG Abington, QVN Randolph, ANS Westwood, etc. As ORS—MNE, NID, and RQG as ORS—WU, DWO, and RY. As OQ—BOQ, VHF, W2H, Boston, is on 2 meters. YAL in Needham, is on 2.40, and 80 meters. APL attended the ARRL Board meeting with BWR. We are sorry to have to announce the death of ex-W1FY, Dr. T. R. Interview, heard on 10 meters; RYK, NBE, TXU, AAF, and QCL and VVZ mobile. TQS is going to Provincetown for the summer and will be on 40 meters. G9 will be QRP, and the Cape has the call W1Y9JQ and is on 2 and 80 meters. FWS’s son has taken the name HRG, and his new call, MA2X, has brought the Maiden 8 and his group to the South Shore Club’s meeting. This group has a very nice set up.

Compact and Self-Contained to 6000 V. 5 MEGS. +70 db.

Complete with batteries and test leads—$26.95

LC-2: Custom leather carrying case — $5.75

Whether your rig is battery powered or runs on 3 phase 220... home-made, factory-wired, or Uncle Sam’s best... The PRECISION Series 40 will help keep your gear in tip-top operating condition. Compact size, rugged construction and small size make the Series 40 easy to carry, easy to use, easy to read. It does a million and one accurate measuring jobs that will save you time, work and money.

SPECIFICATIONS

1 A.C.-D.C. and Output Voltage Ranges: all at 1000 ohms per volt.

- 3-12-60-300-1200-6000 volts.

2 0.01-0.05-0.10-0.20-0.50-1.00-5.00-10.00-20.00 ohms.

3 Resistance Ranges: self-contained batteries.

- 0.001-0.005-0.010-0.020-0.050-0.10-0.20-0.50-1.00-2.00-5.00-10.00-20.00-50.00-100.00-200.00-500.00-1000.00 ohms.

4 Decibel Ranges from 22 to 70 db.

5 1% Wirewound and Film Type Resistors.

6 Recessed 6000 volt safety jack.

7 Anodized, etched aluminum panel.

8 Large-numerical, Easy-Reading Meter.

9 400 microamperes ±0.1% accuracy.

10 Sold by leading Radio Parts and Ham Equipment Distributors. Write for latest PRECISION Test Equipment Catalog. Fully describes Series 40 and other high quality electronic test instruments.

PRECISION APPARATUS COMPANY, INC.

92-27 HIRACE HARRINGTON BLDG., ELMHURST 13, N. Y.

(Continued on page 88)
HAMS...make switches as you need 'em—
all parts at your finger-tips!

Centralab offers you 4 switch kits —
to make practically any standard or
miniature switch arrangement

These Centralab Rotary Switch Kits are the
fastest answer to modern switch assembly. Kits
contain all parts to assemble almost any switch for
low-power applications. This includes test gear,
intercom, p.a. systems, radio and TV, plus specialized
control and analysis equipment. You can make
switches as you need them...right in the shack...
saves unnecessary trips.

Centralab has selected these kits according to
up-to-the-minute needs of thousands of amateurs,
professionals and engineers. Every single part has
a good reason for being there.

You pay only for parts included — there's no
charge for the cabinet. Your nearby Centralab Dis-
tributor can furnish complete kits and kit replace-
ments from stock. So, see him soon and select the
kit that's right for you. While you're there, make
it a point to stock up on Centralab ceramic capaci-
tors, controls and printed electronic circuits.

● THE 414 KIT contains:
  77 Standard Phenolic
  Sections
  20 Standard Index
  Assemblies
  34 Deluxe "DD" Phenolic
  Sections
  35 Bar Knobs
  Plus miscellaneous shields, brackets, and hardware.
  With this kit you can build any of Centralab's standard
  1400 Series stock rotary switches or 31 special switches
  of from one to ten sections. Write for bulletin 41-138.

● THE 419 KIT contains:
  49 Standard Steatite
  Sections
  15 Standard Index
  Assemblies (11-60° and
  60° Indexes)
  32 Deluxe "DD" Steatite
  Sections
  35 Bar Knobs
  Plus miscellaneous shields, brackets, and hardware.
  With this kit you can build any of Centralab's standard
  2500 Series stock rotary switches or 27 special switches
  of from one to ten sections. Write for bulletin 42-138.

● New No. P-2000 Series 20 Miniature Ceramic Switch
  Kit. 39 Steatite sections and 12 Index assemblies in new
  miniature sizes . . . 0.5" dia. — plus hardware and
  accessories.

● No. 1500 Selector Switch Kit. 33 standard rotary switch
  phenolic sections, 16 index assemblies and adequate sup-
  ply of flat shafts, spacers, nuts, bolts, lockwashers and
  knobs. 8" x 9" x 7".

Centralab, A Division of Globe-Union Inc.
912H E. Keefe Ave., Milwaukee 1, Wisconsin
For complete information on all Centralab Kits
—ask your jobber, or write for new Catalog 28.

Name
Address
City Zone State
NEW HAMPSHIRE — SCM, Carroll A. Currier, W1QFM — SEC: DXG, RM: CRW, PAM: UNY: The Port City Amateur Radio Club has a new tower for its antennas. The TCPN would like some more outlets in New Hampshire. What say, some of you boys, why not call in and get some good experience? The Net meets every day in the summer at 1800 hours, KYG and his XYL, QYJ, and the two jrs. operate; have moved to Carolina. A new tower is set to arrive on September 13th to attend the New Hampshire State Convention to be held at the Masonic Temple on Main St. in Concord. It is being sponsored by the New Hampshire Amateur Radio Club.

RHODE ISLAND — SCM, Merrill D. Randall, W1JBB — SEC: MLJ, RM: BTH, RIN: is on summer schedule, meeting every Mon., Wed., and Fri. nights. 15x00, W1RIN. Mike and Key Club is glad to announce that the long-penned-for licenses are now being for the elevee Novices who graduated from their club school.

VOYKOM — SCM, Raymond N. Flood, W1PPF — SEC: NLO, PAM: AXN, RN: OAK. Aste. RIN: TAN. Vermont QSO Party successful. Listed in the Vermontian, Green Mountain State, copies of which were sent to all stations in each state reporting. UFEZ has a Lycope 381 with N and L band, and likes the XYL and phone band. The Rutland CWRC lists on 3000 and 3300 kilo-hertz. The ARRL has a station in the Tri-County ARC and are setting up the local a.s. station in the new Municipal Blvd, in Brattleboro, QG has a new jr. operator. VERH got married, and is now operating new 73A-2 receivers. VSA is EC for Chittenango County. Traffic: W1RJA 117, OAK 119, AVE 27, WFE 21, NDB 18, IT 18, AXN 10, TAY 10, ELY 4, VZB 4, UPS 2.

NORTHWESTERN DIVISION

ALASKA — SCM, Glen Jefferson, KL7NT — The Sour- dough Net is doing fine work with NPS passing to a new station now and then. AOA has a new station. Look out for the new detail at this writing. The evening call-up is in a good key of fellows out in the bush. Aيخ said his business in Anchorage and now is State Police. AOT, PQ, BK, AGD, AN and their XYLs spent Memorial Day at borough lodge at AN. AOT brought home the bag limit of trout; everyone else in quite on that score. AUI is on TDY at Anchorage for a stretch. The Anchorage gang is planning a noise-elimination picnic. Much is needed to restore decent receiving conditions. Traffic: (May) K7AHR 3235. (Apr) K7AQ/CH/KL7 120. IIDAHO — SCM, Alan K. Ross, W7LW — Hayden Lake; FIS writes that activity is slowing down with the moving away of RIJK, ELJ, and WN7SPA. Lewston; A nice letter was received from the EC, IDZ, who reports the ham club there is after a station license. OUV, Helen, has been appointed OPS. OUS is Aast. EC, Salmon, WN7OZ, has applied for AREG membership. Boise The General State Radio Club is having summer picnics. The local 20-M-F, net meet every 8th, afternoon for mobile activities and Sun. evenings for a net, except summer. Unofficial report. Hamming has been slow with me because I have been putting together a Tech-Master TV kit. By the time I read this note, I'll know how the TV will perform! Traffic: (May) W7TCI 149, MRS 28, FIS 11, NVO 4. (Apr) W7ASS

MONTANA — SCM, Edward G. Brown, W7KGJ — A number of Montana hams certainly deserve thanks for their cooperation and teamwork in the flood emergency at Great Falls and Havre. KRMZ was in the mobile; RDL, QPK, TCR, and DXK with DXK portable. SFR, MM, BOZ, and K7KCD were Net Control Station. Supporting stations were EWR, CVQ, NJZ, NZT, YU, FEQ, EKG, PXX, QYO, GCW, BFW, LBR, JZW, LHM, PFT, GNY, RYY, KNO, NCS, EKL, and FIS. Cutoff emergency and the way it was handled proves the Montana gang can handle emergency conditions as well as any and certainly they have to take a back seat in any emergency activities. ROM now is on 40 meters. SMY has 276-fl., centered at Concord Radio

Concord Radio
55 Vesey Street, New York 7, N. Y.
Phone Digby 9-1139

MINIMUM ORDER $5
20% Cash with C.O.D. Orders

For our SPECIAL BULLETINS of Limited Quantity RED
HOT Buys — send name, address, 1st to Dept. Q-8

4985 Each

LIMITED QUANTITY

Conrad Radio
55 Vesey Street, New York 7, N. Y.
Phone Digby 9-1139

MINIMUM ORDER $5
20% Cash with C.O.D. Orders

For our SPECIAL BULLETINS of Limited Quantity RED
HOT Buys — send name, address, 1st to Dept. Q-8
A NEW
MOBILE RECEIVER CONCEPT

SUPER-CŒIVER

Super-cœiver, a new Gonset development, offers you mobile receiver performance equal to that of a high-quality, fixed station communications receiver.

The Super-cœiver combination consists of three elements: HF tuning head, which may be a Super-Six or other standard, good quality converter, a control box and the all-important Model 3041 unit, the heart of the combination. The latter is actually a crystal controlled, superheterodyne receiver with input circuits fixed-tuned to the output frequency used for the average converter. (1430 kc for Super Six)

When preceded by a converter, this input constitutes the first I.F. of a dual-conversion receiver and the high frequency used insures adequate image rejection. The second conversion to 265 kc's provides a new high order of mobile receiver phone selectivity. Four, double tuned I.F. transformers provide highly desirable steep-shoulder and restricted band-pass selectivity characteristics. A highly stable voltage regulated BFO with adjustable pitch control permits CW or SSB reception. Manual AF and RF gain controls, (and AVC) provide optimum, wide-range adjustment for strong or weak signals. The well-known Gonset noise clipper effectively copes with ignition interference. Between carrier, background noise suppression, (squelch) brings this new amateur unit into line with long established commercial practice. A well-filtered, vibrator power supply, (built in) also furnishes regulated voltage for the associated HF converter. PM speaker is mounted on the Model 3041 panel. A highly compact control head mounts RF and AF gain controls, also BFO and MUTING on-off switches. Four foot cables with connectors are supplied for easy interconnection of all three elements. Here in brief, is a description of the Gonset Super-cœiver combination, a new mobile receiver concept.

Six band operation, (10-11-15-20-40-75) when used with "Super Six".

"Finger-tip control" with remote control head 2' high to match Super-Six converter.

COMPACT! Model 3041 unit is 6½" wide, 6½" deep and 5½" high. Control head is 5" wide, 3½" deep, 2" high.

Price includes tubes and 1430 kc crystal for Super Six input. (Crystal may be factory exchanged for 1525 or 1550 kc inputs at no charge if sent in with the warranty registration card supplied with each equipment.)

$11950
INCLUDING FEDERAL EXCISE TAX.
(Price does not include Super Six converter.)

SEE IT AT YOUR DEALER

GONSET CO.
901 SOUTH MAIN ST.
BURBANK, CALIF.
to the
E.E. or PHYSICS GRADUATE
with an interest
or experience in
RADAR or ELECTRONICS

Here is what one of these positions offers you

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

OUR COMPANY
located in Southern California, is presently engaged in the development of advanced radar devices, electronic computers and guided missiles.

THESE NEW POSITIONS
are for men who will serve as technical assistants to the companies and government agencies purchasing Hughes equipment.

YOU WILL BE TRAINED
(at full pay) in our Laboratories for several months until you are thoroughly familiar with the equipment that you will later help the Services to understand and properly employ.

AFTER TRAINING
you may (1) remain with the 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). Adequate traveling allowances are given, and married men keep their families with them at all times.

YOUR FUTURE
in the expanding electronics field will be enhanced by the all-around experience gained. As the employment of commercial electronic systems increases, you will find this training in the most advanced techniques extremely valuable.

How to apply
If you are under 35 years of age and have an E.E. or Physics degree and an interest or experience in radar or electronics, write to

HUGHES RESEARCH AND DEVELOPMENT LABORATORIES
Scientific and Engineering Staff
Culver City, Los Angeles County, California

the ranch west of Laurel, JRG was on the air May 2nd with single sideband rig using modified W1EJO exalter with 2055P final v.s.w.r.-control carrier incandescent lamp to put his new a.s.b. rig on 8 meters soon. TKR worked ZL1C with low power on 80-meter e.w. TRU is the new call issued to the Harlo Radio Club, NM is doing a club job with the Montana State Net, so please give him all the support you can and keep the net rolling. A good way to do that would be to originate a message once in a while.

Traffic: WTCT 48, BNU 21, RDO 21, CVQ 12, LBK 12, RDJ 2.

OREGON — SCM; John M. Carroll, W7BUS — The Salem gang is to be congratulated on the fine convention — good organization and informative meetings, FRT is to be comminicated on a fine year-long job. Annual additional charge for amateur license plates as discussed in the meeting by the Secretary of State is felt to be in error after plates already made. Joe Hallock, F7C, of Common, District, states the biggest obstacle in Novice and General Class licenses is the law on emergency and portable operation indicated by recent examiner results. But he has invited the entire convention to tour the plant on Saturday and announced on Monday it was closing down permanently — probably too many free samples. Swap shop operations indicated war surplus prices are not holding up. The civilian talk indicated more modulation is in order as soon as a new plan is coordinated with National G.D. Headquarters. Ex-Oregonian LV brought out new subjects along electronics lines now by the Navy. KE6L will mail dope on the r.f. bridge voltmeter discussed in the meeting on receipt of a card. Activities for YLs and XYLs are very well planned. Traffic: 7HDN (April-May) 67, AHN 63, QAY 25, PBA 25.

WASHINGTON — SCM; Laurence M. Sebring, W7CQ — SEC: BYV; RM: F7KX; W7BD made a 3000-mile vacation trip. The Cascade Radio Club of Everett has the following new members: GPZ, JPC, and THJ. BG attended the Northwestern Division Convention. OE has completed modernization of transmitter control circuits and dummy antenna. ZD6F operated P8Y's rig while P8E was on DX. W7VY, Everett Valley Radio Club has been affiliated with the 7 invariably, SOX, signing DILAY, still is plugging away in an attempt to make DXCC; PMZ moved to Florida; PHC John, call HOME, Silent Keys. He was one of the real old-timers, and one of the founders of the AARS. BME and YR are changing their license DX. PXZ has a new rig of 75 meters. K074 has new Coon 146, which keeps him up in the air. JKJ on 7CE for Columbia Valley. K0NM special set he is on now on 22 meters. MTX received his Old Time Club certificate today. OEB worked 5ZXQ and CR9AII on 20 meters. OHJ is building a new hooju. The Wenatchees crew operated on Field Day at Lake Wenatchee. PQT, EC for Skagit County, checks into WSIN regularly. OEX and BA were made honorary members of 7CEARL. PMZ has a new Lyseo exalter, F1X took a long motor trip — no mobile. JPJ and ITA's daughter were married. K7F is spending his time fishing. GAX passed away; P8M is home from Alaska. P6V had a housewarming; ten hams and their wives were present. 67M will be here this week, 7HCJ and NH4T worked out of 67 on 10 meters. NLJ visited DYL0, D6L now is W7; GBU took a business trip to Atlantic City. E2N is mobile on 10 meters, AAO and NV are on 7; PHX is out of 67P. GBU, HCJ, JEM, JQV, JNP, NLJ, NXH, OHJ, OPR, OWY, PCW, P7K, F7X, KFA, BBA, and LIT attended the Spokane Club picnic at Pah Lake, near Cheney. CWS is mobile with a new converter for his mobile, The Skagit Valley Club meet at CZ7's shack. KT is trying out the traffic business. E2L and C7Y tried 6-meter airborne mobile, mobile. K072 is W7BA; KTG 843, CZX 534, PKY 446, RTQ 332, FIX 25, M1S 180, OZ 180, KHE 101, F70 101, AMO 83, OEB 78, BG 73, APS 60, RAF 5, NNP 60, BLY 39, EHM 25, AB 30, CWN 29, SKT 29, CAT 27, HNA 25, WEZDF 7, 13, 14, 13Q, ETO 11, LVB 3, PQT 2.

PACIFIC DIVISION
HAWAII — SCM; John R. Sanders, KH6RU — This will be the last call for the HIC HAM CONVENTION at Honolulu, Aug. 16th! Be there! Hambone for the one-day operations at Bellows Field again this year. The Honolulu Mobile Club held another successful Treasure Hunt. AVJ, who has activated the K80A Coast Station, has turned out of his classes, starts a new class in July. AWL, his XYL, is active on 7-Mc. phone. Recent graduates of the classes are Novice 7CRR and 7AWN. G6OOG will be the last report from your present SCM. I have for some time known that my business was not allowing sufficient time to properly carry out the SCM duties, but I have carried on as best I could. Now the job is being placed in the able hands of KH6KS, who will be assisted by his ever-hearty XYL, KG7APC. Please extend our cooperation, gang, and many thanks for that given me. Traffic: (May) KG7AAA 6581, KATLJ 4189, KATRJ 1008A, (Aug) K6AAA 3856.

NEVADA — SCM: Ray T. Warner, W7AGU — SEC: HJ; EC8s; KOA, L0S, NUA, O2X, JY, TO, and ZT. QPS; JUO, SPOF 7; the most recent EC, Neuber, is on the (Continued on page 89)
Heathkit AMATEUR TRANSMITTER KIT

Model AT-1

$29.50

Shipping WT. 16 lbs.

Built-in power supply

Rugged, clean construction

Crystal or VFO excitation

Pre-wound coils — metered operation

Single knob band switching

9/2 ohm coaxial output

Range: 60-40-20-15-11-10 meters
6AG7 oscillator • Multiplier
6L6A • Amplifier • Doubler
Besto • Rectifier
105-125 volts AC 60/60 cycles 100 watts
Size: 8½” high x 13½” wide x 7” deep

Here is the latest Heathkit addition to the Ham Radio field. The AT-1 Transmitter Kit incorporates many desirable design features at the lowest possible dollar-per-watts price. Panel mounted crystal socket, standby switch, key click filter, AC line filtering, good shielding, etc. VFO or crystal excitation — up to 35 watts input. Built-in power supply provides 425V @ 100MA. Amazingly low kit price includes all circuit components, tubes, cabinets, punched and formed sheet metal parts, speaker, circuit components, and detailed step-by-step construction manual. (Crystal not supplied.)

New HEATHKIT COMMUNICATIONS RECEIVER KIT

Model AR-2

$25.50

Shipping WT. 12 lbs.

CABINET


Range: 335KC to 35MC
12BA8 mixer oscillator
12BA6 IF amplifier
12AV7 detector + AVC + Audio
12BA6 RF BFO oscillator
12AG6 Beam power output
5VDC heater
105-125 volts AC 60/60 cycles
45 watts

THE IMPROVED Heathkit GRID DIP METER KIT

Model GD-1A

$19.50

Shipping WT. 4 lbs.

Compact one hand operation

Handphone monitoring jack

Transformer operated

Pre-wound coil kit

Range: 2MC to 250MC

Meter sensitivity control

The invaluable instrument for all Hams. Numerous applications such as peaking, neutralizing, locating parasites, correcting TVI, etc. Receiving applications include measuring C, L, and Q of components, determining RF circuit resonant frequencies, etc. Thumbwheel drive for convenient one-hand operation. All plug-in coils are wound and calibrated (rack included). Handphone panel jack further extends usefulness to operation as an oscillating detector.

HEATH COMPANY
BENTON HARBOR 9, MICHIGAN

Two additional plug-in coils are available and provide continuous extension of low frequency coverage down to 355KC. Dial correlation curves included. Shipping WT. 1 lb. Kit 341.

$3.00
IN CONNECTICUT IT'S

PRESBENTING

A Great, New
Receiver, the
NATIONAL
NC-88

...covering
80, 40, 20, 15,
and 10 meters
with bandspread; covers 540 Kcs. to 40
Mcs. in 4 bands; tuned r.f. stage; 2 i.f.
stages; built-in speaker; noise limiter;
separate high frequency oscillator,

$19.95

HRO-60

$48.35

Additional
NATIONAL EQUIPMENT

SW54 ............... $ 49.50
NC125 ............... 179.95
NC183D ............. 369.50

Write to our Bill Cummings, W1RMG, for
trade-ins and time payment plans. Mail your
order to Date Electronic Distributors or telephone

SPrue 7-5555

DALE ELECTRONIC DISTRIBUTORS

for speedy and
dependable service
plus complete
stocks always on
hand.

DALE ELECTRONIC DISTRIBUTORS
Serving the Entire Electronic Industry
SOUND...INDUSTRIAL...SERVICE...AMATEUR
150 JAMES STREET, NEW HAVEN 13, CONN.

air with a Viking II at Blue Diamond, near Las Vegas.
Helen, the XYL of Asst. Director BVZ, now is on a
mobile in Arizona for several weeks and will
meet many of the Arizona gang. KOA is RA3BQ, Radio
Officer for Elko County, PCH, with Bell Tel., transferred
from Oakland. DQF and KC1Q are active in the C.A.P.
area and have a new 500-watt rig ready. KOA, who is quite emergency
conscious, has TCS and 223 in a panel truck. JD was heard
in Las Vegas and 144 Mc. by KN1Z. Some behind
144 Mc. to the Coast still remains to be broken by two-way
communications. JUO was active during the V.H.F. QSO
Roundup, week end. W7SNH, also participated.

SANTA CLARA VALLEY — SCM. Roy I. Cousin,
W6LZL — The San Mateo County Amateur Radio Club
meets every Wednesday at 6:30 P.M. The San Francisco
Radio Club was host to the Central California Radio
Council recently and the three main topics were Field Day
and the License Stake Out in the State Legislature.
Representatives reported on the progress of Field Day
activities, and AGC reported that the Bill was progressing
very slowly but keeping his day in hand. The next meeting
is July 10th, following the BAN convention in San Francisco.

EAST BAY — SCM. Ray H. Cornell, W6JZ — KG6A
continued to make HPL. The Mist, Diablo Cove, was
visited by the Sheriff's Office on Arnold Industrial Highway
on the 3rd Fri. K6DX and W6FAR turned out to be old
friends from crystal detecting days. K6VR is KH6R's
ORS appointed. W6Q2E is building a light beam trans-
mitter. W8V, MXQ, GJK, HLB, and I0K spent the June
15th weekend at Tehama County hot spot. V8V made
K6Q on Mt. Able to establish a new within-bay
2-meter DX record. During the V.H.F. Party Bay Area
stations worked to 190 stations, and many worked
more than 100. Looks like there is plenty of v.h.f. activity.

NORTH HOLLYWOOD — SCM. Cary Harrison, W6DZ —
continues to maintain his DX setup at his home
in North Hollywood. He has recently added a new Collins
Exciter unit, PER is active on a regular basis
with a Johnson Viking, MFZ and MXQ were Field Day
champions for ORC and EBRG, respectively. Thanks to
PVH and EBA for news of the Northern California
DX Club each month. Many clubs have appointed a member
to send me news of their group each month. Why doesn't
your club do the same? East Bay clubs are all having
K6J35 who has visited most of them with his tuna fish can
r.f. bridge and his mobile antenna. There is a nice picture
of this antenna and his layout in the May DX Review.

SKY RIDERS OF LOS ANGELES — SCM. R.T. Gritter,
K6EB, and CBF found SARO's hidden transmitter in a record
35 minutes. GP has a 70-ft. simplex tower up, and
PVH goes so much fun out of waving TVI that he enjoys
receiving complaints. RPR, YFA, and PLY are a few who
soon will be on sideband with multiple transceivers.
K6AQP, Guy Kane, formerly 3A2AB, is a new member
of the Northern California DX Club. K6OAPB is working
his way to another 100 states on 2-meter DX and
around 80 states with 10-meter DX.

GRAND RAPIDS — SCM. Vern C. Oldham, W8ATB
is now SID. WN8PZ is very active and is hamming it up
with a Johnson Viking, MFZ and MXQ were
Field Day champions for ORC and EBRG, respectively. Thanks to
PVH and EBA for news of the Northern California
DX Club each month. Many clubs have appointed a member
to send me news of their group each month. Why doesn't
your club do the same? East Bay clubs are all having
K6J35 who has visited most of them with his tuna fish can
r.f. bridge and his mobile antenna. There is a nice picture
of this antenna and his layout in the May DX Review.

SAN FRANCISCO — SCM. R. F. Cebekovitz, W6ATO
— SEC: NL: PL: 5-4947, Eurema Area: EC: GLX. The
Humboldt Amateur Radio Club meets the 2nd and 4th
Fri. in the YMCA rooms, Municipal Auditorium, entrance
off Van Ness Ave. W6UZ, Bremerton Area: EC: EZ. The
Tamalpais Club EC: ZUB. This is a just a word of appreciation
of a public-spirited citizen — Art Walters, DRS, president of
the Marin Radio Club, Art, with Sun and Ka and thousands
of postpaid postcards, which he took to radio clubs
in the area — among them the San Francisco Radio Club
— distributed them to all attending who was signed in favor of the California License Plate Bill.
and handled all for mailing to the Senators and Assemblies
from each area. Congratulations to the members of the
Tamalpais Club, on the new daughter. The Marin
Radio Club meets the 2nd Fri. at the American Legion
Hall, Larkspur. The Tamalpais Radio Club meets the
(Continued on page 88)
for Superior Performance
Choose BUD Products

LOW PASS FILTER

Harmonics can be greatly reduced or eliminated at the transmitter by the use of a BUD LF-601 low pass filter, which has the following characteristics:

1. Minimum attenuation of 85 decibels on all frequencies above 54 megacycles and a minimum of 93 decibels above 70 megacycles.
2. Maximum rejection is adjustable from 55 to 90 megacycles. This tunable feature provides two slots at least 100 decibels down on any 2 TV channels.
3. The cut-off frequency is 42 megacycles.
4. The unit will easily handle a full kilowatt modulated on a reasonably flat line.
5. The insertion loss is less than one DB.
6. Since the design of this filter provides an adjustable feature, the unit can be used with either 52 ohm or 72 ohm coax.
7. Each inductance is in an individually shielded compartment.
8. All capacitors used are variable.

Bud LF-601
Size 12" x 2½" x 2¼"
Amateur Net — $13.95

CODE PRACTICE OSCILLATOR AND MONITOR

THE BUD CODEMASTER is a real money saver. No longer do you have to consider your code practice oscillator useless after you have learned the code. A flip of the switch and you have a real good CW monitor. This is a really versatile instrument.

It has a 4" built-in permanent magnetic dynamic speaker and will operate up to twenty earphones.

A volume control and pitch control permit adjustments to suit individual requirements. Any number of keys can be connected in parallel to the oscillator for group practice.

This unit will operate on 110 volts A.C. or D.C. An external speaker may be plugged in without the use of an output transformer. All controls are placed on the front of the unit and all jacks are in the rear. The unit is 6½" high, 5½" wide and 3½" deep. It is finished in Grey Hammertone enamel with red lettering.

CPO-128
Amateur Net — $14.48

Also available in earphone model CPO-130 at $13.20 Amateur Net

BUD RADIO, Inc.
2118 EAST 55th STREET • DEPT. QS • CLEVELAND 3, OHIO
IT'S CRYSTAL CLEAR IT'S HUDSON FOR CRYSTALS!

Smashing Bargains in Top Quality Precision-Made Crystals for Amateur and Novice

ALL BRAND NEW FULLY GUARANTEED $129 each
In lots of 3

Single Crystals... EACH $1.49

Crystals of this quality, at such a Low Price are scarce in men's reach! So we suggest you act 'em while you can. They're all precision-ground in standard crystal holders (1/4" spacing), Calibration accuracy is within .002% of marked frequency. We will deliver within 10 days of your specified frequency. Get 'em in sets and Save More at our Rock-Bottom Price!

The Following Frequencies Are Available:

40 METERS
(Including Harmonic Outputs to 20, 15, 11, 10, 6 and 2 Meter Bands)

6200 Kc to 6807.5 Kc for (6 and 11 meters)
7000 Kc to 7425 Kc for (20, 15, 10 and 10 meters)
8000 Kc to 8222 Kc for (2 meter band)

80 METERS

3500 Kc to 4000 Kc
(Includes Novice 3700 to 3750 Kc Band)

160 METERS
1800 Kc to 2000 Kc

In All Cases Please Give Frequency Desired... We will ship WITHIN 10 Kc of your specified frequency!

NEW!
NATIONAL World Master RECEIVER
NC-88

In Stock
for Prompt Delivery

All that the name NATIONAL stands for in Quality, Dependability and Top Performance. Here’s the receiver that tops them all for Value at this world-beating price!

$119.95

ORDER NOW — Order by Mail or at Either of our 2 Great New York Salesrooms. 20% Deposit Required with All C.O.D. Orders! Send cash and save C.O.D. charges!

HUDSON RADIO & TELEVISION CORP.

48 WEST 48TH ST. • 212 FULTON ST.
(Continued on page 50)
All beams use any standard transmission line. Full data supplied with each beam. ALL GOTHAM beams assembly quickly, are adjustable over the entire band, and can easily be stocked on a single mast. Every beam complete with all hardware, fittings and castings.

6-10 M. BEAMS

S63N • Std. 6m 3-El. (No T). $12.95, 1 - 8' Boom, 3/4" Aluminum Tubing; 1 - 6' Center Elements, 3/4" Aluminum Tubing; 1 - 2' Ends Inserts, 3/4" Aluminum Tubing; 1 - Beam Mount.

S63T • Std. 6m 3-El. T-match, $16.95, 1 - 8' Boom, 3/4" Aluminum Tubing; 3 - 6' Center Elements, 3/4" Aluminum Tubing; 5 - 2' End Inserts, 3/4" Aluminum Tubing; 1 - Match (4' Polyethylene Tubing); 1 - Beam Mount.

D63N • Deluxe 6m 3-El. (No T), $21.95, 1 - 8' Boom, 3/4" Aluminum Tubing; 3 - 6' Center Elements, 3/4" Aluminum Tubing; 6 - 2' End Inserts, 3/4" Aluminum Tubing; 1 - Beam Mount.

D63T • Deluxe 6m 3-El. T-match, $24.95, 1 - 8' Boom, 1" Aluminum Tubing; 3 - 6' Center Elements, 1" Aluminum Tubing; 6 - 2' End Inserts, 3/4" Aluminum Tubing; 1 - Beam Mount.

S64N • Std. 6m 4-El. (No T), $28.95, 1 - 12' Boom, 3/4" Aluminum Tubing; 4 - 6' Center Elements, 3/4" Aluminum Tubing; 8 - 2' Ends Inserts, 3/4" Aluminum Tubing; 1 - Beam Mount.

S64T • Std. 6m 4-El. T-match, $34.95, 1 - 12' Boom, 1" Aluminum Tubing; 4-6' Center Elements, 1" Aluminum Tubing; 8 - 2' End Inserts, 3/4" Aluminum Tubing; 1 - Beam Mount.

D64N • Deluxe 6m 4-El. (No T), $38.95, 1 - 12' Boom, 1" Aluminum Tubing; 4 - 6' Center Elements, 1" Aluminum Tubing; 12' 2' Ends Inserts, 3/4" Aluminum Tubing; 1 - Beam Mount.

D64T • Deluxe 6m 4-El. T-match, $44.95, 1 - 12' Boom, 1" Aluminum Tubing; 4 - 6' Center Elements, 1" Aluminum Tubing; 12 - 2' Ends Inserts, 3/4" Aluminum Tubing; 1 - Beam Mount.

S65N • Std. 6m 5-El. (No T), $42.95, 1 - 12' Boom, 3/4" Aluminum Tubing; 4 - 6' Center Elements, 3/4" Aluminum Tubing; 10 - 2' Ends Inserts, 3/4" Aluminum Tubing; 1 - Beam Mount.

S65T • Std. 6m 5-El. T-match, $48.95, 1 - 12' Boom, 1" Aluminum Tubing; 4 - 6' Center Elements, 1" Aluminum Tubing; 12 - 2' Ends Inserts, 3/4" Aluminum Tubing; 1 - Beam Mount.

D65N • Deluxe 6m 5-El. (No T), $52.95, 1 - 12' Boom, 3/4" Aluminum Tubing; 4 - 6' Center Elements, 3/4" Aluminum Tubing; 10 - 2' Ends Inserts, 3/4" Aluminum Tubing; 1 - Beam Mount.

D65T • Deluxe 6m 5-El. T-match, $59.95, 1 - 12' Boom, 1" Aluminum Tubing; 4 - 6' Center Elements, 1" Aluminum Tubing; 12 - 2' Ends Inserts, 3/4" Aluminum Tubing; 1 - Beam Mount.

S60N • Std. 10m 4-El. (No T), $21.95, 1 - 12' Boom, 3/4" Aluminum Tubing; 4 - 6' Center Elements, 3/4" Aluminum Tubing; 8 - 2' Ends Inserts, 3/4" Aluminum Tubing; 1 - Beam Mount.

S60T • Std. 10m 4-El. T-match, $27.95, 1 - 12' Boom, 1" Aluminum Tubing; 4 - 6' Center Elements, 1" Aluminum Tubing; 8 - 2' Ends Inserts, 3/4" Aluminum Tubing; 1 - Beam Mount.

D60N • Deluxe 10m 4-El. (No T), $32.95, 1 - 12' Boom, 3/4" Aluminum Tubing; 4 - 6' Center Elements, 3/4" Aluminum Tubing; 8 - 2' Ends Inserts, 3/4" Aluminum Tubing; 1 - Beam Mount.

D60T • Deluxe 10m 4-El. T-match, $39.95, 1 - 12' Boom, 1" Aluminum Tubing; 4 - 6' Center Elements, 1" Aluminum Tubing; 8 - 2' Ends Inserts, 3/4" Aluminum Tubing; 1 - Beam Mount.

S82N • Std. 15m 2-El. (No T), $19.95, 1 - 12' Boom, 1" Aluminum Tubing; 2 - 9' Center Elements, 3/4" Aluminum Tubing; 2 - 7' Ends Inserts, 3/4" Aluminum Tubing; 1 - Beam Mount.

S82T • Std. 15m 2-El. T-match, $22.95, 1 - 12' Boom, 1" Aluminum Tubing; 2 - 9' Center Elements, 3/4" Aluminum Tubing; 2 - 7' Ends Inserts, 3/4" Aluminum Tubing; 1 - Beam Mount.

D82N • Deluxe 15m 2-El. (No T), $29.95, 1 - 12' Boom, 1" Aluminum Tubing; 2 - 9' Center Elements, 3/4" Aluminum Tubing; 2 - 7' Ends Inserts, 3/4" Aluminum Tubing; 1 - Beam Mount.

D82T • Deluxe 15m 2-El. T-match, $33.95, 1 - 12' Boom, 1" Aluminum Tubing; 2 - 9' Center Elements, 3/4" Aluminum Tubing; 2 - 7' Ends Inserts, 3/4" Aluminum Tubing; 1 - Beam Mount.

S83N • Std. 15m 3-El. (No T), $22.95, 1 - 12' Boom, 1" Aluminum Tubing; 3 - 12' Center Elements, 3/4" Aluminum Tubing; 5 - 9' Ends Inserts, 3/4" Aluminum Tubing; 1 - Beam Mount.

S83T • Std. 15m 3-El. T-match, $29.95, 1 - 12' Boom, 1" Aluminum Tubing; 3 - 12' Center Elements, 3/4" Aluminum Tubing; 5 - 9' Ends Inserts, 3/4" Aluminum Tubing; 1 - Beam Mount.

S85N • Std. 15m 5-El. (No T), $38.95, 1 - 12' Boom, 1" Aluminum Tubing; 5 - 12' Center Elements, 3/4" Aluminum Tubing; 6 - 12' Ends Inserts, 3/4" Aluminum Tubing; 1 - Beam Mount.

S85T • Std. 15m 5-El. T-match, $44.95, 1 - 12' Boom, 1" Aluminum Tubing; 5 - 12' Center Elements, 3/4" Aluminum Tubing; 6 - 12' Ends Inserts, 3/4" Aluminum Tubing; 1 - Beam Mount.

S80N • Std. 20m 3-El. (No T), $35.95, 1 - 12' Boom, 1" Aluminum Tubing; 3 - 12' Center Elements, 3/4" Aluminum Tubing; 6 - 9' Ends Inserts, 3/4" Aluminum Tubing; 1 - Beam Mount.

S80T • Std. 20m 3-El. T-match, $37.95, 1 - 12' Boom, 1" Aluminum Tubing; 3 - 12' Center Elements, 3/4" Aluminum Tubing; 6 - 9' Ends Inserts, 3/4" Aluminum Tubing; 1 - Beam Mount.

D85N • Deluxe 20m 3-El. (No T), $46.95, 1 - 12' Boom, 1" Aluminum Tubing; 3 - 12' Center Elements, 1" Aluminum Tubing; 6 - 12' Ends Inserts, 3/4" Aluminum Tubing; 1 - Beam Mount.

D85T • Deluxe 20m 3-El. T-match, $49.95, 1 - 12' Boom, 1" Aluminum Tubing; 3 - 12' Center Elements, 1" Aluminum Tubing; 6 - 12' Ends Inserts, 3/4" Aluminum Tubing; 1 - Beam Mount.

FAMOUS GOTHAM SHIELDED CABINET

Our 6th Month in production! Use the Gotham Shielded Cabinet, all-steel 20x13x" 24x15" aluminum cabinet, designed for only one purpose—elimination of that shielding cabi它是 possible to apply all the TV steps easily and quickly. No alterations on your present rig, no loss of resale value, no danger of damage, no reconfiguring—a few minutes your rig is completely shielded and you are testing for TV. Remember: If you don’t clean up your TV, we refund in full. Price: $12.95.

GOTHAM HOBBY

107 E. 126 Street
New York 35, N.Y.
per cent of this total with KRR, HQN and SHJ crashing through to BPL in the process. VE, ex-SCM of both Georgia and Alabama, has taken up QTH in Pella Church, Va., and is presently an OTH. In addition he is the OM of YZC, 14 years old, LW took up residence in Norfolk and with it the job as editor of the FYT Bulletin beginning with the September issue. Dick also will send out interim information on items of interest using the VN frequency 2650 kc. every Fri. at 2000 hours EST. K3EPD of HALA has gone 14,255 M. at 1246 hours except week ends. Norfolk's AREC members, IUO, VAS, YVQ, and LJE conduct regular emergency drills. IUO is the OM of the Naval Reserve Round-up each Fri. at 2200 EST on 7110 kc. During the Waco, Tex., disaster HQN and HK handled an aggregate of 830 emergency messages during the course of the annual educational program. Continuous operation, the VN summer session, Mon., Wed., and Fri., reports plenty of activity, KRR, UWS, UHJ, and SHJ keep things humming. FF has moved to the bench for the summer. VN QSO Party winners were UWQ with 73 contacts and 50 counties for a score of 4500, followed by FY 4480, RTY 4080, TEJ 4026, all 'phone, and UMG 3861, WNY 20, of Pella Church, took the Novice prize. CQJ has taken over EC appointment in Arlington replacing SHR, whose new QTH rendered him ineligible for that area.

Traffic: (May) WARR 774, SHJ 682, HQN 581, UHJ 258, HAG 171, FF 151, UWS 148, OX 120, WNY 71, LXN 66, OXG 54, VUY 53, KFC 45, JAS 44, EB 34, FF 33, RIX 28, CPV 24, LYY 22, RZV 22, TCC 22, LW 21, E4D 16, WAB 15, QZL 14, OXG 13, EYX 12, RG 12, SPE 6, LK 6, WBOC 1. (Apr.) WPATC 29.

WEST VIRGINIA — SCM, John T. Sizemore, W9MCR — The Stonewall Amateur Radio Clinic held its annual Amateur Radio Clinic held at Jackson Mill with thirty attending. Rigs on 75 and 40 meters were in operation; seven out-of-town hams attended.

The complete kit includes:
2 lengths of #16 copper- clad steel conductor twin-lead, cut to length
1 75-foot length of standard 300 ohm twin-lead for use as lead-in
1 high strength laminated T-block

Assembly and installation instructions.

ROCKY MOUNTAIN DIVISION

COLORADO — SCM, Karl Brogge, W9CDX — SEC, AEE. As this is being written in Wyoming, Calif., the traffic reports will have to come next month. Our SCM has talked with quite a few of the hams out here and heard KB9 in Denver write the Denver Radio Club has purchased a 14-foot house trailer to use as a mobile emergency station. The funds to purchase the trailer were raised by direction, and at the last club meeting about half of the cost of the trailer was donated — out of a clear sky, yes! Nice going, fellows. The Grand Valley Radio Club (Grand Junction), dinner was a great success. A dozen or so were present. GDC received a two-column write-up in the local paper with pictures of his rig and tower. KXY reports a big opening on 8 meters on April 24th. He has his XYL monitor the TV set for openings and then hurries home to work

SOUTHEASTERN DIVISION

ALABAMA — SCM, Dr. Arthur W. Woods, W4GJW — KX1 answers AENB, AEPB, and RNS, OAO answers AENB, AEPB, and RNS, PEPK and AEPB answers AENB, AEPB, and RNS is attending summer school, also, RLG sends a traffic report but no news. UJN answers AENB and AEPB and handled considerable traffic, TJK is back on the air.

Continued on page 98
the gear for the road...
always in stock at ALLIED

Gonset 3016 "Commander"
All-band Phone-CW transmitter for mobile use. Covers 1.7 to 64 mc. Supplied with 2 plug-in final coils which cover 30, 75, 40, 20, 15 and 11-10 meters. Up to 50 watts input on CW; 35 watts on phone. Use with any carbon or high-impedance crystal or ceramic mike. Tubes: 6AG7 crystal osc., 6146 final, 12A7'T7 speech, 2 — 75S mod. 5 1/2 x 8 1/4 x 7 1/4" deep. With tubes; less crystal mike, and key. Requires 300-30 v. DC at 200-225 ma. and 63 1/2 x 4 1/4". 8 lbs. 98-041. NET. $124.50

Gonset 3026 "Communicator"
Complete 2-meter Amateur phone station in portable case. Transmitter: AM phone; 5-7 watts output takes crystal or carbon mike. Uses 8-mc crystals. RF Section: 6CL5, 12AT7, 2E26, 8006 tuning eye rect. and 6E6 tuning eye. Receiver: Tubes 144-148.3 mc. Cascade RF noise limiter; PM speaker; 6K6Y, 12A7'T, 2 — 6H6G, 6J5P, 6T8. Receiver-Transmitter Tubes: 12A7'T, 6V6, 2 — 6X4. With tubes and 19" whip; less mike and crystal, 10 1/2 x 9 1/2 x 7". For 110-120 v., 50-60 cycles AC or 6 v. DC. Shpg. wt. 24 lbs. 84-912. NET. $209.50

Gonset 3040 "Super-cleaner"
For use with Gonset "Super-Six" illustrated above but not supplied. Morrow, RME, etc. converters. Crystal-controlled, 4 double-tuned high-Q 266 kc 18" transformers, BFO with pitch control, separate AF and RF gain controls, noise clipper, built-in speaker. Adjustable squelch. Integral power supply; battery-saving circuit. Separate control head for dash, underseat or trunk mount. Main unit, 6 1/2 x 9 1/2 x 7 1/2"; control head, 2 1/2". With cables and connectors; tubes, speaker, crystal for 1480 kc input, power supply, mounting brackets. 6 volt operation. 8 lbs. 84-914. First deliveries in October. NET. $119.50

VFO MODEL 3020 TUNING HEAD. (Illustrated at right above.) For VFO control of above on 75, 20, 15 and 10 meters. Requires no tubes. 5 1/2 x 3 1/4 x 5 1/2". Shpg. wt. 3 lbs. 98-042. NET. $29.95

Gonset 3002 Converter
Provides continuous coverage from 3 to 30 mc. in three ranges. Each range is spread over nearly 300° to permit simple, accurate tuning. Range A: 3-4 mc; Range B: 8-16 mc; Range C: 18-30 mc. Has illuminated dial. Power requirements: 10 ma. 135 volts and 6 volts DC at 0.75 amp. 1500 kc output. Supplied complete with tubes, cables, and instructions. 5 1/4 x 3 1/4 x 5 1/4". 5 lbs. 84-954. NET. $44.75

Gonset 3030 "Super-Six" Converter
Covers 25, 40, 20, 15, 11-10 meter Ham bands—as well as 19 and 49 meter bands (for worldwide short-wave broadcasts). Panel controls: Antenna Trimmer, On-Off, Band Selector, Has RF Gain Control, Oscillator Compensator, and hi-lo impedance Antenna Switch on rear panel. The "Super-Six" may be used with any receiver covering 1430 kc. Supplied with tubes and cables. Housed in gray metal case, 5 1/4 x 2 1/2 x 5 1/4". Power requirements: 80-135 volts DC at 10 ma and 6 volts at 1 amp. 5 lbs. 84-913. NET. $52.50

Gonset 3008 Converter
A sensitive 2-meter converter. Features super imposition tuning system—any 144-148 mc signal can be heard by tuning dial only 2 mc. from 144-146, or 146-148 mc. Images from one half are heard simultaneously with fundamentals in other half. Eliminates all non-Amateur VHF images. Output frequency, 1 mc. Requires 135-250 volts DC, 20 ma; 6 v. DC. With tubes, cables, 3 1/4 x 5 1/2 x 6 1/4". 5 lbs. 84-926. NET. $44.50

Gonset 3001 Clipper Noise Limiter
An easy to install noise limiter for any receiver with 2nd detector-AVC and 1st audio in one tube. Effectively minimizes ignition noise, atmospheric static and other peak-type interference. Recommended for use with Gonset equipment in mobile installations, but will improve reception of any receiver. Size, 2 x 1 x 1 1/4". Complete with 3006 tube, cables and installation instructions. Shpg. wt. 2 lbs. 60-596. NET. $9.25

3006 STEERING POST BRACKET. Mounting bracket for all Gonset converters. May also be adapted to mount any conventional mobile converter. Converter can be mounted on either side of steering post. With mounting straps and hardware. Shpg. wt., 1 lb. 84-994. NET. $3.90

ORDER FROM ALLIED RADIO
833 W. Jackson Blvd., Chicago 7, III.

FREE
236-Page Buying Guide
Refer to your ALLIED Catalog for everything in station gear. If you haven't a copy, ask for it today.

TERMS: Only 10% down on ALLIED's Easy Payment Plan—ask for details.

TRADE-INS: We'll make you the kind of deals that are FB for you.
EASTERN FLORIDA — SCM, John W. Hollister, Jr., WA4FWZ — SEC; IM. The mobile Flamingo, Pelican, and DNM and BSM Nets in and around Miami and Lauderdale are well organized. The FEPN on 3910 kc, will be the same reliable net, 3575 kc, will hold down its end but at this time we are shy on the 7-Mc band. DNM reports the following active on 144 Mc.: M3P, VXZ, Dandel, AYV Umastilla, MPJ Easton, NNE Orlando. Listen at 7x7, B and 9 p.m. RWM reports 2DXL now on Dusk Bench. Fort Lauderdale: Listen for the Flamingo Net on 29.044.4 kc, at 7:30 p.m. Fri. and the DSN at 8:15 p.m. The BSN is on 29.444.4 kc at 144 Mc. W4N2QL reports activity on YUL, XYL of MLS, Broward, Dade, and Palm Beach fixed and mobiles will handle communications for the Miami-Palm Beach Area SSBs. IM says plans are shaping up for the Gold Coast Hamfest to be held at Fort Lauderdale this year. Key West: W4N4DQ is club activities manager. Key YL, ex-WG7Y, is XYL in the YUQ. Work the West stations and get a nice certificate. (QSLs via MCX.) Club officers are SWL, MCX, OYV, WKS, and OFZ. KJ4J is ex-W4JLM (all bands), Miami: SCM had a most enjoyable visit with the Dade Club. OHP built the slickest VFO exciter ending with an 829B and TV1-0CD on all bands. LVV is new club president. MRR and Herb W4TJR operate the ARDF. The ARC has in good shape and want more members. New Fort Pierce: KJ has turned NOS for 3497 kc. MRS Net over to QRM in Jacksonville. Sarasota: TFF and YI are mobile with an Elmac and Super Six. Bill made his W5Z. LMT reports the Florida Phone Traffic Net handed 30H messages in May. Tampa: A good traffic band is WPWZ (ex-4LDM) and his XYL OFX/4 (ex-4K2T). Clewiston: FJF reports Tropical Net (3910 kc at 8 p.m.). NCS and ANCS are FDU, F2U, WPWZ, and PZT. Traffic: W4HUV 817, FFC 544, DRD 239, W6- FYG, WPXG/2 21H, W4PZ 188, QZT 186, QZT 184, LMT 5, UWZ 56, RWM 55, SK 59, KJ 32, YY 28, SBV 12. FZW 11, IM 9, TFP 3.

WESTERN FLORIDA — SCM, Edward J. Collins, W4MBS/RE — SEC: PLE, FWQ won the Globe King transmitter at the Mobile Hamfest. QK and SZH are QRL getting ready for the Pensacola Hamfest. HIJ is getting the mobile gear in the new car. WN42PZ is on every 7-Mc. Using his 7-K.2 and 4.8 kc. He is aware of WP9C old friend. PTK is going great guns on mobile rig. TTM keeps the home transmitter going. NOX/NYX handles the G. It trails WPQ meets the Pensacola Net on 10 meters. UCW is still faithful to 10 meters. 2GZ keeps the big Navy transmitter going all day and the rig at home at night. WN4YFF, WA4FX, and WP9C are looking at the power. IYK conducted a very FB Novice program in his Science Classes this past school year. AXF is getting back into stride after a recent operation. KVE has returned to the air. AXF is heard on 144 Mc. MS has temporary antenna up on 50 Mc. so as not to miss any opening. MUZ is a long time station. WM4X is a 3.5-Mc regular. UX4W has large in Mobile. 30Hz at the Mobile Hamfest. Please contact PLE if interested in CD appointments, etc. KWM keeps 14 Mc. In his Marks. KVRM has a vertical for coloring. HZ has an 14 Mc. R7Z has been handling traffic. UC keeps the parts rolling.

GEORGIA — SCM, James P. Born, Jr., W4ZD — The Georgia Crackers Radio Club and affiliated nets held the annual meeting at the Kennebec Amateur Radio Club’s Hamfest May 31st at Lithia Springs, Ga. Officers elected were ZD, pres.: RPO, first vice-pres.; AGB, second vice-pres.; OKL, third vice-pres.; OKL, secretary-treas. NS, historian. The officers of the Club also are the NCS of the Georgia Crackers Emergency Net as follows: ZD, Net Manager; RPO, north NCS; AGB, south NCS; OKL, all NCS. LJR was the Viking II at the Kennebec Hamfest. LJR has a new ham shack and plans to return to the air soon. The Atlanta Radio Club’s Annual Hamfest will be held Aug. 30th at Robinson’s Tropical Garden on Peachs Ferry Road on the banks of the Chattahoochee River. A Viking II transmitter will be given to the lucky attendant. WN42H2 is a new ham in Carrollton. TO is off the air and is moving to a new ham shack. USA has a new 8P000-JX receiver. Members of any net in Georgia are eligible for membership in the Georgia Crackers Radio Club. Any net member interested, please contact the Club’s secretary, W4MZO, 1024 Berkshire Road, Ponce De Leon (May) WAUSA 2788, 4KWAR 2609, FDB 1210, W3AF 4 299, W4CQG 184, W1UOF/4 103, W2DZ 73, NS 23, CB 39, W4AMTS 14.

WEST INDIES — SCM, William Werner, KP4D — NCB, HZ, AK, CY, HZ, LK, MC, OA, and QK renewed AREC membership. Welcome to the IM, RG, AM, RL, RO, and RV4BD. IS obtained WPR-125 certificate. Two Novice Awards are WP4A UM, UM, and WP4A UM, and UU, UW renewed ORS appointment. WP1TQL belongs to Emergency Service Boy Scouts of America Amateurs. WP2KRM reports regularly to the 3925-ke Net. Present schedules of nets follow: 80-meter AREC, 3550 kc, 8 p.m. Mon., 3925-ke AREC, 8 p.m., 10-meter AREC, 28.8 Mc, 7 A.M. and 8 A.M. Armed Forces Net, daily, 4 p.m., 3925-ke. W2KRM reports to the 3925-ke. Net from a hospital bed. RC put up 7-Mc. folded dipole and 135-foot end-fed Zepp. CX is readying AT-13 for all-band operation. GN/mobile has

(Continued on page 84)
Famous CRESCENT INDUSTRIES — a long-time builder of record players and other quality electronic audio products — is FIRST to break the forbidding $90 mark in tape recorders, an almost impossible task considering the components and precision required! RADIO SHACK is proud to be the first company privileged to bring you the glad tidings!

RADIO SHACK PROUDLY INTRODUCES TWO NEW 1/2-TRACK RECORDERS WITH PLAYBACK

EVERY IMPORTANT FEATURE YOU NEED!

★ Dual Track Recording
★ Fast Forward, Rewind
★ 7" Reel Rewind 80 Sec.
★ 70-8500 CPS at 7 1/2 IPS
★ 90-6000 CPS at 3 1/4 IPS
★ Wow, Flutter Under .005%
★ Handles up to 7" Reels
★ 2 Hrs. on 7" Reel @ 3 1/4
★ 1 Hr. on 7" Reel @ 7 1/2
★ 3 Watt AC Amplifier
★ Inputs: Mike, Radio-Phono
★ Output for External Spkr.
★ Output for External Amp.
★ 1-Knob for Record/Play
★ Separate Tone Control
★ Separate Volume Control
★ Recording Indicator Light
★ Compact: 8 3/4 x 10 7/8 x 11 1/2"
★ Light: 20 lbs. Net Wt.
★ New Shure Microphone
★ Includes Pre-Recorded Tape
★ Includes Tape Takeup Reel
★ For 110-120V 60 cy. AC.

Model
903 (3 3/4"")
Order No. 34-000
$50

Model
907 (7 1/2"")
Order No. 34-001
$84

SCOTCH RECORDING TAPE FOR ABOVE

<table>
<thead>
<tr>
<th>Order No.</th>
<th>Type</th>
<th>Base</th>
<th>Reel*</th>
<th>Feet</th>
<th>Net</th>
</tr>
</thead>
<tbody>
<tr>
<td>34-085</td>
<td>101A</td>
<td>Paper</td>
<td>7&quot;</td>
<td>1200</td>
<td>$2.29</td>
</tr>
<tr>
<td>34-088</td>
<td>111A</td>
<td>Plastic</td>
<td>7&quot;</td>
<td>1200</td>
<td>3.23</td>
</tr>
<tr>
<td>34-041</td>
<td>111AP</td>
<td>Plastic</td>
<td>7&quot;</td>
<td>1200</td>
<td>4.00</td>
</tr>
</tbody>
</table>

*All plastic reels; Type 111AP reel is new professional type.
LISTEN to the story of Brush headphone quality

Try out the best—and judge for yourself why the Brush Model BA-206 headphones are best suited for your individual application.

Acoustically—you’ll enjoy the high fidelity and smooth frequency response which gives you all the lows and crisp clean highs.

Electrically—being capacitive in nature, they draw negligible power and only require modest driving voltages. Hence, these headphones are ideal for monitoring applications—and may be used in either high or low impedance circuits and are extremely well suited for multiple installations.

Mechanically—you’ll find them exceptionally light and comfortable. The advanced design gives your ear a smooth, comfortable, air-tight fit which is important for excellent bass response.

Listen for yourself—and then be surprised at the low cost of these superb headphones! Write for bulletin. Brush Electronics Company, Dept. VV-8, 3405 Perkins Avenue, Cleveland 14, Ohio.

BRUSH ELECTRONICS COMPANY

formerly
The Brush Development Company,
Brush Electronics Company is an operating unit of Gievela Corporation.
KEEP YOUR EYE ON THE "Surprise" TRADE-IN EVENT OF THE YEAR

Don’t be distracted by claims of "just as good." Nothing, but absolutely nothing beats a Walter Ashe "Surprise" Trade-In on your used communication equipment. Allowances were never better than now. So get your trade-in deal working today. Wire, write, phone or use the handy coupon below.

JOHNSON VIKING II Transmitter Kit.
Shpg. wt. 85 lbs. Net $279.50
JOHNSON VIKING II, Wired and Tested
Net $319.50

HALLICRAFTERS SX-71.
Less speaker. Shpg. wt. 51 lbs. Net $224.50

ELMAC Model A-54. Wired for 10, 11, 20, 40 and 75 meters. Net $143.00
Model A-54H.
Same as above but for crystal or dynamic mike.
Net $153.00

COLLINS 75A-3 with 3 KC
Mechanical Filter. Less speaker.
Net $330.50

ELMAC Mobile Receiver. Model PMR-6-A.
Net $134.50

FREE CATALOG! Send for your copy today.

WALTER ASHE RADIO COMPANY
1125 Pine St., St. Louis 1, Missouri

☐ Rush "Surprise" Trade-In offer on my _
   (show make and model number of new equipment desired)
☐ Send new 1953 catalog.
Name ___________________________
Address _________________________
City ____________________________ State ___________

All prices f. o. b. St. Louis • Phone Chestnut 1125

Walter Ashe
RADIO CO.
1125 PINE ST. • ST. LOUIS 1, MO.

95
A single tankful of gasoline will cost you more than a year’s ARRL membership and QST.

Figure it out—ARRL Membership and QST cost you less than 8 CENTS A WEEK

And you can enjoy QST all day, every day of every month.

QST and ARRL Membership $4 in U.S.A. ($4.25 in Canada, $5 elsewhere)

The American Radio Relay League
West Hartford 7, Conn.
STEINBERGS

IMMEDIATE DELIVERY

Single Sideband Exciter SS-75

Check these specifications and you'll see why the SS-75 is now the one piece of equipment that places all the advantages of single sideband at your finger tips:

★ Built-in stable VFO, with voltage regulation.
★ Carrier injection to receiver antenna terminals ... tune in SSSC signals the same as AM, no other gadgets necessary.
★ Illuminated VFO tuning dial provides 31 inches of bandspread 3800-4000 KC in 4 bands, with 5 to 1 gear reduction.
★ Built-in voice control and receiver disabling circuit. Also provides for break-in CW operation.
★ Specially designed crystal filter network for maximum stability and reliability.
★ Carrier injection to transmitter available for working single sideband WITH CARRIER, for tune-up adjustments, or CW.
★ 10 watts output, with additional 807 socket for up to 100 watt operation with external power supply.
★ Handsome grey crackle cabinet, chrome trimmed, 20" x 12" x 12". Complete with 12 tubes, including one 807, operating manual..................... $245.00

Frequency conversion mixer for 40-20 meters, rack mfg. 3½" x 19" less power supply.................. 75.00

WRIGHT T-R SWITCH
For break-in operation on CW, AM, or SSSC. Use one antenna for transmitting and receiving. It's instantaneous! No moving parts, no power needed to operate. Coax fitting for connections to feeder and receiver. Will handle 1 Kw. With 75 meter plug-in coil... $9.95
Extra coils $1.75 per band

TUBE SOCKETS
For 4-prong tubes 866, 809, 811, 100th etc. Heavy phosphor bronze side wiping contacts, metal shell, white porcelain base. Regular list $1.50, while they last............... 45¢

PHOSPHOR BRONZE AERIAL
125 ft. of the finest aerial wire obtainable. 42-strand phosphor-bronze with linen center. Will not stretch, very high tensile strength, diameter approximately same as No. 14 copper, very flexible. Excellent for transmitting or receiving antenna, control cable, guy wire. Regular list $4.95.................. 90¢

PA-400 LINEAR FINAL
Here is a completely self-contained linear final and power supply, conservatively rated at 400 watts peak input power.
Requires less than 8 watts drive, a perfect companion to the SS-75.
Handsome gray crackle cabinet, chrome trimmed, 20" x 12" x 12", complete with all tubes, weight 75 lbs. ................... $265.00

MINIMUM ORDER $2.00.
Send 20% deposit with COD orders. Please include sufficient postage or instruct us to ship by Express Collect. Overpayment will be refunded by check.

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 Bunett W8WHE
### INTERFERENCE NIL! WITH SPRAGUE HYPASS CAPACITORS

- Suppress voltage regulator noise
- Effectively bypass power and control leads to suppress TVI

These exclusive 3-terminal network feed-thru capacitors, installed in series with circuit being filtered and case grounded, suppress noise and TVI where ordinary capacitors will not work. Whether your rig is a miniature mobile or a car-sized California kilowatt, there’s a Hypass Capacitor for virtually every interference problem. See your jobber, or pick out the capacitors you need and send in the coupon below.

<table>
<thead>
<tr>
<th>MF</th>
<th>Dia. x Length</th>
<th>Cat. No.</th>
<th>Net</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 WWD</td>
<td>1 x 1 1/4&quot;</td>
<td>+48P18</td>
<td>$2.28</td>
</tr>
<tr>
<td>250 WYAC</td>
<td>1 x 1 1/4&quot;</td>
<td>+48P9</td>
<td>1.56</td>
</tr>
<tr>
<td>600 WYDC</td>
<td>1 x 1 1/4&quot;</td>
<td>46P12</td>
<td>1.29</td>
</tr>
<tr>
<td>1000 WYDC</td>
<td>1 x 1 1/4&quot;</td>
<td>47P12</td>
<td>1.44</td>
</tr>
<tr>
<td>2500 WYDC</td>
<td>1 x 1 1/4&quot;</td>
<td>47P15</td>
<td>1.56</td>
</tr>
<tr>
<td>5000 WYDC</td>
<td>1 x 1 1/4&quot;</td>
<td>47P16</td>
<td>1.92</td>
</tr>
</tbody>
</table>

*Has female screw terminals
**Bulkhead Mounting
***50 amp. thru-current for voltage regulator use.
Under-dash Mobile Xmtr.
Measures: 7½" x 7½" x 12" tall
Weight: 14½ lbs.
Covers 10, 20, 40 and 75 meter bands.
For Carbon Mike Input $139.00
For Dynamic or Crystal Mike, 149.00
Power Supply, 110 volts AC, $39.50

SONAR Model SRT-120 Transmitter
For mobile and fixed location operation.
Has band-switch for 80, 75, 40, 20, 15,
and 10 or 17 meters. Plus spare position
for any future band. Has provision for two
 crystals or external VFO head. Final ampli
fier employs the new Ampexes 9903/5894A
 tubes. Power input is 120 watts on CW,
and 100 watts on phone. All circuits
mated. Power requirements: 600 volts
ac at 350 ma, and 63 volts at 6 A.
Complete with Tubes $198.50
External VFO Head 19.50
SRT-120F same as SRT-120 but with built
in push-to-talk relay and self-contained
power supply for use with 110-125 v.
50-60 cycle line 279.50
Also available in Kit Form:
120 Kit $158.50
120P Kit $198.50

GONSET “SUPER 6”
Six Band Amateur Converter
A compact converter covering 10, 11, 15,
20, 40, and 75 meter phone bands. Also
covers 6 mc. (49 meter) and 15 mc. (19
meter) short wave broadcast bands. Uses
6C36 low noise rf stage, with panel con
trolled antenna trimmer, 6A16 triode mixer,
6C4 modified Clepp oscillator, and
68H6 IF stage.
Complete with Tubes $52.50

Portable Mobile Receiver
A complete 10-tube dual conversion, com
munication receiver. Provides coverage of
6 bands from 10 to 60 meters as well as
broadcast and 160 meter band.
Dimensions: 4½" high, 6" wide, 8½"
depth. Weight: 6½ lbs.
Complete with Tubes $134.50
(ex less power supply)
PSR-6 Power Supply for above $24.50
Specify 6 or 12 volts operation
PSR-116S 115v. AC Power Supply with
Built-in 5 Meter $34.50

TECRAFT
Cascade, Crystal
controlled CONVERTER
for 144 MC & 220 MC operation
Features high sensitivity, complete stabili
ity, low noise factor, high image rejection
(9 tuned circuits), 6 MC pass band at 6 db
down points with peaking at any portion of
the band. ruggedly built on copperplated,
nickel-finished chassis; heavy shielding;
handsome hardwood case. Available with
output or 10. Frequency to match your
communications receiver. Uses 6BQ7,
2-6C6E, 2-6S6.
Complete with plugs, tubes, crystal
$42.50

JOHNSON VIKING Mobile Transmitter Kit
A low cost, efficient rig in kit form, ready
for quick and easy assembly, 30 watts
input at 300 volts... up to 60 watts, at 600
voltage, 100% modulated... three stages,
807 output...75, 20, and 10 meters with
provision for additional band... crystal
control. Other features include: band
switching, gang-tuning, rf fixed bias
supply, and metered stages $99.50

HARVEY-WELLS
Bandmaster Model TB550
Senior Model $111.50
Deluxe Model 137.50
VFO for above $47.50

HARVEY RADIO CO., INC.
103 W. 43rd St., New York 36, N.Y. • Hudson 2-1500

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.
don't be outmoded by obsolete gear!

TRIAD TRANSFORMERS
keep ham rigs modern

The Triad Plate Power shown above was developed exclusively for ham use. Its short plate leads reduce TVI and increase performance. Its decal carries all essential information. Its grey baked-enamel finish adds good looks and quality to any rig.

Triad engineers help keep your rig modern by developing transformers best suited for your requirements. When you buy transformers, specify Triad.

Write for Catalog TR-53D

TRIAD TRANSFORMER CORP.
14055 Redwood Ave. • Venice, California

is available. To all taking part, may we say "well done." Next nine piece of work done by amateur operators, this time in the confines of the City of Toronto, was the extensive search for three missing children. The Norntown Radio Club, cooperating with the city police, contacted several stations via mobiles in the extensive search. Those taking part were AIB, AXM, AZX, BGO, BVM, BRI, BYZ, DFC, DFA, DGO, DHO, DQW, DQX, DUN, DXA, FGC, KG, KW, NO, RU, UU, and V7KU/3. DNE, a newcomer to Hamond, had 104 contacts and broke into traffic-handling in one case. VD moves traffic with five watters. We welcome DME to the game, DIG, now located in Hamilton, looks for antenna space. VZ chases gremlins which locate in 813s. EAB reports an increase in 2-meter activity. FA is a new Toronto outlet on OSN. The annual dinner-dance held by Nortown was a success. Congratulations to ATR in heading the traffic list for the month. May we ask you fellows to let us know when you SCM know your doings, whether they seem small to you or not. It is the only way we can make a contribution to the column. Traffic Monitor 11, 14 M, 19 M, 28 M, 22, 23, 24 M, 40 M, 70 M.

QUEBEC — SCM, Gordon A. Lynn, VE2GFJ — Keep in mind the Eastern Canada ARRL Convention to be held Sept 16th in Victoria Hall, Montreal, sponsored by the Montreal Amateur Radio Club. QC sends its report of activities in Three Rivers, CA reports conditions variable and traffic is low, although a few clubs and BRIG worked during the month. The South Shore ARC held a successful spring dance in Masonic Temple, St. Lambert May 23rd with 110 hams and friends present. MG has been appointed EC for Verdon, replacing QU, who has changed QTH to Drummondville. AEW has a Hammarlund HQ-120X receiver. ZK is working portable from his home in the Laurentians. DR finds gardening interferes with radio but manages to get on for week-end DX and occasionally for traffic. Traffic: (May) VE2ED 11, VL 2. (Apr.) VE2DR 67.

BRITISH COLUMBIA — SCM, Peter McIntyre, VE7CR — Mobile operators are out in force with hi-monthly trips and outings planned. New mobiles heard lately are AHP and ABD. Those of you who will be operating in the USA are reminded to make certain you comply with the FCC regulations of band operation and notification of the proper FCC district engineer of the district in which you will be operating mobile. As of June 1st, AD, of Victoria was appointed EC for District No. 1. Congratulations to BC, of Merritt, who was the recipient of the annual cup award of the BORBA as the amateur doing the most for amateur radio in 1952. He keeps possession of the large trophy for one year and receives a small miniature for permanent possession. We would also like to say "well done" to HR, our QSL Manager, and HI, the other nominees for the cup award and want to let them know that their effort for the amateurs is not going unnoticed. The TVI committee is in operation and is acquiring the necessary equipment. I would like to be connected with all clubs in British Columbia as to their activities and any pertinent data pertaining to amateur radio in the Province. Your SCM attended the recent Oregon Amateur Radio Conference held in Salem, Ore. A to-the-point talk by W7USN, the ARRl president, gave him a great deal to think about. Traffic: VE7FJ 18, QG 70, AA 15, JT 14.

SASKATCHEWAN — SCM, Harold R. Horn, VE8HR — QL is the new PAM group. Your cooperation and assistance when called on will help. Jim considerably. If you are off the net, or wish to drop out, please let the PAM know, so time can be saved on roll call. Will some one volunteer for Section Emergency Coordinator? Please let me know, who has done a good job. Wishes to be relieved of this important office because of other activities. KD is a new call at Raymore and FB is new at Chokelow. EE was the Saskatoon boys with his XYL and mobile. NC and CO made some W contacts during openings on 50 Mc. during the month. JD works 14 Mc. with a 6149 running 40 watts. Traffic: VE8FJ 16, DS 8, HR 7, DD 6, FG 6, GT 6, RE 6, MX 3, GO 2, VH 2.

IS YOURS ON FILE WITH YOUR QSL MGR?

[Form to fill out]
NEWARK'S
Page of Values!

VARIABLE CAPACITOR BUY!

Ideal for VFO

63 Mmf

High quality variable capacitor originally designed for use in the master oscillator section of the famous BC-375. Extremely rugged construction and fan tail tracking adjustment make this unit ideal for VFO use. 5500 volt Bashoff.

4 point, screw type suspension. Micro-meter adjust. Wt., 2 lbs. $4.50.

Special Price 1.35

AERVOX CAPACITORS

At A Fraction Of Their Original Cost

<table>
<thead>
<tr>
<th>No.</th>
<th>Mfd.</th>
<th>VDC</th>
<th>Each</th>
</tr>
</thead>
<tbody>
<tr>
<td>540G24</td>
<td>2</td>
<td>1000</td>
<td>.98</td>
</tr>
<tr>
<td>540G25</td>
<td>2</td>
<td>1500</td>
<td>1.29</td>
</tr>
<tr>
<td>540G32</td>
<td>2</td>
<td>2500</td>
<td>1.39</td>
</tr>
</tbody>
</table>

NEWARK CAPACITOR SPECIALS!

.01 Mfd. 8000 VDC Test. Metal cased by-pass. 10/32" screw terminals. 1 lb. 54G585. 10 for 7.50. Each 98c

2 Mfd. 600 VDC. General Electric Pyranol-filled capacitor. Flange type mounting. Ceramic pillar terminals, 10/32" studs. Size, 2x2x1 1/2". Wt., 1 lb. 54G6006. 10 for 3.00. Each 1.50

5 Mfd. 1000 VDC. Type BAR. Oil filled. Solder terminals. Size, 3x3x3/4 x 1 1/2". Wt., 1 lb. 54G400. 10 for 7.50. Each 98c

.2 Mfd. 5000 VDC. Sprague oil-filled unit. Ceramic terminals, 10/32" Stud. Size, 5x5x3/4 x 1 1/2". Wt., 2 lbs. 54G586. 10 for 10.20. Each 1.29

.1 Mfd. 3000 VDC. Round can capacitor. Upright mounting. 2 1/4 x 1 1/4" dia. Shpg. wt., 1 lb. 54G608. 10 for 1.25. Each 20c

1 Mfd. 5000 VDC. General Electric Pyranol-filled filter capacitor. Large ceramic terminals. With mtg. clamps. Size, 4x4x2 1/2 x 1 1/2". Wt., 3 lbs. 54G604. Special Price 4.95

WAR SURPLUS TUBE SPECIALS

9C24/24G ........................................... .99
805 ........................................... 4.50
838 ........................................... 4.50
1007 ........................................... 11.95

SPECIAL PARTS VALUES!

35 ohms, 50-watt Pot. Ohmite Type "J" wire-wound pot. Heavy ceramic form. 1/2" shaft for 9/16" mtg. hole. 1 lb. 54G587. 10 for 5.60. Each 69c

Feed-Thru Insulator. Double cone high glaze ceramic insulator. 1/2" diameter. Mounts with 1" above chassis. Complete with 10/32" threaded rod, washers, and nuts. Wt., 1/2 lb. 54G580. Special Price 10 for 1.00

Low-loss Steatite Socket. For 829B/ 6F29 or 6L4 tube. Center has large cooling hole. Less shield. Mfd. by Johnson. 3/8" mtg. centers. Wt., 1/2 lb. 54G588. 10 for 5.00. Each 58c

Mallory Type NF-1-2 Noise Filter. For filtering generator hash. Will handle either 6 or 12 VDC at 50 amps. Formerly used on 32 volt aircraft systems. Easily mounted on car generator. Wt., 1/2 lb. 54G502. 10 for 5.00. Each 69c

SAVE ON TRANSFORMERS!

Thordarson T-45166 Output Transformer. Single 6L6 to 2-4-8-500 ohms voice coil. Case size 2 1/2 x 2 1/2 x 8 1/2" high. Shpg. wt., 9 lbs. 54G591. 10 for 12.00. Each 1.50

Driver Transformer, P.P. 2A3's to grids. Case size, 3 1/2 x 2 1/2 x 8 1/2" high. Shpg. wt., 4 lbs. 54G111. 10 for 15.00. Each 1.95

ROTARY SWITCH BUY!

2 Position—32 Circuit. May be connected as a 16PDT switch, or may be used as a shorting switch. Screw terminals. Rated at 10 amps, 125 volts AC. 1/4" shaft. Size, 2 1/2" dia. x 5 1/2" long. Complete with black bakelite knob and screws. Wt., 1 lb. 54G582. 10 for 7.50. Each 98c

EXTENSION LIGHT VALUE

7 1/2" Belden Extension Cord. Heavy rubber covered cable and plug. Moulded rubber socket for 110 volt bulb. Extra heavy galvanized steel shield and protective guard. Less bulb. Wt., 1 lb. 36G191. 10 for 7.50. Each 98c

Order from Department T-8

Send for Latest Catalog

223 WEST MADISON STREET • CHICAGO 6, ILLINOIS
Strays

In a purely coincidental issuance, W10AK's dachshund "Wiener" sports dog-license number 73 in Barre, Vermont.

From Skip, organ of the Fresno Amateur Radio club, in its pep announcement of W6TO/6's Field Day effort: "There will be a TV set on the hill so that operators, relaxing when off watch... will have something to enjoy." The supply of sledgehammers, we presume, was ample enough to go around.

Ubiquitous is the word for amateur radio. WN3VBP writes that the call sign W6ROS appears on the radio-shack set of TV skit "Time for Beanie," while W6SJJ spotted amateurs EI35AB and PK-M in the "Wash Tubbs" comic strip.

Clarence A. West, W21YG, has developed what he believes to be the smallest grid-dip oscillator ever built. His experimental electronic test instrument is built around a single RCA-2N33 point-contact transistor and is powered by a miniature 22½-volt hearing-aid battery. The complete unit, together with power supply, is contained within a metal case measuring 5 by 2¼ by 3¼ inches and its total power consumption is only 25 milliwatts. Mr. West is an engineer for the Radio Corporation of America.

Answer to QUIST QUIZ on page 49
We Can't List Everything
Write UNCLE DAVE—He's Got It!

Collins 32V-3 Transmitter $775
VFO Controlled, Bandswitching, Gangtuned. Covers 80, 40, 20, 15, 11 and 10 meters; 150 watts CW, 120 watts phone; entire RF section enclosed in metal shield. (In Stock)

Collins 75A-3 Receiver $550
With Mechanical Filter and Speaker

Extra Special
ANTENNA ROTOR
Heavy Duty
Very Popular National Brand
WITH 7 FEET OF 4 CONDUCTOR CABLE
A REAL BUY $29.95

National HRO Sixty
$485.50
Matching Speaker $18.00
Here's the latest and the greatest of the famous National HRO series! Features dual-conversion plus 12 permeability-tuned IF circuits!
NC 183-D (Less Speaker) .......... $369.50
NC 125 (Less Speaker) ............ $149.50
SW 54 (Complete) ................. $49.95

Used Equipment—Send for Demonstrator and Used List

Johnson Viking II
Kit, complete with tubes—$279.50
less crystal, key and mike
(In Stock)
Wired and Tested ............... $324.50

Sonar SRT 120 Transmitter
All bands 120 watts CW, 100 watts phone.
Switches to all six bands, TVI suppressed, with 10 tubes.

Sonar MR-3
Sonar SR-9
Sonar MB-26

$198.50
$89.95
$72.45

Sure We Take Trade-ins—Top Allowance

July Specials
Demonstrators
Sonar SR9 ................................................. $57.50
Sonar MR-26 ........................................... $57.50
National 5V64 ........................................... $42.50
Harvey-Wells TB500D Transmitter .......... $119.95
Harvey-Wells AP550 Power Supply .......... $34.50
Hallicrafters S77 // Receiver ........... $149.95
Hallicrafters S77 (AC/DC Version of S88) $99.00
Hallicrafters S400 Receiver ............... $109.00
Gosset 2 Meter Transmitter .............. $33.95
Gosset 2 Meter Remote .................. $33.95

Mobile Special!
Single button carbon hand mike. Complete
with cord and plug. Finest made. While
they last, Post Paid .............. $3.75

Gosset Manual Control .... $16.50

Mobile Season Is Here!
Master
Mobile Antennas and Mounts
2, 10, 20, 40, 75
In Stock for Immediate Delivery
Send for Circular

Special
Electric "HAM" Clock $11.95
24-Hour w/ GMT Indicator
Regular $15—Just a few left at this price

Foreign Trade Solicited
Extra Special
National HRO-60 $450.00
Demonstrator (Complete)
Collins Demonstrator Models Also Available—Write for Details

Radio Distributing Company
904 Broadway, Albany, N. Y.
Telephone Albany 5-1594
We now have openings for work in the fabrication and processing of experimental electron tubes.

R.F. Amplifiers

(Continued from page 16)

weak-signal readability. The change for the better is very slight, however, as the principal result of installation of the preamplifier has been to make it easier to hear the noise being picked up by the antenna. Apparently, on 144 Mc., as on 50 and 28 Mc., there appears to be little point in going below about 6 db. or so in noise figure, though it is reassuring to know that you can "hear the antenna."

The 6AJ4 and 6AM4 were both tried, individually in each stage, and together in both stages, but no measurable difference in noise figure could be found between them. If the amplifier is adjusted at 146 Mc., it will not be necessary to change it in tuning from 144 to 148 Mc.

Results with the 420-Mc. amplifier were more rewarding, for we still have quite a way to go on this band to reach the ultimate in front-end performance. The best we've done heretofore was a noise figure of about 12 db., obtained with the 6J4 amplifier.4 The 6AJ4, when used ahead of a crystal-controlled converter having a crystal-diode mixer, showed a gain of 17 db. over the crystal mixer alone, and it improved the signal-to-noise ratio of the system by more than 10 db. Tests with the noise generator showed a noise figure of under 6 db. for the 6AJ4 amplifier. Admittedly this may be on the optimistic side, but signal-to-noise measurements, both in the laboratory and on the air, bear out the 6-db. improvement over the 6J4.

If you're straining for the weak ones (and what v.h.f. enthusiast isn't?) that improvement helps.


Negative Feed-back Modulation

(Continued from page 19)

iation system that has admitted nonlinearities and yields questionable results. It should be particularly applicable to portable and mobile rigs where the weight and power requirements of Class B modulators are a decided handicap.

In the experimental unit, it was not possible to obtain complete linearization after the modulation level reached around 90 per cent. This is not an inherent limitation in the general scheme but simply indicates that, in this particular unit, the closed-loop compensation is stretched to the breaking point at this modulation level.

### EaZon

Correct matching will put that lost power into the antenna. The EaZon type 3WA is designed for this purpose. Strong, easy to install and foolproof. Fits RGB/U or any coax of similar dimensions. Weight 4 ozs. Satisfied users throughout the U.S., Types 3W and 4W are ideal junctions for stubs or harmonic traps.

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type 3WA</td>
<td>(see cut) Antenna Match</td>
<td>$4.50</td>
</tr>
<tr>
<td>Type 3W</td>
<td>Tee Junction</td>
<td>$3.00</td>
</tr>
<tr>
<td>Type 4W</td>
<td>Cross Junction</td>
<td>$3.00</td>
</tr>
</tbody>
</table>

Your jobber can supply you or write

DALLAS C. AKERS CO.
33 Greenwood Ave. • East Orange, N. J.
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 160 thru 10 meters. New final amplifier uses parallel 6146 tubes. A true SYMPAK supplied, including copper plating steel cabinet, chasis, wiring harness, all hardware and tubes. Complete construction test and operation manual also supplied. Viking II Transmitter Kit $275.00

JOHNSON MOBILE TRANSMITTER KIT

New Johnson mobile transmitter kit, a bandswitching 4 band rig. 60 watts input, 100% modulated (30 watts on 300 volt supply) 907p final, microphone input - dynamic, crystal or carbon. Crystal or VFO control. Viking Mobile Transmitter Kit (less tubes) $99.50

BRAND NEW! GUARANTEED! STANDARD BRAND

Better than 60% off

Made by leading tube manufacturers, individually boxed in STANDARD BRAND boxes. Fully guaranteed. Available only from New York Mail Order Division

UNBELIEVABLE Price!

WESTERN ELECTRIC

Hearing Aid

Reg. Price $185.00
our price $24.50

Brand new, in original Western Electric jewelers case. Supplied with receiver, receiver cord, battery cord and plug (less batteries). Money-back guarantee. Act now while they last! Uses Burgets XX30E and 8R batteries at $1.55 per set.
Eighty Watts

(Continued from page 98)

The meter is mounted behind the panel as a safety measure. It is held in an aluminum bracket, with the face of the meter flush with the front edge of the chassis. The meter should be placed so that its center comes about 7 inches from the left-hand end of the chassis, and the center of its scale about 5 inches up from the bottom edge. The meter-scale opening in the panel is cut out to fit the inside dimensions of a National CFA chart frame. If desired, a hole can be drilled in the panel to give access to the zero-adjust screw of the meter. A similar chart frame, centered 3 inches below, helps to balance the panel layout and is useful for using the multiband-tuner settings for the various bands, since it is not too difficult to tune the amplifier up on a harmonic, instead of the desired fundamental, without realizing it.

The two power switches are placed either side of a line running through the two multiplier controls, and the rotary switch, $S_4$, is centered on a line between the two amplifier controls. These three switches are mounted 1 1/4 inches up from the bottom edge.

Panel bearings for the controls are not used, the short extension shafts riding in 1/4-inch holes, reamed out just enough to provide free turning without excessive play.

Holes lined with rubber grommets are drilled in the chassis to pass the power leads to the three units. R.f. connections between the VFO output and the multiplier input, and between the multiplier output and amplifier input are made with RG-59/U coaxial cable in lengths as short as possible to minimize capacitance and yet provide shielding. The plugs that fit the shielded 'phono jacks can be easily attached to the ends of the RG-59/U by barb the center conductor so that it will extend through to the tip of the plug, and fraying the braid out around the shell of the plug, and soldering. Be sure, however, to leave enough of the inner insulation so that the inner conductor does not short against the ground shell. After the cable has been carefully made up, it would be well to check for short-circuits with an ohmmeter.

The filter and audio chokes can be seen in the bottom-view photograph. The filter condensers are also mounted under the chassis, supported at each end on terminal strips. The biasing battery is held in place with a simple clamping arrangement. A pair of 2-inch machine screws are spaced slightly greater than the width of the battery. They are fastened permanently in place with nuts. An aluminum cleat with holes to fit the machine-screw spacing is held down with nuts and lockwashers at the bottom ends of the screws.

The cabinet is shown a Par-Metal DL-128. A hole is cut in the left side, toward the rear, to line up with the connector in the VFO unit for the remote-tuning cable.

(Continued on page 108)
Bob Henry says

"Some things call for a specialist!"

When it comes to amateur radio apparatus deal with the man who knows...

BOB HENRY

Bob's a radio ham himself—and he's built his hobby into a nationwide business. All his experience and "know how" are at your service. He sees to it that you get speedy delivery—complete selection—time-payment plan tailored to your needs—and a really liberal trade-in allowance. Yes, Bob knows the wants of the radio ham or hobbyist—and he delivers! Write, wire, phone or visit either store today.

SOME ITEMS IN STOCK ARE:

- Collins 75A3 (speaker $20.00) $530.00
- Collins 32Y3 $775.00; 35C2 $40.00
- Collins 70E-8A $97.50
- Collins KWI transmitter $3850.00
- Hallicrafters S53A $89.95; S33C $49.50
- Hallicrafters 52L $119.95; 57 $105.95
- Hallicrafters 57B $119.95; 540B $110.95
- Hallicrafters SX32 $99.95; SX71 $224.50
- Hallicrafters HT-20 transmitter $440.50
- Hallicrafters TW1000 portable $248.50
- National NC88 $119.95; SW54 $199.95
- National NC183D $369.50; NC125 $179.95
- National HR 060 $483.50
- Hammarlund HQ140X $284.50
- Johnson Viking II (wired $57.00) $278.50
- Johnson VFO kit (wired $17.00) $42.75
- Johnson mobile transmitter $99.50
- Gonset Commander $124.50; VFO $29.95
- Gonset Communicator $159.50; Super-6 $52.50
- Morrow SBR $74.95; 3BR $64.95
- Elmac A54 $149.00; A54 $143.00
- Elmac PM-6A receiver $134.50
- Harvey-Wells TBS50D $137.00; TBS50C $111.50
- Harvey-Wells VFO $47.50; APS50 $39.50
- Lysco 600S $189.95; Lysco 600 $143.95
- Babcock MT5A $99.50

Prices subject to change. Some prices higher on west coast.

Johnson, Gonset, Elmac, Babcock, Morrow, El- dico, Lysco, Hallicrafters, National RME, Millen, Master Mount, B&W, RCA, Hylite, Bud, Vibroplex, Elmac, all others.

First with everything for the radio amateur

HENRY RADIO STORES

"LARGEST DISTRIBUTORS OF SHORT WAVE RECEIVERS"

TWO STORES: Butler, Missouri & 11240 West Olympic Blvd., Los Angeles 64, Calif.
**MULTI-BAND OPERATION**

**SINGLE**

**SIDEBAND 8 TIMES THE VOICE POWER**

HARMONIC TVI VIRTUALLY ELIMINATED

MULTIPHASE EXCITER MODEL 10A (upper left). Approx. 10 watts peak output 160 to 20 meters, somewhat less on 10-15 meters. Will drive beam power tetodes to more than 1 kw input from 20 to 160 meters. SWITCHABLE SSB, with or without carrier, double sideband AM, PM, break-in CW, VOICE OPERATED BREAK-IN and receiver disabling, it's ALL BUILT-IN to this truly versatile exciter. Built-in power supply also furnishes blocking bias for linear amplifier and voltage for optional VFO. With internal xtal and coils for one band. Wired and tested $150.50. Complete kit $112.50. Extra coil sets for $.75 per band.

**OT-1 ANTI-TRIP UNIT**

Plugs into socket inside 10A EXCITERS. Prevents loudspeaker operation, yet preserves voice-control circuit from tripping on heterodynes, static, noise pulses or loud signals. All electronic, no relays, adjustable trip level. Completely wired, with tube. Price $12.50.

**SIDEBAND SLICER**

MODEL A RECEIVER ADAPTER (upper right). Improves any receiver. SWITCHABLE upper and lower sideband reception of SSB, AM, PM and CW. Cuts interference and heterodynes in half. Eliminates distortion caused by selective fading. Works into any receiver having 40-250 kc IF. Built-in power supply. Use a Model A Slicer — notice the "holes" in even our most crowded bands and hear signals you have never heard before. Wired and tested $74.50. Complete kit $49.80.

PS-1 Plug-in prealigned 90° phase shift network and socket available separately for use with GB Signal Slicer and SSB Jr. $7.95 postpaid.

WRITE FOR LITERATURE

Central Electronics, Inc.
2135 W. Giddings Street
Chicago 25, Illinois

---

**Adjustment**

Adequate drive is obtained with the VFO screen operated from the tap between the two VR tubes in the VFO unit (approximately 108 volts). With a fixed bias of -15 volts and a 12,000-ohm grid leak, grid currents in excess of 3 ma. should be obtainable on all bands. It should be limited to 3 ma. by detuning the multiplier unit. If the power supply shown is duplicated, the high-voltage supply should deliver 550 volts under load of 150 ma. plus bleeder current, making the operating input to the amplifier a little over 80 watts. For "phone" operation, the 40-watt 6L6 modulator shown in the last several editions of The Radio Amateur's Handbook should be just about right for this transmitter. The modulation-transformer secondary should be set for 5000 ohms, and the plate current under modulation should be limited to 112 ma.

---

**Rig R.F.-Tight?**

(Continued from page 80)

and does not require pre-drilled tapping holes.

The resistor-mounting strip at the rear was shielded with a separate aluminum box. In addition to this shielding and the low-pass filter (with coax fittings replacing the normal antenna feed-through terminals) which W2IMM had already installed, we added 0.001-u.f. disk-ceramic capacitors to all eight power leads, microphone and push-to-talk leads, and key lead. With these changes, W2IMM is now able to operate on 10 meters on the same table with a TV set tuned to Channel 2. The only alteration on the TV set was the addition of a high-pass filter in its antenna leads. There is no noticeable TVI.

If you have not had TVI troubles to date, naturally you may have only a casual interest in the cures used by others for the disease that might put them off the air. But the spread of more-sensitive receivers in fringe areas on the one hand, and the very human desire to build a bigger and more-powerful rig on the other, may suddenly put any one of us face to face with TVI. This may be particularly true if you have been operating in the v.h.f. bands and find you are interfering with stations starting to operate on u.h.f. bands.

We want to state most emphatically that, while electronic weatherstripping is no panacea for all of your ills, military experience has amply demonstrated that it is a sure, simple and inexpensive aid in keeping your loose r.f. inside your rig — and putting you back on the air and in the good graces of your neighbors.

---

[Note: TVI-20-S weatherstripping is being made available through Allied Radio in Chicago, Harrison Radio in New York, and Radio Shack in Boston. — Ed.]
ELMAC 6-BAND RECEIVER

10-tube dual conversion receiver, covers 160 meters and broadcast, 60, 75, 40, 20, 15 and 10 meters. 12 tuned circuits provide high selectivity. Built-in noise limiter and RFQ. Requires 6V AC or DC at 3.3A, 250V DC at 90 ma. 41x9x28. 8½" D. PFR-6G $134.50

Power Supply for 6V DC. $24.50
Power Supply for 12V DC. $24.50
Power Supply for 115V AC. $24.50

MORROW 5-BAND CONVERTERS


Less Noise Limiter S5RNL $69.95

NEW NATIONAL NC-88 "World Master" RECEIVER

A great new receiver that tops them all for value! Calibrated bandwidth available for 60, 40, 20, 15, 10 meter bands. Covers 540 kc to 40 mc in 4 bands. Has tuned RF stage, two IF stages and two high fidelity audio stages with phonos input. Built-in speaker, noise limiter, separate high frequency oscillator $119.95

COLLINS 75A-3 RECEIVER

Featuring sensational Collins mechanical IF filter. Gives a practical straight-through, flat-topped selectivity curve! Plug-in provision for two mechanical filters, 3 kc IF filter standard equipment. 800-cycle plug-in available. A precision accessory for greater selectivity on CW. Double conversion superhet covers 160 thru 10 meter bands. Accurately calibrated directly in 1/10 mc. Here’s a natural for the SSB operator! With speaker. In Stock! $350.00
800-cycle mechanical filter plug-in unit, Type F455B-8 $75.00
100 kc IF plug-in crystal calibrator for 75A-4 and 75A-5. $35.00
Plug-in NBFM Adapter. 145C-1 $20.00
COLLINS 75A-2 RECEIVER

Still available and In Stock at HARRISON RADIO. With speaker $440.00

NEW FLASH!

Deluxe Gosset "Communicator II" featuring new earphone jack, receiver dial light on-off switch and built-in adjustable squelch. ORDER NOW! $229.50

HARRISON HAS IT!

NEW HAMMARUND HQ-140-X RECEIVER

For the amateur who wants a professional quality receiver, moderately priced. Covers 60, 40, 20, 15 and 10 meter bands with calibrated bandwidths. New circuit design features more efficient separate oscillator and mixer, giving better stability. Uses 6BA6’s for RF amplifier and all 3 stages of IF. New series type noise limiter, 8-position crystal filter. Single wire or balanced line antenna input. With tubes and instructions. HQ-140-X $264.50

Matching Speaker. $14.50

NEW HAMMARUND HQ-140-X & 75A-3 RECEIVERS NOW AVAILABLE!

HARRISON RADIO HAS BEEN HAM HEADQUARTERS SINCE 1925

FREE HARRISON HAM-A-LOG

A post card request puts your name on our mailing list to receive future copies of this popular catalog.
Magnetostriiction (Continued from page 86)

parts are so small that it takes a natural born watchmaker to work with them, and any small inaccuracies in machining have greater effect. Also, coils small enough to operate well on very small resonators are not so easy to make with a reasonably high $Q$.

Conclusion

It is only hoped that enough has been described to enable anyone with perseverence and suitable equipment to get started on what may at present best be considered as a fascinating and challenging hobby. Let there be no mistaken about it, there still is no easy way to build an ideal filter for practical use in a hurry!

Editor's Note: We understand that ferrite magnetostriuction resonators for operation at approximately 100 kc. are now obtainable. Inquiries should be addressed to General Ceramics and Steatite Corp., Keasby, N. J.]

“Plain Ground-Plane” (Continued from page 87)

The next step is the radials. Take four 10-foot 1¼-inch diameter TV mast sections and telescope them together in pairs to form two 20-foot lengths. Then roughly mortise the centers by pounding them on a short length of 1¼-inch diameter steel pipe. The two 20-foot sections so formed will cross and yet remain in the same plane, as shown.

The braces for the radials are made out of 3-foot pieces of TV mastung. They prevent vertical play that would put strain on the $2 \times 4$ where it naturally has been weakened by the 1¼-inch hole. (It was W2IHT's idea to bolt a reinforcing block to the $2 \times 4$ at this point, as shown).

Point flat one end of each of the four braces. These will be the lower ends of the braces. Then proceed to make the two braces for the radial that does not pass through the $2 \times 4$. Start by drilling holes in the flattened ends of two of the braces and slipping them over the bolt placed in the $2 \times 4$ a few feet down from where the radials cross. It can then be seen that the upper ends of these two braces must be flattened in a plane at right angles to the plane into which the lower ends were flattened. When this is done, the next move is to hammer the upper flattened ends back at an angle to make them parallel to the radials. Then place the upper ends of these braces upside down and lengthwise on that same short piece of steel pipe and round them with a hammer.
EVERYONE IS TALKING ABOUT

World Famous WRL TRANSMITTERS

Do what hundreds of smart amateurs are doing. Switch to a WRL Transmitter, still one of the world’s best buys. WRL offers the most liberal trade in allowances — the most flexible time payment plan. Small down payments — no interest charges if bill paid within 60 days. No red tape! It pays to deal with WRL — the world’s most personalized radio supply house.

Lea I. Meyerson, W9GFO
CJ, on 10-20-40 & 75 Meters

SEE US FOR

The latest 40 Meter Gear, including Genset Super Six — $52.50, and new Morrow SBR — $74.95.

We have in stock 40 Meter crystals, coils, antennas, Crystals for new 40 Meter Phone Band. 7200-7300 K.C. — $1.50 ea.

40 AND 15 METER
Amphenol Folded Dipole Antennas
15 or 20 Meters — $8.00 ea.
40 Meters — $7.80 ea.

We have the new Hackensahl HQ 140X receiver with speaker... $279.00

New Hylite 15M Beams in Stock
2 Element — $45.50
3 Element — $59.00

SEND NOW!

FREE 1953 WRL CATALOG

WRL 165 WATT GLOBE CHAMPION TRANSMITTER

Wired $349.50

WRL 400 WATTS (Phone-CW) GLOBE KING TRANSMITTER

Wired $495.00

HAMS PREFER

THE WRL GLOBE SCOUT

(50 Watts CW — 40 Watts Phone)

Latest triumph of the WRL engineering staff. A beautiful, compact XMT, completely self-contained, including power supply — 8N x 141/2W x 81/2D. Contains new 6146 tube in final, covers 160M thru 10M. Metering provided for final and final plate circuits. Complete kit includes all parts, chasis, panel, power supply, cabinet, tubes, meter and one set of coils. Can be used for mobile work with suitable power supply. (Auxiliary socket provided.) Ideal XMT for the novice or experienced ham.

KIT FORM
(Incl. all parts & tubes)

WIRED

By our engineers

$89.95

$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 — $2.75

Quality crystal microphone and stand — $10.17

Signal R-50 Key — $1.43

40 Meter Coils for new 40M Phone Band — $3.00

"GLOBE KING XMT REALLY GETS OUT!"

Writs Dr. Charles L. Meistroff, of Richmond, Virginia

"Haven't had any trouble in matching the Globe King to anything or in getting out. Buried here in the midst of a noisy business district it does more than just make the grade for minimum requirements. It is so individually characteristic that when the unmodulated carrier is on, the boys know it's the Globe King that is on the air. No TVI either in the video or audio phase. My beam and antenna farm is located on the roof of a TV and electrical appliance store. That's proof enough, that is all that's needed. Happy with it and glad I have a Globe King."

Signed C. L. Meistroff. W4TFA

Dr. Meistroff with his Globe King.

WRITE FOR DETAILED SPECIFICATION EQUIPMENT SHEETS

World Radio Laboratories, Inc. 744 West Broadway Council Bluffs, Iowa

Q-8

Please send me:
□ Globe Scout Info
□ Globe King Info
□ Globe Champion Info

□ New Log Book 25¢
□ Free Catalog
□ Used Equipment List
□ Radio Map 25¢

World Radio Laboratories, Inc.
744 West Broadway
Council Bluffs, Iowa

Name ____________________________

Address ____________________________________________

City ____________________________ State ____________

WRL REFERENCE MAP

25¢ HANDY WALL SIZE

WRITE FOR DETAILED SPECIFICATION EQUIPMENT SHEETS

PHONE 7795

World Everything in Radio
LABORATORIES
COUNCIL BLUFFS, IOWA

111
TOWERS
by
TRYLON

Amateur radio types • Guyed towers for
FM-TV antennas • Vertical radiators • Micro-
wave towers • Commercial communication
towers • Transmission line supports, etc.

Completely fabricated by the most
modern methods by 20-year tower spe-
cialists, Trylon towers offer top value for
any installation—commercial or ama-
teur. Special design and construction
features assure maximum dependability.

WIND TURBINE COMPANY
WEST CHESTER, PA.

CRystal COntrolled
CONVERTER

For Two Meters

MODEL
RC-1B

$45.00
NET
(Complete, with
power supply, crystal,
and all tubes)

Converter for 144 mc., complete with built-in
power supply, crystal, tubes, output cable
and input fitting for 52, 75, or 300 ohm line,
$45. Now available at leading distributors.
Specify input impedance when ordering.

Crystal Converter for Collins 75A2 $65.00
For further information, write Dept. Q-B

SUMMIT ELECTRONICS
LABORATORIES, INC.
393 No. Pearl Street  Albany, New York

umer to fit the cylindrical undersurface of the
radials.

The other two braces are shaped in the same
manner—except that both ends of each must
be flattened in the same plane. Also, it is neces-
sary to angle the lower ends of the latter two
braces to make them lie flat against the 2 × 4.
Don’t drill the bolt holes through the lower ends
of the last two braces—nor through the upper
ends of any of the braces—until you have each
end properly shaped and fitted. You will find
that angling and shaping the braces will throw
prematurely-drilled holes out of line. As soon as
each brace is shaped and drilled, the proper point
for the corresponding bolt holes in the radials
themselves can be determined and drilled.

The guy wire from radial to radial prevents
horizontal play. We used galvanized baling wire
salvaged from bundles of asphalt shingles. Any
weather-resistant wire that won’t stretch will
do the job.

Along about this point on our first antenna,
DeCamp barged into the back yard, slide rule
under his arm. We produced the sheet of calcu-
lations that had taken us several hours and told
Bob we figured from his formulas that in order
to use 70-ohm coax on a ground-plane cut to the
center of the 10-meter ‘phone band, our 1½-inch
radials should be 8 feet 2 inches, our 1½-inch ra-
diator should be 7 feet 6 inches and our matching
stub should be 29 inches. He warmed up his slide
rule and announced we were a quarter-inch off
on our radiator.

Don’t cut radiator or radials until the con-
struction is complete. For only then can you
measure precisely upward and outward from the
point where the elements theoretically intersect
(see DeCamp’s article). This point is precisely
the center of the bolt that holds the two long
radials crossed together.

Although the “plain ground-plane” is bulky
—as what antenna above 6 meters isn’t?—it’s
easy to handle because it is comparatively light.
The construction may sound complicated but,
actually, it requires only a little elbow grease
and a careful eye. To switch around the old saw
—it’s easier done than said.

P.S.: Haven’t been lucky enough to be on
during the fleeting moments when 10 meters is open
during these days, so cannot report on this an-
tenna’s DX capabilities. But W2HGT reports
some nice QSOs with South Americans with his
model of same—with 45 watts.

Strays

The by-line of Beverly Dudley appearing in
this issue should cause old-time Leaguers a
reminiscent twinge. Just 25 years ago this
April Bev joined the roster of QST authors with
an article titled “Keying Master-Oscillator Cir-
cuits.” At that time, licensed as 9BR, he was
with the Chicago Evening Post as its Technical
and Radio Editor. Mr. Dudley joined the ARRL
staff in 1929 and served meritoriously for several
years in editorial and technical capacities.
EVER TRIED LOADING A MOBILE RIG?

it's easy with the

Johnson Viking Mobile

ALL BAND OPERATION
INDIVIDUALLY TAILORED COUPLING CIRCUITS
FIXED SERIES TUNED
PA TRIMMER

All stages metered and gang tuned... instant bandswitching, 100% modulation, sufficient audio gain for either high impedance or carbon microphones. The Viking Mobile is designed for maximum output on 75, 40, 20, 15, 11 and 10 meters. Maximum PA input: 60 watts at 600 volts; up to 30 watts with only 300 volts. VFO input and power provisions. Under-dash mounting—all controls readily accessible and visible. Chassis may be quickly removed from cabinet without disconnecting power cables.

Several power supply options permit using any 6 or 12 volt power equipment, however, the Viking Mobile kit may be obtained with a complete 500 volt, 200 ma. dynamotor power supply capable of delivering 50 watts amplifier input.

Write for your copy of the Viking Mobile Brochure 716, today!

E. F. JOHNSON COMPANY
210 SECOND AVENUE S.W.
WAUSAU, MINNESOTA

slender design
excellent response
new low cost

The New TURNER ADA 95D
DYNAMIC MICROPHONE

Here's the microphone that amateur operators everywhere have been waiting for... a slim, modern dynamic priced within your budget! Maximum sensitivity to voice is achieved through Alnico V magnets and moving coils. Frequency response, 70 to 10,000 cps; output level, -58db; standard 5/8" - 27 coupler swings microphone in 60° arc; satin chrome finish; 20 ft. removable cable set; choice of 50, 200, 500 ohms or high impedance. List price: ADA 95D...$35.00. With switch...$38.50.

THE TURNER COMPANY
917 17th Street N.E. Cedar Rapids, Iowa

Microphones by TURNER

In Canada: Canadian Marconi Co., Toronto, Ont., and Branches
Export: Ad. Aurora, Inc., 89 Broad Street, New York 4
NOTE THE NEW FEATURES OF THE
DOW CO-AX RELAY
FOR 52 OR 72 OHM LINE
Type 'N' or UHF Conn.
Capacity 1000 watts

FEATURES:
1. AC types entirely free of hum and are guaranteed equally as silent as DC.
2. Causes negligible change in SWR up to 100 MC.
3. Now available with type 'N' or UHF connectors.
4. Magnet coils entirely shielded.
5. Special type receiver connector automatically grounds receiver contact inside of connector during transmit and protects receiver from RF (Optional).
6. External SPDT switch (Optional).
7. Tongue pressure on contacts both AC and DC energized or de-energized, sufficient for all types of mobile service.
8. Overall length 4½", width 3".
AC types (all voltages). Amator net. $10.50
DC types (all voltages). Amator net. 9.50
Add $1.00 for SPDT external switch.
Add $1.00 for special type receiver connector.

THE DOW-KEY CO., INC.
WARREN, MINNESOTA

BC-221 Frequency Meter
(Continued from page 39)

should be something as follows:
3500.000 kc. 200 div.
3566.667 1700
3750.000 2500
4000.000 4800

Other useful, but weaker, zero-beat check points can probably be obtained at the following additional frequencies (kc.):
3333.333 3666.667 3800.000
3555.556 3700.000 3833.333
3714.286 3714.286 3866.667
3900.000 3727.273 3875.000
3615.385 3733.333 3888.889
3625.000 3709.629 3900.000
3636.364 3777.778 3928.571

Of course, if one is available, a standard-frequency crystal with multivibrator or other harmonic generator will come in handy for making the bandspread calibration, particularly if the marker frequencies occur at intervals of 10 to 50 kc.

An incidental advantage of the bandspread arrangement is that considerably smaller effective tuning capacitance is required than that used on the general-coverage frequency ranges. As a result, the amplitudes of higher harmonics are not too rapidly attenuated, and it has been found possible to use harmonics up to at least 32 Mc., instead of limiting operation at 20 Mc., as recommended for these instruments. By making use of the fundamental frequency, and the second, fourth, sixth, and eighth harmonics of the bandspread range, the BC-221, as modified for bandspread operation, will serve to give expanded scale readings for all amateur bands up to 32 Mc., except for the 11-meter band. The latter band may be covered, without the bandspread feature, by using the eighth harmonic of the general-coverage high-frequency range of the instrument. If necessary, a harmonic generator (such as a crystal rectifier) in the r.f. output circuit can be used to increase harmonic output for this band. By adding suitable amplifiers, the BC-221 frequency meter, as modified for bandspread operation, makes an excellent basic variable-frequency oscillator for the amateur transmitter.

In conclusion, one word of advice may be in order. The BC-221 is a precision instrument whose calibration is easily disturbed. To avoid unnecessary labor in converting the instrument for bandspread operation, make sure you understand thoroughly the circuit of your meter, as given in the schematic wiring diagram affixed to it, as well as its mechanical construction. Plan all steps fully before you begin operating on the instrument in any way. Finally, if you value your present BC-221 meter, do not undertake to make the modifications described unless you are competent with a slide rule as well as with a soldering iron. Like an alarm clock, the BC-221 is easier to take apart than to get operating properly.
Two for Two

Two excellent units for the ultimate in two meter mobile performance, the "222" transmitter, the "226" receiver. Both are small in size, both top performers. Built like good mobile equipment has to be built... sturdy, rugged... capable of withstanding vibration... highest quality, conservatively rated components... nothing marginal in either parts or circuitry. "222", "226", equipment with dependability as the design keynote.

FOR AMATEUR, C-D OR CAP SERVICES

"222"—2 METER TRANSMITTER

Net 89.50

"226"—2 METER RECEIVER

Net 99.50

"226" RECEIVER: Freq. range 143-149 mcs. 2-RF, (SAQ5's) 2-I.F., with 6 tuned circuits. Shunt-type noise limiter. Antenna trimmer. 7 tubes plus OB2 voltage regulator for HF oscillator. Tunable.

"222" TRANSMITTER: Freq. range 144-148 mcs. Power output 5 to 7 watts into 50 ohms. X11 controlled. 6X8 osc-mult', 5763 mult', 2E26 PA, 2-6AQ5's plate mod.

At your dealer... or write direct for complete technical literature.

THE ROBERT DOLLAR CO.
COMMUNICATIONS EQUIPMENT DIVISION
50 DRUMM ST., SAN FRANCISCO, CALIF.

The RIGHT ANSWER

Yes, the right answer is yours—and in jig time—when you use an ARRL LIGHTNING CALCULATOR. Complicated, time-consuming computations go out the window.

Answers to many radio problems are obtained accurately and quickly!

IMPROVED: The ARRL Lightning Calculators have been "ruggedized," are better than ever. A tough plastic coating now protects the calculator surface from smudges, stains and discoloration. The indicator arm is heavier-weight Vinylite. Each calculator is shipped in a protective Cellophane envelope.

- TYPE A: Rapid, accurate and simple solutions of problems involving frequency, inductance and capacity.  - TYPE B: Direct-reading answers to Ohm's Law problems involving resistance, voltage, current and power. Either type, $1.25 each, postpaid.

THE AMERICAN RADIO RELAY LEAGUE, INC.
WEST HARTFORD 7, CONNECTICUT
BUY OF A LIFETIME!
TRIED AND PROVEN THE WORLD OVER

LETTINE 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, portatile or mobile operation. Even if you have a transmitter of your own you can't afford to miss this wonderful buy, direct from our factory, ready to operate.
The 240 is a 40 to 50 watt Phone-CW rig for 160 to 10 meters, complete with (8 x 14 x 8) cabinet, self contained A.C. power supply, MOBILE connections, meter, tubes, crystal and coils for 40 meters. Tubes: 616 osc. 207 final. 6L7 Crystal, tube amp., 6N7 phase inverter, 2 6L6's mod., 5U4G rect. Weight 30 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 set. 160 meter coils $3.60. Also for CAP, Broadcast, MARS, Marine, State Guard, Novice.
LETTINE RADIO MFG. CO.
62 Berkeley Street
Valley Stream, N.Y.

LOOK FELLAS!
BANDSWITCHING!
10, 11, 15, 20, 40, 80 METERS
BABCOCK MOBILE D-X MITTTER

Can be tuned up to switch between 2 of the 6 hands with 2 crystals in each band — then one of the 4 frequencies and the proper antenna may be selected by the 4-position switch with no further tuning required.

• No plug-in coils
• The 4 static fit inside transmitter
• 8¾ wide x 5½' high x 7½' deep
• Tubes: 6AQ5 osc-doub-quad, 6146 final amp. 12AU7 speech amp., 2 — 6AQ5 mods, Class A.B.
• Input to final amp. when using Babocke PS 4A power supply: 35 watts
• Complete metering, including RF output watts

PRICE $99.50
including tubes and connecting plugs, less crystals.
Write for Details
C & G RADIO SUPPLY CO.
2505-6 Jefferson Ave.
Tacoma 2, Wash.

Antenna Coupler
(Continued from page 47)
to the output terminals of the antennascope. Couple the input terminals to a grid-dip oscillator or other low-power variable-frequency r.f. generator. Set the antennascope dial at 50 ohms and the r.f. generator to the frequency of one of the antennas to be checked. Adjust the coupling or output power of the r.f. source for approximately full-scale deflection of the antennascope meter. Connect the feed line of the antenna to the proper coil of the coupler, using some trial degree of coupling. Switch in the proper link on the coupler. Now tune the condenser of the coupler for the greatest dip on the antennascope meter. If the meter does not go to zero, increase or decrease the amount of coupling to the antenna, readjusting the tuning condenser with each change to obtain the greatest dip. When the antenna coupling that results in the lowest meter reading is found, leave this and increase or decrease the coupling of the link coil of the coupler to make a still greater dip if possible. This adjustment should bring about a complete null if the input impedance of the antenna feed line is nonreactive. If a complete null cannot be found, the antenna or its feed line need adjustment. The antennascope may be used for this purpose also. The above procedure should be repeated for each antenna to be used with the coupler, and a record kept of (1) the tap or link position of the feed line, (2) the coupler-link position, (3) the condenser-dial settings for various frequencies in each band. This record will make it possible to return quickly to the correct

<table>
<thead>
<tr>
<th>Band</th>
<th>Antenna Coupling Link</th>
<th>Coupler Link</th>
<th>Cond.</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-element</td>
<td>1-turn link</td>
<td>Maximum</td>
<td>20.0 7</td>
</tr>
<tr>
<td>10 m.</td>
<td>beam, 75-</td>
<td>75 meshed</td>
<td>possible</td>
</tr>
<tr>
<td>ohm coax</td>
<td>at center of</td>
<td>coupling to</td>
<td>29.0 6</td>
</tr>
<tr>
<td>feed line</td>
<td>Lc</td>
<td>Le</td>
<td>29.2 6</td>
</tr>
<tr>
<td>¾-wave</td>
<td>Clipped to</td>
<td>5% of</td>
<td>14.0 63</td>
</tr>
<tr>
<td>lobed dipole</td>
<td>Lc ¼ turn</td>
<td>maximum</td>
<td>14.1 62</td>
</tr>
<tr>
<td>20 m.</td>
<td>each side of</td>
<td>possible</td>
<td>14.2 60.5</td>
</tr>
<tr>
<td>ohm feed</td>
<td>center tap</td>
<td>coupling</td>
<td>14.25 60</td>
</tr>
<tr>
<td>line</td>
<td></td>
<td></td>
<td>14.3 66.5</td>
</tr>
<tr>
<td>¾-wave</td>
<td>Clipped</td>
<td>+40 db of</td>
<td>14.35 66</td>
</tr>
<tr>
<td>lobed dipole</td>
<td>across 3</td>
<td>possible</td>
<td>14.4 65</td>
</tr>
<tr>
<td>40 m. pole, 200 ft.</td>
<td>coupling to</td>
<td>7.2 12.5</td>
<td></td>
</tr>
<tr>
<td>ohm feed</td>
<td>cold end of</td>
<td>Lc</td>
<td>7.2 12.5</td>
</tr>
<tr>
<td>line</td>
<td></td>
<td></td>
<td>7.2 12.5</td>
</tr>
<tr>
<td>¾-wave at</td>
<td>One end</td>
<td>Maximum</td>
<td>7.0 14</td>
</tr>
<tr>
<td>75-</td>
<td>3.5 Ma.</td>
<td>clipped on</td>
<td>possible</td>
</tr>
<tr>
<td>80 m. directly</td>
<td>hot end of</td>
<td>coupling to</td>
<td>3.7 74.5</td>
</tr>
<tr>
<td>end fed</td>
<td>Lc</td>
<td></td>
<td>3.8 69.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3.9 65</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4.0 60.5</td>
</tr>
</tbody>
</table>

settings when antennas are changed. (See the accompanying table for representative values of coupling.)

Don't worry if the coupler is slightly off resonance when adjusted by the above method. This

(Continued on page 118)
You will benefit 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 county areas that surround the Bendix Radio plant.

Write, Wire or Phone
MR. E. O. COLE
Dept. K

Bendix Radio
DIVISION OF BENDIX AVIATION CORP.
Baltimore-4, Md. Phone: VALley 3-2200
Makers of the World's Finest
Electronic Equipment


Johnson BI-NET
FULLY AUTOMATIC
Mobile Dual Band Antenna Resonator

- one antenna
- two bands
- no switching

Dual mobile antenna loading network for 10 and 20 meter amateur bands. Mounted in the center of a standard mobile whip antenna, it enables the operator to change bands while in motion. Operation is completely automatic, no relays nor mechanical control required. After initial adjustment, the BI-NET requires no further attention. Now, for the first time, true bandswitching mobile operation is attainable.

The BI-NET is a tuning network consisting of two adjustable, low-loss inductors and a ceramic insulated fixed capacitor. Inductors are silver plated for maximum conductivity. The assembly is enclosed in a streamlined, weatherproof plastic housing and is equipped with 3/8 x 24 female threads at each end for antenna mounting. Overall size, 4-7/16" high, 5-5/16" long, 2 3/4" maximum width, weight 14 oz.

AMATEUR NET
$10.95

E. F. JOHNSON COMPANY
210 SECOND AVENUE SOUTHWEST
WAUSAU, WISCONSIN
NEW MOTOROLA
Home Unit Monitor Receiver

Now available—the new Motorola Monitor or Alert Receiver, for operation in the 25-50 mc, and 152-174 mc. ranges. Optional selective signaling, emergency 6 VDC power supply, and red-yellow-blue-white light alert cabinet attachments. Ideal for amateur, as well as public safety, civilian defense, industrial and commercial radio systems.

For further information write to:

Motorola
Communications & Electronics, Inc.
Amateur Sales Dept. - QST - Aug.
1327 W. Washington Blvd., Chicago 7, Illinois
Attention: Harry Harrison, W9LIX, Tel. Talyor 9-2200—Ext. 161

LOOK HERE, FELLOWS!

We will gladly pay the highest possible price for the purchase of any Heterodyne Frequency Meter as illustrated here, including the BC-221, the TS-173, the TS-174, the TS-175, and the TS-121.

Please write, giving complete information on make, model, and condition to:
WESTON LABORATORIES, Inc.
Littleton 3
Massachusetts

“BROADCAST OPERATOR’S HANDBOOK”
by Harold F. Ennes
2nd edition. Complete daily operating routine—inside and outside the studio. Valuable tips for veteran operators; indispensable for new operators. Solves the operating problems of studio and transmitter personnel. Only $5.40 at jobbers, bookstores or from

JOHN F. RUDER
Publisher, Inc.
480 Canal Street, New York 13, N. Y.

will be the case if the antenna feed line is not absolutely flat. Tuning the coupler slightly off resonance is necessary to produce an s.w.r. of 1 to 1 in the link line. The final amplifier of the transmitter should always be tuned to exact resonance, and loading should always be adjusted at the transmitter end of the link line so as not to upset the impedance match in the coupler, once this has been correctly set.

Exact adjustment of the links on the coupler is desirable, but not absolutely essential. Very little difference in results will be noticed if the coupling here is slightly incorrect, so if it is necessary to move the link when changing antennas, it can be returned near enough to its original position by eye. In most cases, the tightest possible coupling will be required.

It should be mentioned in conclusion that the coupler can, of course, be designed to permit operation on bands other than those mentioned. By using four times as much inductance (about twice as many turns) for $L_1$, the low-frequency coverage can tune to 80 and 160 instead of 40 and 80 meters. Similarly, the high-frequency coverage can be changed to tune to 40 and 80 instead of 20 and 40, or shifted toward higher frequencies to cover 6 and 10 meters, by a suitable change in the inductance of $L_2$. By making $L_1$ large enough to cover 80 and 160, it can also be made to cover 40 by shorting out about half the turns.

Silent Keys

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

W1BRK, George E. Hayward, Bridgewater, Mass.
W1BPJ, Clarence C. Townsend, Branford, Conn.
W1EBB, Ernest Tyron, Lebanon, Conn.
W1EFG, Ralph L. Buckley, West Seabrook, Me.
W1FJO, Joseph Dorrath, Brattleboro, Mass.
W2JSZ, Albert L. Baker, Summit, N. J.
W8DEH, Robert L. Louden, San Marino, Calif.
W8LJW, George O. Hamer, North Hollywood, Calif.
W9OSW, Edward G. Blosser, Willits, Calif.
W9FQS, Joseph J. Wilson, Santa Maria, Calif.
W7FJH, Frank P. McKay, Jordan Valley, Ore.
W7NVZ, Myron V. Everitt, Douglas, Ariz.
W7OBL, Roy P. Greisen, Seattle, Wash.
W7PBC, William L. White, Orting, Wash.
W9EOC, Murlin D. Hoover, Hicknell, Ind.
W9GEW, Frank C. Ahlgrim, Dowser Grove, Ill.
W9NWF, Glenn D. Obenheim, Logansport, Ind.
W9NHI, Emerson M. Eagleton, Canon City, Colo.
AC4YN, Reg N. Fox, Kallimpung, India.

Be a Radio Ham or Commercial Operator. Pass FCC code test in few weeks. Fascinating hobby. Good pay, interesting work in Commercial field. Same system used by radiotelegraph specialists. FREE book explains how Amateurs and Operators learn code and develop amazing skill and speed

EVERY MONTH . . .

More and More hams are buying their gear from W2FEU at Adiron-dack Radio Supply.

There must be a reason.

ADIRONDACK RADIO SUPPLY
185 Main St.
Amsterdam, N. Y.

Write Dept. Q8 for Catalogs

HY-LITE Antennae Inc.
242 E. 137 St., N. Y. 51, N. Y.
NOW! Only $10 Down!
Up to 15 Months to Pay!

Think of it! Just $10 down—and monthly payments on a 39 ft. tower are only $12.30. A big 61 ft. tower costs only $20.70 per month. Order yours today!

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

Widths of Base Equal to 1/3 Height

Vesto Towers are available in a wide range of sizes to meet requirements of amateur and commercial users alike. Note the low prices for these quality lifetime towers: 22-$184.00, 25$127.00, 33$149.00, 39$192.00, 44$208.00, 50$239.00, 61$259.00, 100$1,269.00.

Towers are shipped to your home knocked down. Pay FOB Kansas City, Mo., 4th class freight. Prices subject to change . . . so order now! Check or money order . . . or write for free information.

VESTO CO., Inc.
20th and Clay
North Kansas City, Mo.

RADIO and TELEVISION
Over 50 years N.E. Radio Training Center. Trains for all types FCC operators’ licenses. Also Radio and Television servicing. FM-AM broadcasting transmitters at school. Send for Catalog Q.

MASS. RADIO SCHOOL
271 Huntington Avenue
Boston 15, Massachusetts

LEARN CODE!
SPEED UP YOUR RECEIVING with G-C
Automatic Sender
Type S
$24.00 Postpaid

Housed in Aluminum Case Black Instrument Finished; Small—Compact—Quiet Induction type motor, 110 Volts—60 Cycle A.C.
Adjustable speed control, maintains constant speed at any setting. Complete with two rolls of double perforated tape. A wide variety of other practice tapes available at 50c per roll.

GARDINER & COMPANY
STRATFORD • NEW JERSEY

YL News & Views
(Continued from page 48)

Inga, YLRL Chairman for the tenth district last term, reports that to her knowledge the only other YLs in North Dakota besides herself are W6s APK BIC CVQ DPZ DBH and HIEZ. . . . Some California YLs consistently on two meters are W6s CEE FE4A JMS and PIF. . . .
W3RXJ, Irene, is chairman of the Washington, D. C. TVI Committee, and she has been re-elected Seny-Trenx, of the W3X Club. K26AAE, Sue, writes that K26AE AC CN DG DW KA LK4 and NL are regularly on 16 and 10 . . . OM K86AVO writes that his wife recently received the call K66AWL. Violet is ex-W5UGD. . . . Among the 410 persons present at the Fresno Hamfest were W6s FE6A GYQ JMS KJ6 LFR and PIF. W6KLNJ, Betty went back home with an Elmac transmitter. . . . One of W0HGT’s (Leonore) pupils in her grammar school radio class (see Nov., ’52, column) has dropped the “N” from her call, making W9UHE. Marie, at the age of ten, one of the youngest YLs to have her General Class license.

Armed Forces Day
(Continued from page 48)

TFT WCE, W4s MOP NIS ZCA, K4NRV, K6NRJ, W6s BYB NTE, W9s AKP and TCJ. Of these, W2WCE, W4MOP and W4ZCA made perfect copy.

NDS, Great Lakes, Ill., was copied by W2s JAV KLD PAI PAP, K2NRS, W3s FYW USA, K4NRY, W4OLL, W5USN, K5s AIR NKL, W6s GRW TCJ THE, W6s CHI and QHG. Of these, K5NCL, W9GRW, W9TCJ, and W9THE made perfect copy.

Ten stations copied NDW2, Salt Lake City, Utah. Apparently this station was not adjusted for standard shift. However, W6ITL, W6PQ, K6USN and K6USA made perfect copy and the following made readable copy: W6s CLW FLW L1J/7 YDK, K7NRL and W0UVL.

Conditions on the West Coast appeared to be fairly good; nine stations submitted perfect copy of the broadcast from NDW, San Francisco, California. These were W6s BV DOU EV FCS 1TH KY NSS OWP and ZII. Good copy was submitted by W4TAC/6, W6s AEE CLW FLW NYS SCQ and W7LQC/W7GPR.

An interesting feature was reported by W6CMQ. Official duties in the Navy prevented him from participating in reception of the broadcasts in the h.f. band. However, the text of the broadcasts was relayed to him by W6CLW on 147.85 Mc. This v.h.f. transmission was received during his absence on “automatic start” equipment. W6CMQ states “This equipment is common in the Los Angeles area. The reception of the Armed Forces Day test message by this means indicates another phase of amateur preparations to meet emergency requirements.”

RCA INSTITUTES, INC.
A Service of Radio Corporation of America
350 West 45th St., New York 18, N. Y.
OFFERS COURSES IN ALL TECHNICAL PHASES OF RADIO, TELEVISION, ELECTRONICS
Approved for Veterans
Write Dept. ST-53 for Catalog
WANTED COMMUNICATIONS and RADAR PERSONNEL
WHO WANT TO EARN $7,000 Per Year, Or BETTER

PHILCO TECHREP DIVISION
Offers Such Openings

FUTURE OPPORTUNITY AND JOB SECURITY
...are more than "sales talk" at Philco. Demands for our electronics installation and service work throughout the entire world have been coming to us with increasing regularity since 1941. This is YOUR best assurance of a future with us.

PLUS—OF COURSE
...the fact that in Civilian Radio and Television, PHILCO has led the industry for 20 years.

COMPENSATION IS TOPS!
Salary, bonus, subsistence up to $6,500 state-side and $7,500 foreign; PLUS, hospitalization, group insurance, profit sharing, retirement benefits, merit and faithful service salary increases and paid vacations.

TRAINING PROVIDED
Philco provides all necessary refresher courses and new courses, where required on new equipments, to insure your qualifications before assignment. Pay while training.

WRITE for complete details to
PHILCO TECHREP DIVISION
22ND & LEHIGH AVENUE
PHILADELPHIA 32, PA.

AN/APR-4 COMPONENTS WANTED
In any condition. Also top prices for ARC-1, ARC-3, APR-1, APR-5A, etc., TS-34 and other "TS-", and standard Lab Test equipment, especially for the MICROWAVE REGION; AR1-12, BC-291, BC-221, LAL, LAF, LAG, and other quality surplus equipment; also quantity Spares, tubes, plugs and cables.

ENGINEERING ASSOCIATES
434 Patterson Road Dayton 9, Ohio

Twice as EASY as Hand Sending
THE VIBROPLEX
Semi-Automatic

ORDER YOURS TODAY!
There's no arm-tiring effort, no nerve strain, no arm fatigue, when you send with this easy-working Vibroplex. Simple to operate. Simultaneously, each hand or any style of keying. Adjusted to any desired speed. And remember, only Vibroplex has "Soft Movement" that gives it the smooth, positive action and easy manipulation you want. No user key so easy on the arm. For better keying with less effort— insist on Vibroplex! Choice of five models, $13.95 to $29.95. Left-hand models, one dollar more. ORDER YOURS TODAY! At dealers or direct. Write for FREE descriptive folder.

THE VIBROPLEX CO., 833 Broadway, New York 3, N. Y.

COMCO Communications Systems with Customized quality

VHF-FM MOBILE PACKAGE
- VHF-FM mobile and base stations
- Remote control equipment & relay stations
- VHF-FM two-way aircraft equipment
- Aeronautical ground station equipment
- VHF-AM mobile unit for airport vehicles
- VHF antennas and other accessories

For details contact your nearest COMCO dealer

COMCO
Manufacturers of Professional Radio and Television Equipment
COMMUNICATION COMPANY, INC.
POMPTON, NEW JERSEY

121
V.H.F. Party Results
(Continued from page 61)

W6QN W6JU W6GJW W6GJH W6LW W6LX W6LQ W6IFC W6IL W6TV

W6QO W6VNH W6TVW W6ZQ/A W6UR W6OBQ W6WJ1 W6TTL W61WID/W1WID/W1/1 W6AZK W6LJN W6RWH W6MIL/W6PM QMN RUD W61WID/W1WID/1

W6QO/1 W6VNH/1 W6TVW/1 W6ZQ/A/1 W6UR/1 W6OBQ/1 W6WJ1/1 W6TTL/1 W61WID/W1WID/1/1

W6N/1 W6PM/1 W6QMN/1

W7OKY/1 W7NGW W7KE W7HJX W7HJX/1 W7HEP W7CBM W7AXS W7KO W7AXM/1

W7OKY/1/1 W7NGW/1 W7KE/1 W7HJX/1/1 W7HEP/1 W7CBM/1 W7AXS/1 W7KO/1 W7AXM/1/1

W6QW W6GQO/6 W6GNO/6 (W6NO/S) 1210-1211-10-AB W6YYM

W6QW/1 W6GQO/6 (W6NO/S) 1210-1211-10-AB W6YYM

W66QMV W6LWQ W6KNL W6HJ

W66QMV/1 W6LWQ/1 W6KNL/1 W6HJ/1

W66QMV/1/1 W6LWQ/1/1 W6KNL/1/1 W6HJ/1/1

W66QMV/1/1/1 W6LWQ/1/1/1 W6KNL/1/1/1 W6HJ/1/1/1

W670N W6MWR W6GJH W6GJH/1 W6QKW W6QKW/1

W670N/1 W6MWR/1 W6GJH/1/1 W6GJH/1/1/1 W6QKW/1 W6QKW/1/1

W670N/1/1 W6MWR/1/1 W6GJH/1/1/1 W6GJH/1/1/1/1 W6QKW/1/1 W6QKW/1/1/1

W670N/1/1/1 W6MWR/1/1/1 W6GJH/1/1/1/1 W6GJH/1/1/1/1/1 W6QKW/1/1/1 W6QKW/1/1/1/1

ROANOKE DIVISION
Virginia W4GQ W4KQ W4AAO

ROCKY MOUNTAIN DIVISION
Colorado W9SKY W9GQ W9QX

SOUTHERN DIVISION
Georgia W4GQ/4 W4US W4QK

SOUTHWESTERN DIVISION
Arizona W7LE W7ZQ W7LW

WEST GULF DIVISION
Texas W5FW W5VF

CANADIAN DIVISION
Ontario VE3QV W6AO

HAM COUNTERMAN®
Ham wanted by large Northern New Jersey electronic distributor to work as radio parts counterman. Large ham business. Excellent opportunity for right man. Inquiries held in strictest confidence. Box 130, QST

POPULAR NATIONAL DIALS
ACN — the original design so popular with manufacturers, amateurs and experimenters who "build their own" and desire direct calibration, 5" H. x 7 1/2" W. $3.30 net. ICN — an illuminated version of the ACN, 5 1/2" H. x 7 1/2" W. $6.00 net. SCN — same dial scales as ACN in reduced size, 4 3/4" H. x 6 1/2" W. $3.00 net. MCN — scaled down dial, ideal for mobile installations and small converters, 2 3/4" H. x 3 3/4" W. $2.70 net.

National
NATIONAL COMPANY, Inc.
Malden, Massachusetts

*Technician.
#QG, Staff — not eligible for award.
#WQON, opr. #W7QHP, opr.
QST BINDERS

Keep your back issues of QST in a neat orderly way. No more fishing through a disordered stack of loose, dog-eared copies, digging for a back issue, and finding it the last one under the pile ...

- Holds 12 issues of QST
- Opens and lies flat to any page
- Protects and preserves your copies
- QSTs always available for reference

PRICE $2.50 postpaid
Available only in United States and Possessions

The AMERICAN RADIO RELAY LEAGUE, Inc.
WEST HARTFORD 7, CONN.

Evans RADIO
Service to hams • "YOUR FRIENDLY SUPPLIER"
by hams. Nationally accepted brands of parts, tubes and equipment. Trade-ins and time payments. Write W1BF.
10 HILLS AVENUE • CONCORD, N. H.

GET INTO ELECTRONICS
You can enter this uncrowded, interesting field. Defense expansion, new developments demand trained specialists. Study all phases radio & electronics theory and practice: TV; FM; broadcasting; servicing; aviation, marine, police radio. 10 month course. Graduates in demand by major companies. H.S. or equivalent required. Begin Jan., March, June, Sept. Campus life. Write for Catalog.
VALPARAISO TECHNICAL INSTITUTE
Dept. TN
Valparaiso, Ind.

SELSYS OR SYNCHROS WANTED
CASH for Navy or Army Ordnance type Selsyns or Selsyns 40 cycle types as follows:
$35.00 for 1DG, 1D, 1F, 1G, 1DF, 1CT, 1HG, 1HCT, 1HDG
$20.00 for 5DG, 5G, 5F, 5CT, 5D, 6DG, 6G, 6CT
$25.00 for 7G, 7F, 7CT, 7DG, 7HG, 7HCT, 7HDG

ALSO NEED—GE Selsyns Models 229A1, 229H1A, 229A1; Autosyns AX100 or 200 series; Delco Control Motors 49-7, 52-11, etc; Delco and G. E. PM Motors, Inverters, Tubes, and other Electronic Components. All merchandise Subject to Inspection.
Send Lists—Will Advise Price.

ELECTRO SALES CO., INC.
58 Eastern Ave. • Dept. Q • Boston 13, Mass.

AT ANY PRICE...
you couldn't ask for more
in a MOBILE TRANSMITTER!

40 WATT
BABCOCK
MOBILE
D-X MITTER
6 Band-Band Switching
—2 Bands (3.5–7.3 mc) (14–30 mc)
—2 Crystal Frequencies per Band
—Instantaneous Antenna Change-over
with LS-1 or LS-2 Units into 8 ft. whip

Features:
Finest Components available
6BK5 oscillator
6146 final amplifier
Complete Metering, including
Watts output into 52 ohm antenna load
Small Size—5½' hi., 8½' wi., 7' d.
Readily adaptable to mobile or home use

ONLY $99.50

HAM NET
Priced to Gain Volume Sales among
Distinguishing Ham Operators

PRICE INCLUDES TUBES

Write for Free Literature and name of your nearest dealer.

BABCOCK • RADIO ENGINEERING, INC.
7942 Woodley Ave., Van Nuys, Calif.

123
The No. 75012

PHASE-SHIFT NETWORK

The MILLEN No. 75012 network is a complete and laboratory aligned pair of phase-shift networks in a single compact 2" x 1 1/2" x 4" case with characteristics so as to provide a phase shift between the two networks of 90° ± 1.3° over a frequency range of 225 cycles to 2750 cycles. This unit is equally well adapted for use in either single sideband transmitting or receiving equipment. When used in a suitably designed transmitter it is possible to obtain a 40 db suppression of the unwanted sideband. The No. 75012 precision adjusted phase-shift network makes possible the building of single sideband equipment without the necessity of complicated laboratory equipment for network adjustment.
Speeding Electronic Progress through crystal research

The JK G-12 is a precision 100 kc G-T cut crystal intended for operation in Meacham Bridge and similar oscillators. Available for operation at series resonance or into large load capacities. Resistance approximately that of usual lamp used for amplitude stabilization, simplifying bridge circuit design. The JK G-12 is vacuum sealed. Equipped with octal base it is more convenient than usual “soldered-in” type of precision standard crystal. Suitable for transistor oscillators. Will fit JK 07EH temperature control unit. Consult us on specific applications.

Did you know? Surgical cleanliness during manufacture is an important reason for the unequalled stability of JK Crystals. In an airconditioned, dust-free plant crystal blanks are repeatedly cleaned with chemicals, washed in distilled water and spun dry — plain tap water or even a fingerprint would impair stability. The final crystal, vacuum sealed in a glass holder, provides stability equal to a watch that would remain accurate to within three seconds over a year’s time. Creative research combined with today’s most modern production facilities brings you today’s finest — JK "Crystals for the Critical".

THE JAMES KNIGHTS COMPANY, SANDWICH, ILLINOIS
the
best
in
UHF
INSULATION

CUSTOM MADE
TECHNICAL CERAMICS

For Electronic and Electrical uses

Sold only to Manufacturers

ALSiMAG®

52ND YEAR OF CERAMIC LEADERSHIP

AMERICAN LAVA CORPORATION
A subsidiary of Minnesota Mining and Manufacturing Company
CHATTANOOGA 5, TENNESSEE
you can’t log ‘em if you can’t hear ‘em!

No matter what else a receiver does, it must pull ‘em in! And that’s just what the NC-183D does! Compare its low sensitivity (on 6 meters) and extremely low noise level with the highest-priced amateur receivers made ($150 higher!) and you’ll see why you’ll hear more, log more on an NC-183D!

**COVERAGE:** Continuous from 540 kcs. to 31 mcs. plus 48 to 56 mcs. for 6-meter reception.

**FEATURES:** Two tuned R.F. stages, 3 stages of I.F. Voltage regulated osc. and BFO. Main tuning dial covers range in five bands. Bandspread dial calibrated for amateur 80, 40, 20, 15, 11-10 and 6-meter bands. Bandspread usable over entire range. Six-position crystal filter. New-type noise limiter. High fidelity push-pull audio. Accessory socket for NFM adaptor or other unit, such as crystal calibrator. $369.50*

**A WORLD-BEATER IN VALUE!**

What other receiver can match the features of the NC-88 at anywhere near its modest price?


$119.95*  

*Slightly higher west of the Rockies
Transmitter "Finals"
-100% Beam Power!

Check through the transmitter section of the new Mobile Handbook. You will find that every rig illustrated uses one or more beam power tubes!

Once again beam power tubes, originally developed by RCA, prove to be the choice of amateurs—for these very good reasons: RCA beam power tubes are versatile. They fit all types of transmitter operations, fixed-station or mobile. They offer better results with fewer stages, tubes, and components—operate efficiently with low-voltage power supplies. Take advantage of these features—and design a compact rig that goes places.

Stop in and see your RCA Tube Distributor about this great line of beam power tubes. He carries a complete supply in stock.